Citizen Engagement on the Environment

Scoping Review

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Executive summary

Defra has funded an innovative programme of work – Citizen Engagement on the Environment (CEE) - to understand the public's environmental attitudes, values and priorities and how they could be involved in informing environmental policy making and implementation in the future. To prepare for a 12 month programme of citizen engagement exploring these aims, this scoping report collates contemporary evidence on public attitudes to the environment and considers it alongside the relationship of those attitudes and public engagement approaches to policy making.

The report is intended primarily for an internal audience and is a working document for the CEE research team to guide and orientate their programme of delivery. We also anticipate the report will have wider resonance for policy makers and analysts across Defra and Natural England and non-governmental stakeholders to consider how this agenda connects to the areas they work in.

The findings developed are based principally on a Rapid Evidence Assessment (REA) with the following aims:

i. Explore public attitudes to environmental issues and what influences them
ii. Identify examples of successful approaches to engaging the public in environmental issues

From an initial search of 1,211 potentially relevant items (in academic and grey literature), 131 items were read at full text. A Weight of Evidence rating was applied and 37 of these items were then sythesised and included in our findings. The research team also has relevant contextual research knowledge of the areas in our enquiry and so we included some further studies in call boxes throughout.

Whilst the respective evidence bases related to this enquiry have different histories, geographies and primary sources we usefully bring them together – and to the degree possible, this analysis has allowed us to (a) examine how publics themselves understand or define the environment as well as the factors that influence attitudes, (b) extend the enquiry on attitudes to also focus on behaviours as the two are often discussed together but driven by different things, (c) explore how public engagement has interacted with environmental policy making and (d) review what makes a difference to people's points of view when they participate in such processes.

Summary of findings relating to public attitudes

- People think about the environment in multiple ways, rather than through a universal definition. The environment is linked to ideas of offering services and benefits that enrich people's lives as well as through positive associations and connections. However, people tend to priotise environmental issues that are local to them rather than at larger spatial scales.
- Predominant factors influencing public attitudes to the environment include the information they have access to, their own personal experiences, their values and

beliefs and the severity and promixity of an issue. We also identify the 'intention-behaviour' gap that can manifest particularly strongly for environmental issues.
- Separate factors influenced behaviours with respect to the environment including environmental concern, self-interest, perceptions of personal efficacy and cost and convenience. Some of these factors were contradictory – with findings suggesting environmental 'citizenship' is vital for the public to consider their responsibilities with respect to environmental protection, and this contrasting with feelings of low personal efficacy as a reason not to take action.

Summary of findings relating to public engagement

- The evidence demonstrates a spectrum of engagement from consultation on pre-defined policy options to participants deciding what should be on the agenda. These different forms of engagement produced different policy level results and had different impacts on the publics involved – with more deliberative approaches associated with influencing participant understanding of and attitudes to a topic.
- Stakeholder or policy level input into the framing of engagements as well as making commitments to the outcomes of discussions were enabling factors in influencing policy decisions.
- The sources of information used for engagement matters. The evidence suggests pros and cons in using scientific information which can be considered distant and unrelatable compared with information derived from more experiential techniques, e.g. storytelling.
- There is some evidence that engagement that incorporates participants taking action and underlining personal responsibility were effective at influencing behaviour change.

This report concludes by drawing these findings together, highlighting the merit of exploring people's underlying views and values to learn more about what can drive action and the promise of public engagement approaches in informing environmental policy making. We then consider the implications of these points for the next phase of our project delivery.

1 Introduction

The Government has committed itself to an ambitious environmental agenda in its 25 Year Environment Plan (25YEP)[1], with a goal to 'help the natural world regain and retain good health'. The plan seeks to tackle environmental challenges such as air and water pollution, waste, environmental hazards, climate change, and the destruction of natural resources. The plan considers the environment through the lens of 'natural capital', which emphasises the benefits that the natural environment offers people and the country at large. Based on the 25YEP and the central concept of natural capital, the Government is in the process of drafting its first Environment Bill in 20 years[2]. Defra Secretary of State, Michael Gove, has called this an 'unfrozen moment'[3] which provides an opportunity to reshape policies on a host of environmental issues – including agriculture, land use, biodiversity, woodlands, marine conservation, fisheries, pesticides, chemicals regulation, animal welfare, habitat management, waste, water purity, air quality and others.

The decision to leave the European Union may also provide opportunities to further reshape environmental policy including for example in the areas of agricultural, land management and fisheries policy.

In this context, implementation of the Government's environmental agenda is complex, and will involve many decisions over a significant period of time. In order to inform those decisions and achieve the Government's objectives, policy development, implementation and delivery will require good understanding of public attitudes, values and behaviours, and to identify the associated synergies and trade-offs.

This also requires an understanding of how the public can or want to be involved in related decision making. In recent years, a turn to public participation in UK policy making has led to an increase in spaces that allow policy makers and citizens to come together in a range of ways. This has included expert panels, consultations, online engagement and forms of shared governance. Such opportunities also represent an important shift in improving the quality of decision making and trust in public institutions and as Fox and Stoett (2016) identify, top-down translation, without widespread public input, can lead to policies that disregard local priorities and specific contexts. In environmental policy making (see Berry et al. 2019; Devine-Wright 2005; Eden 1996; Fischer 2000 for useful summaries), particular reliance on scientific experts as vital sources of evidence can obscure other considerations from public debate, such as accountability, equity and other values. Participatory processes can also mobilise non-scientific perspectives on issues that can offer social legitimacy to policy decisions (Fischer 2000). Forms of public participation can support not just policy development but also be valuable in mediating policy controversies (see for example, Walker et al. 2018).

[1] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/693158/25-year-environment-plan.pdf

[2] The scope of the future Environment Bill is currently being developed, but as the bill is likely to be discussed during the lifetime of the project, citizen engagement events might address this topic.

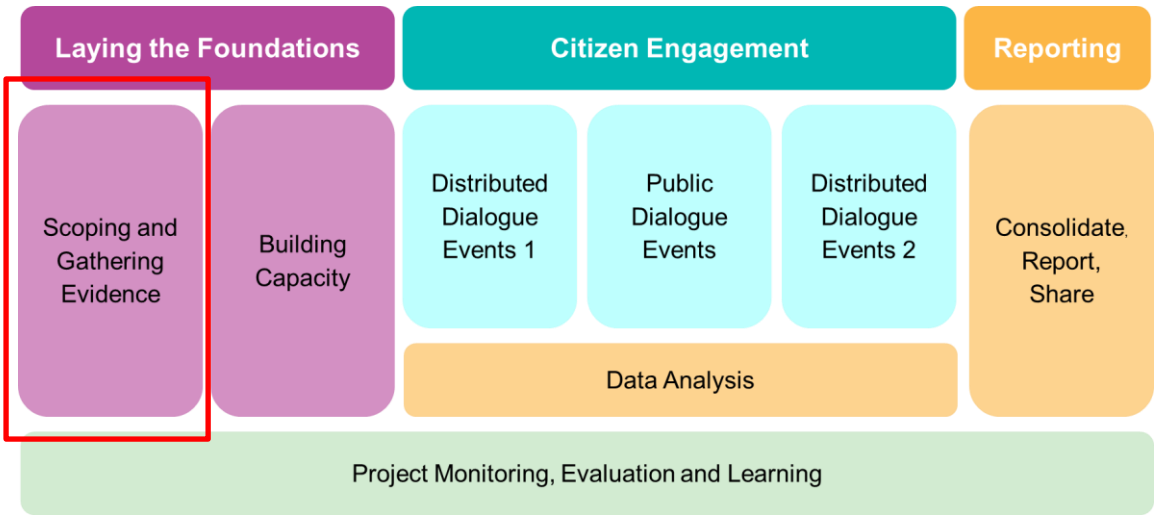
[3] https://www.gov.uk/government/speeches/the-unfrozen-moment-delivering-a-green-brexit

Accompanied by a range of analogous terms and practices, including both citizen and public engagement – the terms we have adopted for our project, it is important to recognise that different approaches reflect different circumstances and possibilities for engagement – from consultation to co-production.

1.1 Citizen Engagement on the Environment

Citizen Engagement on the Environment (CEE) is the programme of research and citizen engagement commissioned by Defra to respond to this context; to understand the public's environmental attitudes, values and priorities and how they could be involved in informing environmental policy making and implementation in the future. To do so, the programme combines a review of the existing evidence in these domains with a series of citizen engagement events (see Figure 1.1 for a summary of the main stages of the programme).

Figure 1.1: The CEE programme



The purpose of this report is to set out the findings from our scoping and evidence gathering. The aims of this phase were to generate insight on (a) public attitudes to the environment and what influences them and (b) approaches to public engagement on environmental issues to inform the design of our citizen engagement events in 2019-2020.

This phase has involved:

- engaging with Defra to refine our programme level research questions
- conducting a Rapid Evidence Assessment (REA) and;
- asking the public two questions through the NatCen Panel[4] in February/March 2019.

[4] The NatCen Panel is a research panel of nearly 4,000 people in Britain, recruited via the British Social Attitudes survey, using a random probability sampling method.

1.1.1 Research Questions

The development of our research questions was the first stage in our scoping work and intended to offer a framework across the life of the project and its different delivery phases. They are as follows:

1. **In what ways do publics' conceptualise and attach value to the environment?**
    a. What is important to the public about the environment?
    b. What are their visons, futures and priorities for the environment?
2. **What are the factors influencing public attitudes to environmental issues?**
    a. Does context have an effect on these factors?
    b. Are there factors which are influential in particular policy areas?
    c. How do publics' respond to trade-offs and tensions in environmental policy making and between environmental issues and other priorities?
3. **What are the different ways publics' can engage with environmental issues and policy making?**
    a. How can different types of engagement activities connect public views to decision making?
    b. What/who are the key influencers on people's decisions?

These questions are based on the aim of the CEE project and are necessarily 'high level' in order to be relevant at different stages of the project and intended to be drawn on in the context of this delivery (See Appendix F). The questions are oriented to help us examine underlying values and approaches with respect to the environment, rather than to explicitly generate data mapped to particular policy areas or government responsibilities. Across all three questions, we are also interested in how segmentation can help to differentiate intelligently between different groups. These questions also relate to existing bodies of literature which was helpful to develop the questions and focus of the REA (see 1.1.2 below).

1.1.2 Rapid Evidence Assessment (REA)

A Rapid Evidence Assessment (REA) combines a systematic approach to searching, quality assessment, and synthesis of an evidence base with a focused reading of the material as it relates to the specific research questions that have be generated to guide the searches. These features ensure that we can identify relevant literature on public priorities and perceptions about the environment and environmental policy as well as public engagement through a rigorous evidence review. Chapter Two covers the detail of the method as well as the results from our searches. Chapter Three presents the findings of the REA.

In addition to the REA process, we had the opportunity to add two survey questions to the NatCen panel's fieldwork for February 2019 that would complement our enquiry. We asked participants to (a) select three environmental issues they considered most important (from a provided list[5]) and (b) the extent to which they thought different groups

[5] These were: Decline or extinction of species and natural environments; Shortage of drinking water; Extreme weather events (e.g. frequent droughts or floods); Pollution of rivers, lakes and

of stakeholders[6] took their views into consideration when making decisions about the environment.

The conclusion to this report draws from the synthesis of these combined findings to identify implications for our research project as a whole.

Finally, a note on language. Whilst we don't provide specific definitions of the environment, citizens or public engagement at the start of this report, we do use associated terminology interchangeably throughout depending on the language used in the relevant evidence. This includes the terms:

- environment, nature and natural landscapes
- citizen and publics
- engagement, public dialogue, consultation and deliberation

We note the contested nature of these definitions, in both research and policy spaces, and that they can often mean different things to different people.

ground water; Pollution of the sea; Air pollution; Noise pollution; Climate change; Growing amount of waste; Agricultural pollution (use of pesticides, fertilisers, etc.) and falling soil quality.

[6] These were: Big companies and industry; Your local community; Your city/metropolitan authority; The government.

2 Rapid Evidence Assessment

2.1 Methodology

Our approach to conducting this REA was shaped by best practice from authoritative sources including the Cochrane Collaboration's MECIR Conduct and Reporting standards[7]. It has three key features: transparency in how the evidence review is conducted throughout the different stages; a rigorous approach to identifying and reviewing the evidence; and working collaboratively with Defra across the review stages to ensure our approach is fit for purpose. Our criteria and processes for determining study inclusion, data extraction and synthesis of findings are summarised in the sections that follow.

The aims of the REA were to:

i. Explore public attitudes to environmental issues and what influences them
ii. Identify examples of successful approaches to engaging the public in environmental issues

The overall objective of the review was to identify and synthesise information from academic studies and unpublished (or 'grey') literature that addressed our particular research questions. A REA is a quick, bounded, question driven evidence gathering exercise, and as noted in the introduction, whilst we identified research questions for the programme as a whole, we needed to tailor them to the REA to fit with the method's parameters.

We did this by grouping questions into our two main domains of enquiry and focusing on definitions and ideas that already existed in bodies of literature (see Table 2.1).

Table 2.1: REA research questions

Public views and attitudes on the environment	1. How do publics' conceptualise the environment? 2. What are the factors influencing public attitudes on environmental issues?
Approaches to public engagement on environmental issues	3. How can different engagement approaches interact with environmental policy decisions? 4. What and who influence people's attitudes and decisions on the environment when they are participating in different forms of public engagement?

The REA aimed to answer these research questions through in-depth analysis of 30 papers (academic articles and grey literature reports) identified through database and

[7] http://community.cochrane.org/mecir-manual; https://campbellcollaboration.org/library/campbell-methods-conduct-standards.html

website searches, as well as relevant papers identified by the client in the original project specification.

2.1.1 Search Strategy

Searches covered relevant peer reviewed publications from EBSCOhost[8], a search platform encompassing a wide range of academic databases with a variety of journal titles. We also searched for grey literature from a selection of websites and online repositories covering both domains of interest (available in Appendix B). Websites were selected with input from the research team and Defra networks. In addition to the grey literature and academic articles retrieved through systematic search, we also screened and included relevant studies from the sources identified by Defra in the research specification.

Academic database searches were conducted by applying a series of search strings based on the research questions. Grey literature websites were examined using condensed search strings comprised of keywords (a detailed search strategy is available in Appendix C). Depending on the number of search hits returned as a result of this process, it is common when conducting a REA to limit the number of items to be screened at the next stage. The large number of hits returned to our four question searches meant we decided to limit screening to the first 200 items at title and abstract.

2.1.2 Screening process

We selected items for screening at two stages: title and abstract, and full-text. Prior to each stage, screening tools were piloted by a group of reviewers to promote consistency and inter-screener reliability.

At the first stage, 1,084 academic studies from the database searches were screened at title and abstract level using Abstrackr software, which uses machine learning algorithms to determine which studies are likely to be relevant to a review and which are not. This software learns from inclusion and exclusion decisions made by the research team and prioritises more relevant papers for screening. As the websites and online repositories did not facilitate the easy import of search results into Abstrackr, the grey literature papers were downloaded and screened directly against the inclusion criteria (listed in the next section). Academic papers that were marked for inclusion (n=112) were manually downloaded as PDF files and progressed to the full-text stage.

The second stage of screening examined each document at full-text level. We systematically recorded the characteristics of each study according to the inclusion criteria to allow for further prioritisation. Each study was also assigned a weight of evidence score, which considered the general quality of the writing; the strength and justification of the methodology; and the relevance of the study to the four research questions we set out earlier (see Appendix E for a template with weight of evidence criteria). Due to the large volume of studies included at the title and abstract stage, not every study was screened at full text. To remedy this, we used separate date cut-offs for the four research questions, which produced a subset reflecting the distribution of evidence for each question.

[8] https://www.ebsco.com/products/ebscohost-platform

Finally, the third stage involved prioritising the remaining included studies to produce the final 30 that would undergo data extraction and analysis. This did not include the grey literature texts identified in the original research specification, which were automatically included at the final stage.

2.1.3 Criteria for including and excluding studies

There were several criteria used to determine inclusion and exclusion decisions at both title and abstract and full text review, which are set out below in no order of priority.

Time frame
We included papers published in or after 1997, to capture the increase in environmental literature that followed the signing of the Kyoto Protocol, as well as recent evidence that reflected up to date environmental attitudes, which are subject to constant change over time.

Geographical location
We prioritised papers set in the United Kingdom to address our specific legislative and social context. Due to similarities in setting and potential for transferability of results, we also included studies set in Germany, the Netherlands, Denmark, Sweden, Norway, Finland, the United States, Canada, Australia, and New Zealand. Studies set in other countries were excluded.

Study focus
Studies were included if they focused on our substantive areas of interest, as mapped out in the research questions:

i. Public conceptualisations of the environment and the factors that influence public attitudes towards the environment

ii. Public engagement approaches – the different ways publics have engaged with environmental issues, how these approaches interact with environmental policy and decision making and the factors that influence public attitudes during these processes

To do so, studies needed to have reported on public attitudes and/or public engagement approaches in relation to 'the environment'. This was defined both in terms of the specific issues asked about in the NatCen Panel questions (which reflect those in the 25YEP) and the environment in broader terms.

Types of study designs
We included primary studies and reviews of evidence. Other types of documents, such as opinion pieces or policy documents were excluded.

Access
Papers must have been available online in English and accessible to NatCen through academic library credentials. Books and papers with dead links or that were behind paywalls were excluded.

2.1.4 Study prioritisation

After full-text review, the number of relevant studies exceeded 30 and a prioritisation heuristic was used to reduce this number down to the 30 studies to be included in the evidence synthesis. In order of importance, studies were prioritised based on the criteria below. Again, we selected studies corresponding to each of the four research questions related to the volume of overall evidence available for each question. (These prioritisation criteria did not extend to the papers identified through the research specification, as all that addressed our research questions were included in analysis).

Publication date
Most recently published studies were prioritised, to capture contemporary attitudes, and based on the assumption that recent literature would build on earlier evidence.

Study design
We prioritised studies using qualitative methods. Existing evidence on public attitudes in particular tends to be quantitative, and so this REA was an opportunity to prioritise qualitative studies to give a deeper insight into the many ways the public conceptualise the environment and the wide range of factors that affect their attitudes. In addition, qualitative research corresponds to the methods that will be used in the later stages of the CEE programme, and so it was important to identify gaps that could be addressed.

Setting
Studies published in the UK were prioritised in line with the project's scope and interest in UK citizens' attitudes towards the environment.

Environmental focus
We prioritised studies that discussed 'the environment' as a whole or environmental issues in general over those that addressed single issues, e.g. only air quality.

Weight of evidence score
Studies that scored highly in terms of general quality, appropriate study design, and relevance to our specific research questions were prioritised.

2.1.5 Data extraction and synthesis

Data extraction was completed using a data extraction tool that was piloted before use to ensure inter-researcher reliability. Extracted data included basic descriptive information relating to the study, as well as any findings relevant to the review's research questions (see Appendix D for the data extraction template). For questions 1 and 3 the extraction took an inductive approach where, rather than looking for a specific piece of information, the extraction summarised all available information relevant to the topic, to look for themes across the evidence.

Synthesis was completed using NatCen's 'framework method,' where columns represent key themes and rows represent pieces of evidence within a matrix. This method had the advantage of linking summarised evidence to the relevant research question as well as to the source document, which enables the content for each question to be easily viewed and interpreted. Once all information was systematically mapped, the summaries were

analysed in relation to the key themes and issues of the review. We also identified gaps and limitations in the evidence base in relation to the research question.

2.1.6 Limitations in the review process

The REA methodology is designed to efficiently locate and synthesise a body of relevant literature, often within a narrow timescale. Because of this, only a limited proportion of papers were reviewed at full text and included in synthesis and reporting. This was in particular the case for papers addressing question 2, which covered a well-researched topic area. The findings presented are therefore based on a proportion of all includable studies and do not comprehensively summarise all existing evidence. They should be interpreted as a synthesis of the most relevant and up-to-date evidence on the research topics.

2.2 Results

Figure 2.1 summarises the screening and inclusion processes. A list of included studies is provided in Appendix A.

- **Grey literature:** 41 websites were searched, and 112 documents retrieved based on title relevance. Of these, 54 were screened at full text and 12 prioritised for inclusion.

- **Academic literature:** EBSCOhost search covered ten individual academic databases, and yielded 1084 documents for title and abstract screening, of which 62 were brought forward to full-text screening and 18 prioritised for inclusion.

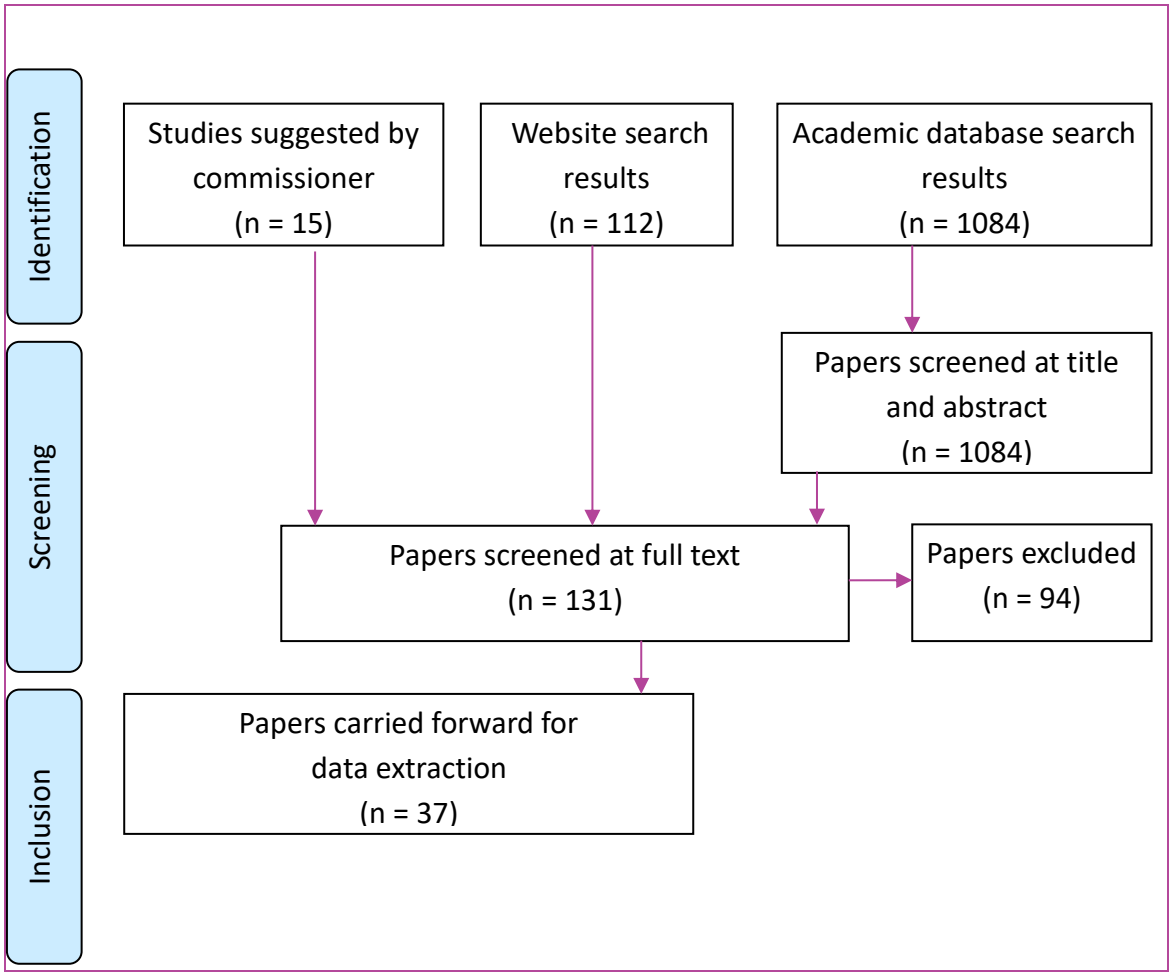
- **Sources identified by client:** 15 texts cited in the research specification were screened at full text and seven included at the data extraction stage.

Relevance to the research questions was distributed as follows[9]: 13 papers were relevant to question 1; 19 papers were relevant to question 2; nine papers were relevant to question 3; nine papers were relevant to question 4.

The following section summarises and synthesises the findings by research question and outlines the gaps in the evidence base.

[9] One paper could be relevant to several questions.

Figure 2.1: The screening and inclusion process



3 Findings

This chapter introduces the findings of our evidence search against the questions identified in Chapter 2 which fall in two main domains.

Public views and attitudes on the environment	*Approaches to public engagement on environmental issues*

The findings relate to the evidence reviewed in these areas and are structured by research question. This has allowed us to examine how publics themselves understand or define the environment as well as the factors that influence attitudes. We have extended the enquiry on attitudes to also focus on behaviours as the two are often discussed together but driven by different things and allows some consideration of how the public view potential trade-offs.[10] We have also explored how public engagement has interacted with environmental policy making, noting that different approaches have different aims, and we have reviewed what makes a difference to people's points of view when they participate in such processes. All studies presented are from the UK unless otherwise specified. Whilst we were also interested in reflecting on how findings could be differentiated by group characteristics, we were not able to draw many clear conclusions from the evidence reviewed.

As outlined in Chapter 2, the REA method has restricted our search and synthesis of evidence closely to specific questions and contemporary literature in our topic areas. As a research team we have a wider knowledge of these cores issues and so have supplemented, through the use of select call out boxes, additional key concepts and ideas that further contextualise the REA evidence in our particular project.

3.1 Conceptualising the environment

Key Findings

The environment is understood by the public in three main ways:

- As natural spaces that provide 'services' that improve wellbeing
- As familiar places people are attached to, often through memories and emotional connections
- Through visible and specific environmental issues

This section will discuss the evidence reviewed in relation to how publics conceptualise the environment. The aim of this section of the review was to identify the different ways that people understand the 'environment', as well as the types of environmental issues perceived to be the most important to them.

[10] The focus of the evidence in both these sections is on the factors that affect these, rather than a discussion on what they are.

3.1.1 Defining the environment

There was a limited amount of evidence included in the review that focused specifically on what the public think the environment is. However, in the studies where concepts and definitions of the environment were discussed, it was predominantly understood in terms of something able to provide certain benefits and unique experiences. Natural landscapes were identified as one of these benefits, providing a place to 'escape' to and thought about as a source of wellbeing, locating people's understandings as also relevant to the relationships they had with the environment.

The Natural Environment

The evidence from the grey literature was most relevant here as many of the reports discussed the meaning of the environment as 'natural' and interrogated public perceptions of nature. A key finding is that the 'natural environment' is often understood in relation to particular landscape features. A Natural England report (2009) shows how the public associate nature with greenery, vegetation and rural landscapes. Features such as fields and hedges are perceived as 'natural', despite being the result of human intervention. However, respondents in the study did associate environments that are less populated and more removed, such as moorland and mountain environments, as the most 'natural' or 'wild'.

Definitions of, and meanings associated with nature are also explored to some extent in the reviewed evidence. For example, a report published by Defra (2018) that sought to understand the meaning of pollinating insects to the public, highlights that people perceive the process of pollination and pollinators themselves as inherently 'natural'. They saw nature as an 'interconnected whole', that humans are a part of, but which they share with other living creatures. Whether people and the natural environment exist and work alongside each other, or whether nature is something external to humans is also touched on in a report that brings together the findings of a public dialogue on the National Ecosystem Assessment. For example, some of the dialogue's participants described the natural environment as an 'external threat' that had the potential to overpower their livelihoods (Fish 2015).

Environmental benefits

The natural environment as a provider of benefits was a concept frequently addressed by the reviewed studies. The evidence suggests that the idea of a 'healthy' natural environment is seen as a requirement for the public to survive and flourish (Fish 2015). This idea of the environment as fulfilling this role and providing humans with services is a debated concept. For example, some participants taking part in a public dialogue on the National Ecosystem Assessment were sceptical about the language of 'services' as it was felt to be an inappropriate way to describe human relationships with the environment (by assigning a monetary value) (Fish 2015). The Defra (2018) report on the meaning of pollinators makes reference to this apparent tension between conceptions of the environment as a service provider, and a perspective that acknowledges the complex connections between humans and the environment, both participants in nature as an 'interconnected whole'.

Despite these debates, the concept of 'cultural services' is discussed in detail by several studies as an important type of benefit provided by the environment. A report published by Natural England in 2011 draws on qualitative research with members of the public in seven different 'national character areas[11]' in the UK to capture the cultural services and experiential qualities of these landscapes. The report outlines eight key types of cultural services (such as identity, cultural heritage, escapism, leisure and recreation) and finds evidence of these across the areas. A follow-on report to the UK National Ecosystem Assessment (Kenter et al. 2014) presented a case study of the value associated with the cultural services provided by marine environments. The survey and workshops conducted with divers and sea anglers sought to capture the participants subjective experiences of the marine environment (and its spiritual and aesthetic values), which would have been invisible if they had only focused on monetary value of services. In the same report, a rapid evidence assessment found that in the non-economically focused literature, cultural values associated with the environment were often manifested through oral traditions, rituals and performing arts.

The evidence suggests that cultural services are associated with particular types of environmental features, landscapes and locations. For example, the Natural England report (2011) found that the delivery of cultural services across the areas studied varied. They found that those less able to provide these benefits tended to be landscapes with less variation, little green space or a limited aesthetic appeal. The idea that the public values aspects of the environment that are perceived to be visually appealing is also explored in a report on why and how people value pollinating insects, which reported that the public view bees as 'beautiful objects' (Christmas et al. 2018).

Place attachment and identity

Several studies highlighted that people exist in meaningful relationships with the environment. These relationships are formed over time, for example, during childhood and consolidated by repeated visits. Two pieces of evidence reviewed the literature on the public's connections to the environment and found that people often have a personal collection or set of places that they value, and thus use frequently to 'escape' or feel connected to nature (Kenter 2014; Natural England 2009). There is a relationship between people's sense of (individual and collective) identity and the environments they perceive to be important to them. Two of the studies considered how the environment is linked to national identity. For example, the results of the European Social Survey showed that 57% of the respondents from Norway agreed that being environmentally friendly is an important part of being Norwegian (Steentjes 2017). Specific landscapes can also be associated with national identity. For example in the UK, the coast is important to the public, even to those who do not live in immediate proximity to the coastline, and landscape features such as woodlands and fields are valued as integral aspects of the English countryside (Natural England 2011).

As noted, the public's relationship with the environment is often defined by the way in which people use it. Multiple studies focused on how the environment can function as a

[11] Natural England use 'national character areas' to sub-divide England into distinct regions based on natural features, such as landscape, biodiversity, geodiversity, history and cultural and economic activity (https://www.gov.uk/government/publications/national-character-area-profiles-data-for-local-decision-making/national-character-area-profiles)

place of retreat. The natural environment is seen as an escape for people from their everyday lives, work and stress and is thus associated with freedom (Fish 2015; Natural England 2011). Benham (2017) for example, talks about local resident's relationships with their local environment in Australia (the harbour and national park within the Great Barrier Reef), used for recreation and connecting to the natural environment in an otherwise industrial landscape. Some of the papers discussed how by providing opportunities for escapism and recreation, the environment is an important source of wellbeing. More specifically, for example, people who took part in a dialogue about the UK National Ecosystem Assessment felt they were able to gain benefits for both their physical (the environment as a place to exercise) and mental health (as a place to spend time peacefully) (Fish 2015).

The differences in how populations interact with and attach meaning to the environment was also part of this evidence. In their literature review on shared environmental values, contrasted with more reductionist approaches to 'nature' as an entity which can be fully known and described, Kenter et al (2014) also illustrate the idea of the environment having both a physical and spiritual meaning. They note that inter-connection of people and the land is a conceptualisation frequently discussed in literature focused on Indigenous groups. Somewhat separately, Natural England's (2009) report also focuses on distinguishing the different relationships people have with natural landscapes, including as places that can serve as backgrounds to activities such as exercise, or play a more meaningful role in people's lives, where memories and emotional attachments are made.

3.1.2 Prioritising and understanding environmental issues

A further dimension to interpreting how people understood the environment related to the importance people attached to environmental issues. The selected studies also illustrate how public understandings about the environment can be viewed through how certain issues are discussed.

Relative importance of the environment

Studies that explored the public's views on the importance of environmental issues, compared with other subject matters, demonstrated that environmental issues were perceived to be of low importance when compared to other national challenges or social issues and in relation to day to day problems. This included immigration or the NHS for example, or family, health and finances (Steentjes 2017; Turner and Struthers 2018). The way the public perceives environmental issues is therefore relative to other agendas, and there is evidence that some people do not recognise the associations between environmental factors and their everyday lives, such as how these might infact affect their health (Turner and Struthers 2018).

A large body of research - not included in this assessment - confirms that nature experience can have positive impacts on health, cognitive function and mental health - see Bratman, Hamilton & Daily 2012; MacMahan 2018 for recent reviews.

In studies that asked participants to prioritise environmental issues, those selected tended to be (a) visible and (b) locally specific. For example, when asked about the

environmental issues that concerned them the most in an online panel survey, participants mentioned more visible problems such as litter (Turner and Struthers 2018). Respondents in Benham's (2017) study – all residents in a region of the Great Barrier Reef world heritage area, surveyed on what they perceived to be the most important climate-related issue selected coral bleaching.

Table 3.1 illustrates the environmental issues respondents to the NatCen panel survey considered the most important. Please see Annexe G for the specific question asked and results of some analysis.

Table 3.1: Environmental issues NatCen panel respondents considered most important

Environmental issue	% of respondents[12]
Growing amount of waste	47.6
Climate change	46.3
Pollution of the sea	45.6
Air pollution	37.8
Decline or extinction of species and natural environments	30.8
Pollution of rivers, lakes and ground water	28.9
Agricultural pollution and falling soil quality	20.0
Shortage of drinking water	16.5
Extreme weather events	12.7
Noise pollution	5.8
Other[13]	0.9

Regression analysis shows that waste for example is an issue of greater concern to men than women, and political party support is also relevant here – with Conservative supporters more likely to be concerned with this issue than supporters of Labour or the Liberal Democrats. Some of the wider factors that influence how the public prioritise environmental issues derived from the literature will be discussed in Section 3.2.

[12] Respondents were allowed to select up to three priorities.
[13] The most common responses from those who selected 'other' included overpopulation and use of plastics.

Specific environmental issues

Six studies reviewed on public conceptions of the environment related to the issue of climate change, with several other papers referring to issues in some way linked to climate change. Multiple papers found that the public tend to define and understand climate change according to its perceived impacts on their lives, as opposed to its (human induced) drivers (Defra 2013; Steentjes 2017; Shuckburgh 2012). In particular, the impacts are often conceived as changes in weather patterns, such as extreme weather events and rising temperatures (Shuckburgh 2012; Steentjes 2017). A report by Defra (2013) found that the majority of people who responded to a nationally representative online panel survey, felt that they had already experienced changes in the weather and expected extreme weather events to become more frequent in the UK, with flooding and heavy rainfall seen as the main priorities needing a response. However, the evidence also shows that the impacts of climate change are perceived to be of more concern for (a) other places and (b) future generations (Defra 2016; Flynn 2008).

Many of the studies that explored beliefs about climate change and what the public associate with it found that there is considerable uncertainty and confusion. For example, Shuckburgh (2012) found that people often conflate climate change with other environmental issues. A study by Defra (2016) segmented respondents based on their level of environmental awareness and engagement. They found that the language used by the public differs based on their level of knowledge, for example, a key distinction was made between 'positive greens' who were confident using technical language and 'stalled starters' who used more simple language. Similarly, more engaged segments were reported to be able to define climate change without solely focusing on its impacts, and the role of human behaviour was a key concern for the 'positive greens'.

3.1.3 Discussion

This section synthesises the evidence to answer the question: *How do the public conceptualise the environment?* The evidence reviewed suggests publics conceptualise the environment in multiple ways rather than through one universal definition. These concepts underpin public attitudes and behaviours and provide insight into how people prioritise and navigate environmental challenges.

Synthesis

This review suggests that the publics' understanding of the environment is linked to several key ideas:

- The idea of '**nature'**, including the dominant conception of the natural environment as composed of greenery, as well as some debate around whether nature is external or something humans are components of;
- Ideas of **services and benefits** which the environment can provide to enrich people's lives;
- The idea that people exist in **meaningful relationships** with places based on identity, emotional attachments and memories.

The idea that the public derive benefits from the environment is key in understanding how they conceptualise and value it. The evidence was focused on

what is termed ‘cultural services’, which relate to the more intangible benefits of being able to access the environment, such as feeling close to nature. Papers did also refer to other types of services that are more tangible and can be quantified, but it was important to recognise people’s subjective relationships with the environment.

Furthermore, it is clear from this review that **the environment for many people is composed of places that enrich their lives**, whether through its aesthetic qualities, or ability to provide contrast and escape from everyday life. Interestingly, certain landscapes are preferable for meeting these needs, suggesting a view of the environment as ‘natural’ and therefore predominantly green, is prioritised.

The relationships between people and the environment are linked to identity, as the evidence showed that the importance of the environment (and specific landscapes) to a population, can be linked to national beliefs/constructs as well as personal identity as people often build strong connections with places over time.

This review has also illustrated that **the environment is conceptualised in terms of specific issues and challenges**:

- The evidence suggests that **the environment is often perceived in relation to other pressing issues that affect the public’s daily lives, and so when asked to consider and prioritise, the environment is often not ranked as a top priority**.

- When asked to prioritise specific issues, **the public tend to focus on the most impactful environmental problems, such as those that are local and visible to them.** Most studies that examined how the public understand environmental challenges focused on climate change.

- Despite being a global issue, the literature shows that people tend to interpret climate change through a local and personal lens, focusing on how the impacts of the issue may affect them and their families (including future generations). In the evidence reviewed, **there was a very weak link between the impacts of climate change and it’s causes, particularly the contribution of individual behaviours.** However, this is not a universal finding, as one study shows conceptualisations vary depending on level of awareness, knowledge and engagement.

Gaps and limitations

This review sought to establish how the public conceptualise the environment, however, there is a considerable lack of evidence on public-led definitions. None of the papers were explicitly focused on exploring, in depth, the publics’ understanding of the environment (what they perceive it to be) and what counts as ‘nature’. In particular, this synthesis has been limited in what it can conclude in terms of how different groups that make up the public conceptualise the environment. It would be interesting to examine a wider body of evidence to attempt to understand the diversity of cultural meanings attached to the environment, and how these differ between different places and communities. In addition, whilst the studies selected indicate how important local

concerns are, there is less evidence discussing the balance between these issues at a global scale.

3.2 Factors that influence public attitudes

Key Findings

There were four main factors influencing public attitudes:

- Provision of information and awareness
- Personal experiences
- Stated values and beliefs
- Severity or proximity of issue

This section presents evidence on the factors that influence *public attitudes* towards the environment. More specifically, the factors relate to what the public think about (a) environmental issues (what affects their views, concerns and level of concern) and (b) environmental policies (what affects their level of support for these). The evidence base also addresses the disparity between attitudes and behaviours and section 3.3 discusses the factors that influence *behaviour* and drive people's decision making. In all cases, within the evidence available for review, no clear distinctions are discussed as to how these might vary between different groups of people.

3.2.1 Provision of information and awareness

The reviewed evidence shows a relationship between how much information people have and their views on environmental issues, such as how concerned they are about potential impacts. A deliberative study conducted on public attitudes towards climate change showed that provision of information leads to an increase in the public's concern about long-term risks (Defra 2013). In a Norwegian study, Kaltenborn (2016) found that people's views on the importance of biodiversity loss as an environmental policy challenge, and their concern around the consequences, was influenced by their self-reported level of knowledge. Similarly, in a study conducted in Australia by Dean et al. (2016) a nationally representative sample participated in a survey that assessed their level of water knowledge and found that this was significantly and positively associated with support for policies.

The public receive information on the environment, both issues and policies, from a variety of sources including the media (such as the news) and by engaging in discussions with others. The public's understanding of, and views on, the potential impacts of complex environmental issues such as climate change, is influenced by the content of messages disseminated by the media, such as television programmes and the news. For example, in a study by Defra (2016), discussion group participants' reactions to climate change were partly based on documentaries about the impacts of melting ice caps and rising sea levels on animal extinction. The public are also informed about environmental impacts through the news; in an earlier study commissioned by Defra (2013) on perceptions of climate change impacts, participants referred to flooding events that they had been made aware of through the media. Benham's (2017) study on local

residents' attitudes towards industrial development in an area of the Great Barrier Reef region showed that how people felt about the development was in part based on what they had seen and heard about the potential environmental impacts in the news. The media played a large role in influencing the views of local people and stakeholders when compared with direct observations.

The amount of media coverage also has an impact on public attitudes. Carmichael and Brulle (2013) found that the more media coverage there is on the environment, the more concerned the public are, as the quantity of coverage is seen to convey the importance of the issue and is translated into public concern. The role of political attention is important here as this in turn influences how much coverage the issue is given by the media. Climate change for example has to compete with other issues and concerns for this political attention and media coverage.

Another way the public obtains information and awareness is through engaging in discussions with others. People can gain information from their social networks, and this knowledge can influence their opinions on environmental policies. Hannibal and Vedlitz (2018) found that engaging in discussion with other citizens about climate change may increase public support for policies that propose research and the use of financial incentives. The influence of participating in environmental dialogue is also discussed by Rokka and Moisander (2009) who reflect on how the process of participating in online communities enables the dissemination of knowledge, which has the potential to shape participants attitudes (and behaviours). They found that social media serves as a space of political participation where members construct a cultural identity of 'ecological citizenship' in relation to their responsibilities as global travelers and in doing so become more aware of ways they can travel responsibly.

3.2.1 Values and beliefs

The reviewed evidence shows that underlying values and beliefs affect public attitudes towards environmental issues and policies. Political views were significant. The British Social Attitudes survey (NatCen 2018) finds that environmental attitudes may be linked to political party, as supporters of the Green Party are the most concerned about climate change, and supporters of the United Kingdom Independence Party are the least worried (although it is not clear from the survey data why these differences exist). Shao et al. (2017) also found that political view point affected support for flooding adaptation policies in the USA. As well as political beliefs, ideas about society (e.g. individualism vs. communitarianism[14]) were found by Rissman et al. (2013) to influence public support for certain types of environmental policy. It was found that communitarians were more supportive of 'stick' policies, such as urban lawn regulations and agricultural taxation, based on the value they place on community and collective welfare.

The publics' concern about environmental issues is underpinned by their beliefs about these issues, such as their cause, and whether they can be easily solved. The British Social Attitudes Survey found that those that believe humans are the main/entire cause of climate change are the most concerned and feel the most responsible for taking action to mitigate it (NatCen 2018). Similarly, the European Social Survey reports that belief in

[14] The terms 'individualism' and 'communitarianism' refer to philosophical beliefs about the relationship between the individual and society.

the ability of science to solve issues such as climate change affects concern, as out of the four participating countries, the UK population were the most optimistic about science, and the least worried about climate change (Steentjes 2017).

3.2.2 Individual interest and personal experiences

Several studies reported that personal experiences of being affected by environmental issues can influence people's attitudes, in terms of how concerned they feel, and whether they support certain policy actions. A study on public attitudes to air quality by Turner and Struthers (2018) reported that those who had experience of a lung condition (either personally or as a carer for someone else) were more likely to be concerned about air quality. In the same study, participants who were not as concerned about the environment (in general) as other issues were driven by the fact that they didn't feel it was affecting them personally. Shao et al. (2017) also found that experiences of previous weather events can influence perceptions of the severity of weather conditions.

A key factor that influences the public's attitudes (level of concern) towards environmental threats is the prioritisation of self-interest. Flynn (2008) for example, explored public perceptions of the energy crisis and views on hydrogen energy technology and found that whilst participants were concerned, this was often limited to impacts at an individual/household level, rather than more globally. Individual interest will be discussed in more detail as a factor that influences behaviour in section 3.2.2.

3.2.3 Severity and proximity of environmental issues

The evidence shows that the actual, and perceived, severity and proximity of environmental issues affects public attitudes. In Turner and Struther's (2018) study on air quality, for participants who were more vulnerable to deteriorations in air quality (due to a health condition, or as someone residing in an urban area), this issue was more of a concern than issues that were less immediate and relatable, such as deforestation. For other participants, air quality was a more distant problem and spoken about in relation to other places (countries such as India and China) where it was perceived to more severe.

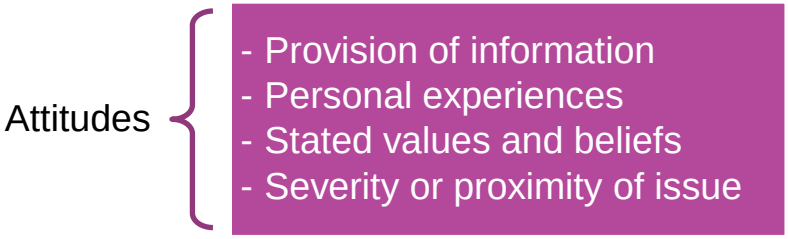
Steentjes (2017) work on climate change demonstrates that perceptions of distance from the impacts of climate change affects the publics' beliefs about it. A survey conducted in four European countries found that whilst a majority (across all four) viewed climate change as a current problem, most respondents also felt that other places were likely to be more affected than their own country. The fact that participants felt psychologically distant from the impacts of climate change plays a role in the fact that the survey shows only few feel high levels of concern about the issue.

Actual proximity to environmental issues can influence public attitudes. Local residents' views on industrial development in a region of the Great Barrier Reef were influenced by concern around how it would impact the environment regardless of whether participants considered themselves to be pro-environment, suggesting that proximity plays a role. This links to 'place attachment', as long-term residents' connections to their local environment were described as a key motivator for opposing the development (Benham 2017).

People also consider whether, and how, they will be personally affected when they consider environmental policies. One of the factors that affects how people in the UK consider the types of actions that are felt to be a priority for tackling climate change is how likely the impact is likely to be felt in the UK in the next two decades (Defra 2013). Concern about an environmental issue predicts support for policy actions that address it. Rissman (2013) found that people who were more concerned about water quality in terms of run-off pollution were more supportive of the US governments policies for controlling it.

3.2.4 Discussion

This section synthesises the evidence to answer the question: *what factors influence public attitudes towards the environment?* The reviewed papers presented a range of factors, as shown in the diagram below.



Synthesis

The **information people have about the environment and environmental issues plays a role in shaping what they think**, and those with more knowledge tend to be more concerned and more supportive of policy actions. One of the main sources of information is **the media, which is influential in terms of both content and amount of coverage**. Environmental issues and events are often filtered through the media and so the public form their views in the context of this. Level of concern itself is also influenced by the amount of coverage, with widely publicised aspects of the environment perceived as more important. The evidence also highlighted that **social networks are a forum for environmental dialogue**, through which the public also form their views about the environment.

In addition to information obtained from the media and through social interactions, the public's **attitudes towards the environment are shaped by their own personal values and beliefs**. Social and political views feed in to environmental attitudes, highlighting the relationship between these, and the complex ways in which the environment is perceived (through a lens of existing views, attitudes and beliefs).

Just as the public are a diverse group in terms of their values and beliefs, they are also individuals who see the environment and the issues it presents in relation to their own **self-interest and personal experiences.** This links to perceptions of how severe, and

proximate an environmental challenge is, as level of concern is linked to whether the public feel they are affected, and to what extent.

Gaps and limitations

Many of the included studies were based on qualitative methods which was useful for gaining an in depth understanding of why (rather than just what) factors are important in shaping attitudes. However, the review has been limited in terms of what it can conclude about the size of impacts as for example, study designs that use experimental methods were not prioritised. Furthermore, the nature of a REA means the factors presented in this section may not be comprehensive or exhaustive. For example whilst the media is identified as influential, this evidence did not include detail on whether or how such media is leading to increasing polarisation of views. However, the factors included do give an insight into the different influences. It was also difficult to establish differences between the groups that make up the public and for which, certain factors may be more significant.

Interpreting values

The REA focuses on qualitative studies that - taken together - demonstrate the variety of people's conceptualisations and attitudes towards the environment. In addition, there is a large body of quantitative and mixed quantitative/qualitative research that links people's attitudes about nature and the environment to theories about basic human values and worldviews (see e.g. Schwartz, Cieciuch et al. 2012; Rose 2013; Braito, Böck, et al. 2017). Most of the studies discussed in the main body of the text do *not* segment participants along value lines. However, taking theories of pre-existing values into account allows to make additional observations about the studies' findings.

Firstly, a significant part of the diversity of opinion visible in the data can be understood through differences in underlying values (see Section 3.2.2 for a few examples that were captured by the REA). Secondly, studies that show that low importance given to certain environmental issues often hide the fact that stark attitudinal differences exist between different value groups, with some value groups highly concerned about systemic and large-scale environmental problems (e.g. those that fit into the values-based narrative of "threat to the planet"), whereas other groups are more interested in local, visible environmental problems (e.g. "litter on the street"). Thirdly, value differences can help us understand that people often engage in similar behaviour for different reasons. For example, they may oppose fracking either predominantly because "it is bad for Planet Earth" or because "it is bad for the local community"; or they may spend time outdoors (cycling, running, walking) either because of health and fitness reasons or because it gives them a sense of connection to nature. For some people and situations, such reasons can overlap, but this is not necessarily the case. A long-distance runner and a bee enthusiast may have very different underlying motivations and a different experience from being out on the same Common on the same day.

Finally, pre-existing values and beliefs explain why the straightforward provision of information sometimes leads to increased knowledge and support for policies, whereas in other situations it does not. The latter situation occurs when environmental issues clash with people's pre-existing values and beliefs, which can lead to processes of "motivated reasoning" and, ultimately, may result in the rejection of the provided information (Rapley, De Meyer et al. 2014).

3.3 Factors that influence behaviours

Key Findings

There were four main factors influencing behaviours and/or behavior change:

- Environmental concern
- Self-interest and concern for the future
- Perceptions of personal efficacy
- Cost and convienence

This section reports on what the evidence tells us about the factors that influence behaviour in relation to the environment, which the review shows are often distinct from the factors that influence people's attitudes.

3.3.1 Environmental concern

The reviewed literature suggests that there is a significant discord between the publics' attitude towards environmental issues (acceptance of the problems and concern) and how prepared, or able, they are to make behavioural changes. A key factor here is that environmental concern is often not the primary driver for any behaviour change. For example, the British Social Attitudes survey found that concerns about climate change do not directly translate into energy saving actions – whilst younger people were more likely to believe in, and worry about, climate change, it is 35 to 64-year olds who report reducing their energy usage more often (NatCen 2018). In a study on the consumption of bottled water, it was found that beliefs about how reduced consumption would benefit the environment were not significantly different between participants who reported consuming high and low amounts, suggesting that concern for the environment is not the main driver in the decision to buy bottled water (Der Linden 2013).

The intention-behaviour gap

LaPiere (1934) was the first to demonstrate experimentally that large discrepancies can exist between people's stated intentions and their actual behaviour. An "intention-behaviour gap" (or "value-action gap", as it is also called) can manifest itself particularly strongly for environmental issues, as shown by some of the examples in Section 3.3. Since LaPiere's study, numerous theoretical frameworks have been developed to understand how and why the gap manifests itself, and how it can be closed. Two influential frameworks are the Theory of Planned Behaviour (Ajzen 2001) and Social Practice Theory (Shove, Pantzar and Watson 2012). Ajzen's approach focuses on the psychological drivers of behaviour such as attitudes, social norms, sense of efficacy etc.; Shove's approach - rooted in sociology - looks at citizens as actors in a system that determines to a large degree the various roles they take on and the behaviours they engage in. Although the psychological-driver model of behaviour change has been successfully applied in situations where personal choices have a clear and visible link to beneficial outcomes (e.g. when promoting personally healthy behaviours), it has been criticised as inadequate for environmental issues such as climate change (Shove et al.

2012). In recent years, several behaviour-change tools have been developed that bring together the psychological-driver and social-actor theories. One such method is the "Individual - Social - Material" (ISM) model, which identifies the causes of the intention-behaviour gap and resistance to behaviour change as existing on three levels: the level of individual psychology; the level of the social environment; and the level of the material world we operate in (Darnton and Horn 2013). The ISM model is a practical facilitation tool that can be applied without the need to be intimately acquainted with the underlying psychological and sociological theories but is solidly rooted in an established evidence base.

3.3.2 Self-interest and concern for the future

Flynn (2008) highlights the gap between people's attitudes and behaviour in relation to energy. This study found that broad environmental goals were less relevant to people's lives when compared with things that were perceived to affect them directly. Rather than the welfare of the wider environment and society, behaviour change was tied mainly to self-interest. The authors therefore conclude that there is limited evidence of any kind of 'environmental citizenship' where individuals take responsibility for making changes that will lead to environmental benefits.

On the other hand, Rokka and Moisander (2009) found that there is the potential for 'ecological citizenship' to be constructed through dialogue in online communities, suggesting that the public can be motivated to act as responsible environmental citizens, through actively engaging with others.

Despite the absence of this collective interest in Flynn's (2008) study, the authors do indicate that the public are likely to make changes if they perceive the consequences of not doing so will affect them personally, or their family in the future. For example, in Flynn's (2008) study, some participants indicated that they might try to make changes or support new energy technologies if it was beneficial to their own and their children's health.

3.3.3 Perceptions of personal efficacy

This factor relates to the belief that the public and the actions they take as individuals can only have a limited impact and is unlikely to make a difference. This belief is a key influence on behaviours, as people feel powerless and lack the confidence or desire to act, sure that their contribution would be pointless anyway (Defra 2017; NatCen 2018). For example, in Turner and Struther's (2018) air quality study, participants felt more confident in the effectiveness of larger scale transport related changes than altering their own domestic energy consumption.

Perceptions of personal efficacy is also linked to the actions of others, as the evidence shows that the behaviour of others (the public and those in positions of power) has an influence on how prepared people are to change. Two studies found that the public were not prepared to make changes unless the government, industries and businesses were seen to be doing so too. Whilst this was linked to what was believed to be fair, it was also connected to the concern that if others continued to act irresponsibly, their own actions would be futile (Flynn 2008; Defra 2017).

The public are motivated to make changes if they see that others are doing so too. Two studies explored this in relation to the consumption of plastic water bottles. In one study, 27% of people said they would use a reusable bottle if others did too (Keep Britain Tidy 2018). The other study found that the combination of providing information alongside activating social norms (which meant informing the public of how they can support the actions of their peers) was effective in changing people's intentions (to consume less bottled water), by providing evidence that others are doing this too (Der Linden 2013).

3.3.4 Cost and convenience

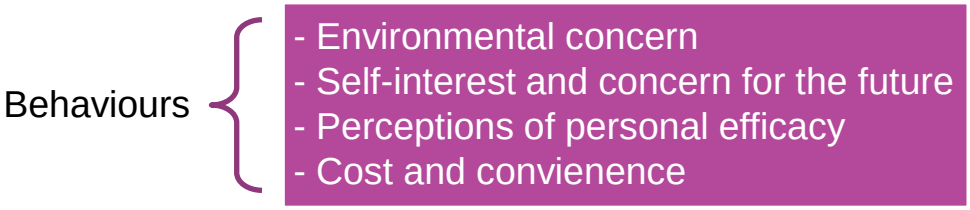
Many of the reviewed studies highlighted the role of cost and convenience as important factors that influenced the publics' environmental behaviours. Cost can be both a barrier to behaviour change, as well as a facilitator, if the public is able to see the financial benefits of making changes or if incentives are provided. For example, cost is a barrier to making changes such as switching to a more efficient heating system or vehicle, in terms of initial and ongoing costs (Defra 2017; Turner and Struthers 2018; Sciencewise 2016). Financial implications affect the publics' views on policies, with those that do not require the public to incur any direct costs or which incentivise certain behaviours seen as the most reasonable (Turner and Struthers 2018). The publics' existing behaviours are also influenced by cost. For example, when purchasing food, for the most disengaged groups, the implications of their choice in terms of food related emissions is often less of a priority than cost (Defra 2016).

The promise of personal economic gain can also influence how prepared the public are to adopt new practices, such as installing renewable energy sources. This is illustrated by the results of a survey carried out with members of the public in Greece. Kosmopoulos et al. (2017) find that over half of the public they surveyed report being prepared to install renewable energy sources, despite the economic crisis.

In terms of convenience, the public are keen for behaviour changes such as purchasing less bottled water, to be made easier to implement, such as through having easy access to tap water (Keep Britain Tidy 2018). Convenience is important as the public have a preference for actions perceived to involve the least 'hassle' and the minimum amount of disruption to existing lifestyles (Defra 2016). In an online deliberative event which explored public views on low-carbon technologies, participants were presented with scenarios which were designed to identify the factors that affected their decision making in relation to accepting new technologies. In relation to the installation of a new heating system, there was concern around the potential disruption involved in this in terms of impact on lifestyle and time frame (Sciencewise 2016).

3.3.5 Discussion

This section synthesises the evidence to answer the question: *what factors influence public behaviours towards the environment?* Studies discussed the range of factors that come into play in shaping people's attitudes towards environmental issues and policies, as well as what drives behaviour, as shown in the diagram below. By addressing both attitudes and behaviours, this report offers some insight to the relationship between the two and suggest why values do not always translate into actions.



Synthesis

This synthesis brings the findings presented in section 3.2 and 3.3 together to consider the interactions between the factors identified, and the relationship between attitudes and behaviour.

The evidence shows that **the more aware and informed people are about an environmental challenge, the more concerned they are**. Level of knowledge is closely linked to the public's beliefs about the cause of the issue (which in turn can affect level of concern), however, **the relationship between attitudes and behaviour is complex, as attitudes do not often translate into actions**, as might be expected.

As environmental concern does not translate directly into environmentally friendly behaviours, there are other factors at play:

- It is suggested that '**environmental citizenship'** is vital for ensuring that the public consider their responsibilities in protecting and looking after the environment, but it is debatable whether this exists, as **self-interest is often prioritised ahead of the collective.**

- Other key barriers to action are a **lack of confidence in the effectiveness of individuals to make a difference and lack of motivation to make changes**, when wider society is not seen to be participating.

- Considerations of what may be involved in adopting environmentally friendly practices play an important role in the publics' decision-making process, when it comes to everyday household behaviours such as food shopping. The public often associate these practices with **high cost and inconvenience** and are more likely to accept changes that do not come with these attached.

Whilst these are barriers, there is potential for these factors to act as enablers too. For example, 'environmental citizenship' can encourage the public to act more responsibly, and people will be more likely to change their behaviours if they believe that it will make a positive difference and see others doing so.

Gaps and limitations

As with the studies that explored the factors affecting attitudes, the studies that considered behaviours did not measure the impact of the factors on the publics' actions. Instead, many of the studies explored participants intentions to change behaviour and their views on the key barriers. Furthermore, the scope of this review means that there have been limitations to the quantity of evidence reviewed, which means that there may be other factors at play that are not considered here. For example, this review as a whole has suggested that perceptions of proximity (in terms of distance and time) is important in influencing level of concern towards environmental issues. However, there was limited discussion in the selected evidence around whether a desire to protect the environment for future generations affects behaviour.

3.4 Public engagement and environmental policy decisions

Key Findings

Three types of interaction between engagement and policy making were found in the evidence:

- Policy makers consult on pre-defined policy options
- Participants decide what should be on the policy agenda
- Community members engage to oppose a policy decision already made

This section outlines the evidence on different approaches to public engagement in environmental policy decisions. Nine papers refer to the interaction between environmental policy and engagement. Six of these were academic articles and three were grey literature reports.

The evidence presented here is grouped around three different types of interaction between engagement and policy: one where policy makers or other authorities consult on pre-defined policy options or conclusions; one where participants themselves decide what should be on the policy agenda; and a third where community members engage to oppose a policy decision proposed or already decided on. Within these groups, we have aimed to identify what aspects of engagement ensured that the results of findings from the engagement were fed into policy.

Whilst the studies shared here are included as they demonstrate the extent to which public engagement has influenced or fed into policy making, we note for the purposes of interpretation that policy making as a process is inherently complex and subject to a range of factors that will ultimately influence decisions. A further point of note in this evidence is that although reported findings are based on the results of various engagements, no specific findings are reported on how participants themselves might have experienced these events.

The relatively limited number of pieces of evidence in response to this question means that rather than summarise thematically across the studies, we have taken studies in turn for examination. This also helps to ensure that the evidence discussed is presented 'in context' which is particularly relevant to public engagement where the precise nature of the engagement and the issue under discussion are often difficult to generalise.

3.4.1 Consultation on pre-defined policy options

Four studies discuss engagement where the public is consulted on their views on pre-defined policy options or conclusions: one on options for nature conservation; another on the results from a benefit analysis on the environment; a third on local government engagement on climate change and energy policy; and the final paper on examples of online engagement.

Gregory and Wellman (2001) describe engagement by the Tillamook Bay National Estuary Project (TBNEP) that aimed to develop a science-based, community-supported restoration plan for an estuary in the state of Oregon in the United States. This involved outlining the possible policy options and working through the complex set of benefits, costs and risks associated with them. The first stage of engagement comprised discussion sessions organised by TBNEP staff with stakeholder groups, including dairy farmers, private and state foresters, local residents concerned about flooding, community groups and individuals such as the county planner and a high school principle. In these sessions, participants considered their values and cause-effect relationships related to various policy options. The result of these discussions were three ecosystem-management actions for further discussion with local residents.

TBNEP, together with the Environmental Protection Agency (EPA) then designed and organised workshops with local residents, where participants completed a workbook on the different policy options and their trade-offs. The workbook detailed the key trade-off associated with each policy option and asked participants how they would prioritise the costs and benefits of each action. These materials were designed by the project partners to make sure that the outputs corresponded to the needs of each organisation. While the paper does not discuss the course taken by TBNEP, the authors emphasise that the results of the engagement informed the body of policy options were acceptable to the public. The results also fed into EPA Office for Water estimates of the economic benefit costs of its sponsored programs.

Medd (2016) reports on public dialogue to test the assumptions and conclusions of the UK National Ecosystem Assessment (NEA). The public dialogue consisted of three one-day regional events in Birmingham, Exeter, and Glasgow with 40 participants in each. In these events, participants discussed how the NEA had characterised the natural environment, applications of concepts and approaches to decision making. The second stage of engagement was a 1.5-day dialogue event in London with 34 of the participants drawn from the previous workshops. Participants discussed the NEA's implications for policy development. In addition to community members, 43 specialists participated in the public dialogue, including representatives from national and local government, policy delivery bodies, non-governmental organisations and academics. Authors conclude that involvement in the events led to inspired and enthusiastic stakeholders: while no direct

policy impacts are reported, the majority of specialists at the final event reported intending to make use of the findings to inform policy.

Adkin et al. (2017) describe two relevant engagement processes related to environmental policy making in Alberta, Canada. In the cases described, the Albertan government came under pressure to respond to climate change and draft new land use planning policy. In the climate change case, the public was engaged through an online survey, allowing participants to review and respond to government-provided facts and policy options; as well as 10 town-hall-style meetings. In the land use planning case, engagement of the public was carried out through open houses and online surveys (no further detail provided). In addition, both cases included engagement with stakeholders and experts.

Authors report that in neither case were the results of the public engagement considered in the ensuing policy drafting. According to the study, this was because the aim of the public engagement was not to make a substantive contribution to the preparation of policy, but rather to outwardly establish the democratic legitimacy of the process. In the case of Alberta, support for democratic public engagement among policy makers was low, since policies alternative to their own carried threats to dominant economic interests or government revenues.

A study by Sinclair et al. (2017) specifically discusses the role of information and communications technology (ICT) in public participation to assess the impact of environmental policy decisions. The paper presents case studies from Canada and Hong Kong with respect to decisions related to energy and environmental infrastructure planning. In the Canadian examples, the public is provided with opportunities for face-to-face participation (including hearings and consultations) and the opportunity to access updates and hearing reports online. The Hong Kong examples describe opportunities for citizens to solely give feedback online. The Environmental Protection Department of the Hong Kong Government has set up a website where the impact assessment process is explained in lay language; periods where community comments submitted on particular plans are marked; and project partners can submit information of their development projects for the public to comment on online. Participants can search for developments near them on an interactive map of the city.

The article does not report on policy influence. However, the authors argue that the use of ICT in information sharing increases the efficiency and democracy of the process, giving the public easier access to project documentation and making it easier for them to comment on plans – although it does require access to a device and internet connection that is not always present. According to the authors the examples demonstrate the use of ICT in information-sharing by the government to the public and vice versa but reflect a wider lack of ICT use in more interactive forms of engaging the public, such as video conferencing.

These examples of consultation on pre-defined policy options highlight stakeholder involvement in engagement as a way to ensure interaction between policy and publics. While Gregory and Wellman (2001) show that stakeholder involvement in planning the engagement can help make sure that the results are relevant to them, Medd (2016) describes how stakeholder presence in the engagement itself is useful for achieving their

buy-in for the policy perspectives and environmental issues discussed. On the other side of the coin, Adkin et al. (2017) demonstrate that 'inauthentic' engagement (where policy makers do not intend to incorporate the results of the engagement) is a reason for a lack of robust interaction between engagement activity and policy. Finally, Sinclair et al. (2017) argue that the use of ICT in public engagement can make the engagement more accessible and therefore more democratic.

Public participation in environmental policy making

Deliberative policy making has become a feature of public participation and is discussed by Stevenson and Dryzek (2014) as an important way to generate effective action on environmental issues. Such efficacy is dependent on questions of democratic legitimacy and deliberation is built on ways people can exchange and acknowledge different perspectives, understand conflict and find common ground, and build a shared vision for society (Involve, n.d.).

In their work on climate change, Stevenson and Dryzek (2014) identify the building of deliberative systems as enabling meaningful communication, the inclusion of all affected interests as well as accountability and effectiveness. To achieve these ideals has at least three implications. The first is that people need to be able to reasonably access engagements and understand what is going on within them. For example, Fischer (2000:18) suggests that scenarios that involve 'technical vs everyday language', such as in environmental planning, tend to give shape to an unequal communicative relationship, which also makes it more difficult for citizens to influence decisions in these cases. He argues that whilst citizens may have incomplete understandings of policy or technical issues, once these issues are re-described in a jargon-free way, most people understand them well. The second is that you can't get to what people think without giving them adequate means to share it with you through their everyday forms of expression, communication and reasoning. In line with theoretical principles of deliberation, Dryzek and Niemeyer (2012) suggest deliberative practices should allow for any kind of communication – stories, humorous gossip, rhetoric. Barnes (2008) also highlights how emotional expressions emphasise the significance of the issues that are the substance of debate and so finding forums and approaches that can take account of these is important. The third is that all with a stake in deliberations should be committed to the process and that it can influence an outcome.

Parkinson (2006) has suggested that deliberative practices can tackle questions neither purely in theory nor practice – but a combination of the two. In this way deliberative engagement can also help individual participants clarify their interests through research and developing knowledge, which in turn can open up possibilities for who can act in relation to a particular issue and can further legitimate policy (Davies 2016).

3.4.2 Public engagement to define policy options

Three papers focused on engagement where the policy options are not pre-defined, but the public is asked for their views on what they want to see on the policy agenda. One of these reports is on public dialogues on landscape plans, another on influencing the bioenergy research agenda, and the third on the perspectives of local communities on natural resource management.

BIS/Sciencewise (2012) report on public dialogue projects in Wales, Scotland and the East of England, which aimed to include public attitudes and values in the landscape plans of these regions. In Wales, the Countryside Council for Wales carried out workshops with community members and farm businesses, where participants identified key land-management issues requiring change. A policy workshop was then conducted with additional stakeholders and policy makers to consider what needed to change in land-use planning. Stakeholders involved in the workshops reported immediate influence on the National Environment Framework in Wales and Glastir and on the new All-Wales Agri-Environment Scheme[15]. This is attributed firstly to the fact that the policy workshop enabled policy makers to hear public discussions first hand. Secondly, a meeting was held with the Welsh Minister for Rural Affairs to discuss the results from the dialogue.

In Scotland, Scottish Natural Heritage organised three evening workshops with 20 participants including community representatives, local leaders, NGOs and local business owners. The purpose of the workshops was to explore effects of climate change on local landscapes and quality of life. According to the report, the workshops shaped other dialogue initiatives and regional strategies, and have the potential to influence the Highland Council's Adaptation Strategy. These policy results were attributed to the good policy and practice links established with local authorities during the process. The report does not mention policy impacts of the English public dialogues.

The Biotechnology and Biological Science Research Council (BBSRC 2013) carried out a public dialogue project to explore public views on bioenergy to feed into their research strategy. Eleven dialogue events were held, exploring thoughts, concerns and potential research topics around bioenergy with the help of future scenarios. While the report does not discuss how these dialogues influenced the final strategy, the mechanism for feeding the results into the research agenda are described. Groups within the BBSRC were involved in the design of the dialogues (for example, through advising on the content of stimulus materials), which gave them ownership over the results. These same groups also led on ensuring that the BBSRC responded to the dialogue, therefore providing a mechanism for the flow of advice back in to BBSRC's decision-making structures.

The third example presented here focused on the effectiveness of visual products developed from engagement activities to inform policy stakeholders about the outcome of that work. Petherham et al. (2012) discuss interactive DVDs produced to reflect the results of participatory processes with local communities on natural resource management in Australia and Vietnam. These DVDs were then shown to local and national government decision makers, policy advisors, National Park officials, Non-Government Organisation (NGO) representatives, public servants, consultants and researchers. The DVDs presented the context at the research sites, local peoples' perspectives on general issues, as well as local views on natural resource management.

Policy makers in Australia and Vietnam engaged with the DVDs and indicated that they would like to see more use of visual products in the policy arena. The authors name the greatest potential impact of this method as raising awareness and understanding of the local contexts of national resource management issues, allowing for more informed

[15] The paper does not detail what type of influence this was.

decisions. This approach also meant that the results of a range of activities in different places could be combined and shared with others easily. Particular features of the DVDs were also considered effective in informing decision makers: there was a preference for short (under 10 minutes) DVDs, with a variety of scenes and cut-aways.

These examples of public engagement to define policy options further emphasises the role of stakeholder involvement in engagement to achieve buy-in for policy suggestions. BIS and Sciencewise (2012) outline actual influence on policy, brought about by stakeholder workshops on landscape plans where participants heard the views of the public first-hand. Stakeholder involvement in the design of the engagement can also lead to ownership over the results, as described in BBSRC (2013). BBSRC (2013) and BIS and Sciencewise (2012) also describe in-built mechanisms of feeding engagement results into decision-making structures, such as having stakeholders responsible for relaying the message to decisionmakers, having a meeting with the responsible minister or establishing links with policy makers from the beginning of the engagement process. Finally, how the results of engagement are communicated may make a difference to policy makers' ability to incorporate engagement results into policy, as described by Petheram et al. (2012). Short visual materials were found to have potential to effectively present different points of view, to aid policy makers' decisions on nature conservation.

3.4.3 Community-led engagement opposing a policy decision

Two papers discuss community-led engagement, aiming to reverse a policy decision already taken. The first one describes opposition to an industrial air permit in the USA and the second on opposition to building a new waste incinerator in the UK, both on the grounds of local air pollution. In addition to community-led action, both cases describe nominal engagement by the authority in question, that aimed to legitimise its decision rather than engage with public views on the topic.

Jarrell et al. (2013) use a case study approach to examine citizen opposition to the air permit of a power plant in Texas, United States. The Christ Church City Council decided to grant an air permit to a power plant and on the announcement of the plan local residents formed a community group to oppose it on the grounds of air pollution. The community group went through official channels of participation, including a contested case hearing[16] and public comments[17], but failed to change the outcome. The authors attribute the failure to a politicised decision-making process and 'inauthentic' engagement: the City Council was not committed to listening to the community members, and open meetings about the decision were only held once the decision had already been made.

Dodds and Hopwood (2006) describe community-led engagement, where a community group was able to reverse the decision of the Newcastle City Council to build a new waste incinerator plant in a disadvantaged neighbourhood. The plan was opposed by residents in the local area as the previous incinerator had produced noise and air

[16] An administrative hearing required by state law for decisions that could affect people's rights, duties and privileges.
[17] A public comment is an opportunity for any interested person to submit data, views, or arguments on a proposed rule.

pollution. In response, the Council proposed the establishment of a partnership working group of local people, Council officers and councillors and other agencies to examine waste management options. The working group held hearings to gather evidence from a range of experts and allowed the members of the committee to test alternatives and reach collective decisions on the content of the proposed waste strategy. The authors describe the City Council as initially unwilling to reverse the decision, but powerful arguments and policy alternatives in line with public opinion, wide-ranging publicity and broad community involvement and support meant that policy makers accepted the results of the engagement process.

These examples of community-led engagement describe cases when buy-in is more difficult to achieve. Like Adkin et al. (2017) above, these examples suggest that engagement is less effective when policy makers are predisposed to not consider the results of engagement. In the successful community-led campaign to reverse the plan to build a waste incinerator, clear objectives and powerful arguments, as well as wide-ranging community support were described as key to ultimately achieving buy-in from the City Council (Dodds and Hopwood 2006).

Table 3.2 shows the results of the NatCen Panel question on the extent to which the public feel different sectors take their views into account when making decisions about the environment. Please see Annexe G for the specific question asked and further details of planned analysis.

Table 3.2: The extent to which the public feel different stakeholders take their views into account about the environment (% of respondents).[18]

Stakeholder	A great deal or a fair amount (%)	Not very much or not at all (%)
Local community	56.0	44.0
Local authority	43.5	56.5
The government	42.5	57.5
Big companies and industry	27.2	72.8

Regression analysis (see Appendix G) shows some variation in different demographic groups on these issues. For example, ethnicity emerges as a significant factor when asking about *Local community*, with white British people more likely to feel the local community takes their views into account when compared with their Asian or Asian British counterparts. This analysis also suggests that those who find it difficult to get by on their income are less likely that those who are doing well to feel *The government* takes their views into account.

[18] 'To what extent do you feel the following take your views into account when making decisions about the environment?'

3.4.4 Discussion

This section synthesises the evidence to answer the question: *How can different engagement approaches interact with environmental policy decisions?*. The synthesis is carried out with a focus on the aspects of engagement that help bring about policy influence. The papers primarily discuss factors that improve the ability of decision-makers to incorporate engagement findings into policy decisions and ones that increase buy-in from decision-makers for the environmental issues or policy decisions.

Synthesis

The evidence presents three types of interaction between policy decisions and engagement: one where policy makers or other authorities consult on pre-defined policy options or conclusions; one where participants themselves decide what should be on the policy agenda; and a third where community members engage to oppose a policy decision already made.

Three factors were found to influence policy makers' ability to incorporate engagement results into policy:

- **In-built mechanisms of feeding engagement results into decision-making structures**, such as having stakeholders responsible for relaying the message to decisionmakers or having a meeting with the responsible minister or establishing links with policy makers from the beginning of the engagement process.

- **Involvement of stakeholders in the design of the engagement** ensures that the results are usable.

- **How information is communicated** may make a difference. Short visual materials were found to have potential to effectively present different points of view, to aid policy makers' decisions on nature conservation.

  Here too, a wider body of research exists. For climate change in particular, the use of visual imagery has recently been surveyed in Wang, Corner et al. 2018.

A number of factors were also found to help engagement influence the policy agenda:

- **Stakeholder involvement in engagement** appears a key factor in achieving buy-in from policy makers to consider certain environmental issues, policy solutions, or points of view and feel ownership over the results. This can mean involving stakeholders in the design of the engagement or in the events themselves.

- In examples where decision maker buy-in is more difficult to achieve, **clear objectives** and **powerful arguments**, as well as **wide-ranging community support** were described as key to ultimately achieving buy-in.

The evidence also suggests that community-led engagement is less effective when the **engagement is inauthentic**, i.e. when policy makers are predisposed to not consider the results of engagement.

Gaps and Limitations

The small number of papers addressing the relationship between engagement and policy decisions indicates a need for evidence and means that the factors outlined above are based on limited data. The papers predominantly describe face-to-face engagement with groups of people, including stakeholders, local residents and members of the general public. In particular, workshops and public dialogue are formats represented in the evidence. The interaction between environmental policy and other possible forms of engagement is not covered by the available evidence.

The evidence focuses on cases where the environmental issue is local (such as building a waste incinerator or forming landscape plans), or one where the organiser of the engagement has direct influence over the policy solution (bioenergy research), and limited evidence was found on cases of national or global policy. In terms of specific policy issues, the REA found no evidence on water pollution, extreme weather events, waste, or shortage of drinking water. Climate change is also not addressed, insofar as it was not linked to local issue.

3.5 Attitudes and decisions in public engagement settings

Key Findings

- Participants come to engagement settings influenced by their existing attitudes.
- Engagement can influence participants' attitudes and/or behaviour towards environmental issues; and understanding of their environmental values and those of others.
- The evidence focuses on engagement that includes information provision and a deliberative component.

This section presents the evidence on the factors that influence people's attitudes and decisions while participating in forms of public engagement. The REA sought evidence for what participants are influenced by when they arrive in the engagement setting, as well as what can change participants' attitudes and decisions during the course it. Nine papers were found that addressed these questions. Most of them were drawn from 'grey' literature, with only one paper drawn from academic literature.

Most examples of engagement involved giving participants information and encouraging them to deliberate over that information. Three types of attitudes and decisions were considered in the evidence: participants' behaviour in relation to the environment;

participants' attitudes towards environmental issues; and participants' understanding and acceptance of environmental policy options. This section will address each in turn.

3.5.1 Environmentally friendly behaviour

Two papers describe engagement that explores ways to change people's consumption behaviour to mitigate environmental issues. The papers report on the types of information and activity that influence people's self-reported openness to change behaviour in the course of engagement.

Beaglehole and Patel (2016) report on online information sessions and deliberative workshops on attitudes to low-carbon heating. Participants were polled before and after the deliberative event and the results show an increase in the proportion of participants willing to consider alternative heating technologies when moving house. Participants reported that the engagement had given them more information, 'opening their eyes' to the importance of low-carbon heating technologies. The authors also note that making the link between climate change, the UK's energy target and their own consumption explicit influenced participants by highlighting their sense of personal responsibility.

Defra (2016) describes findings from 14 focus groups examining whether the public makes the connection between everyday household behaviours and climate change. During the first two waves of focus groups, participants were segmented by their environmental values/attitudes and given information and distinct behavioural interventions to test at home. In a third wave of final focus groups, participants were asked to design an intervention in relation to a 'behaviour goal'. The interventions included an information pack; energy saving tips or actions; educational material to watch and discuss with family or friends; a local event; access to an advice line; food waste diary; and a carbon footprint calculator.

According to the authors, the engagement produced a subtle shift in attitudes of some participants, but the majority did not adopt energy saving behaviours as they felt that individual action does not make a difference. Interventions considered most successful were those that encouraged participants to take action while the ones only providing information were less well received:

- For some participants, increased awareness through information packs and educational materials translated into energy saving or food waste reducing habits. Participants would, however, have wanted more information on what constitutes pro-environmental behaviour.
- The striking images and discussion with family members of a film on climate change opened some participants' minds to new ideas, with some more willing to admit human involvement in climate change than they had previously. Others found it difficult to relate to, as it was scientific and focused on distant issues.
- Energy saving tips made participants change behaviour when the actions were deemed to be achievable or 'common sense', and where participants saw a decrease in energy bills after making changes.

- Participants who were asked to keep a food waste diary were shocked by the extent of their food waste, which made them determined to make changes. Others were cynical as felt they already wasted very little food.
- A carbon footprint calculator was considered powerful in that it gave participants an actual numerical figure representing their environmental impact, in addition to giving practical suggestions for changes.

The examples of engagement designed to change people's behaviour show that participants come into the engagement setting influenced by their existing attitudes, as suggested by Shuckburgh et al. (2012) and Defra (2016). Information given to the participants in the engagement described by Shuckburgh (2012) was filtered by participants' trust in the information source. In the engagement described by Defra (2016), those with prior experience of energy-saving behaviour were predisposed to accept the information given to them.

In addition, underlining participants' personal responsibility for environmental issues influenced openness to change behaviour in the course of engagement. The links between private energy consumption and climate change in engagement on low-carbon energy (Sciencewise 2016), as well as the carbon footprint calculator in Defra (2016) demonstrate that drawing these links can influence participants' willingness to change their energy consumption behaviour. The findings from the activity interventions in Defra's research (2016) also suggest that providing participants with clear and achievable suggestions for practical actions can lead participants to make changes to their behaviour. Finally, activities undertaken as part of engagements were reported to change the behaviour of participants. These were activities that practically demonstrated the impact of consumption behaviour or changes of behaviour, such as a food waste diary or the encouragement to make use of energy-saving tips, which demonstrated to participants a reduction in bills as a result of the behaviour changes.

3.5.2 Attitudes towards and understanding of environmental issues

Four studies explored attitudes towards environmental issues in the context of engagement. Shuckburgh et al. (2012) describe a series of focus groups to explore how people want to be communicated to about climate science and climate change. Focus group participants included people from different locations (rural/urban) and were stratified by their views on climate change. Focus groups were held separately for members of the 'lay' public, natural scientists and humanities academics. Participants were presented with articles from a range of media sources on climate change and asked to rank and discuss them.

The authors state that the participants interpretations of the articles they were presented with were influenced by the views they held on the publisher/particular media source. For instance, the BBC was considered a trustworthy media source, as it was seen to be an independent, non-biased source of factual information. Pre-existing attitudes and participants' background also influenced the type of information participants valued. For example, participants with strong views on climate change looked for information that affirmed their views and distrusted information that did not. While the natural scientists

looked for facts and evidence on climate change, the arts and humanities academics were looking for a structured argument, and members of the lay public were interested in newsworthy stories.

Sciencewise (2013) describes the results of a public dialogue pilot on climate change. The dialogue included three workshops, where participants moved from exploring the context of carbon emission reductions and UK policy to making recommendations on climate change policy. The workshops also included presentations by 'expert witnesses' to inform participants about the issues affecting the 4th Carbon Budget. In pre- and post-dialogue surveys, participants reported that their knowledge of climate change had increased. As knowledge increased, so did concern: before the dialogue, 32% of panel members rated their concern about climate change at level 7, but by the end of the dialogue 43% rated their concern at level 10. This was attributed to the fact that the participants were given information from a variety of sources that all pointed to the same results, giving credibility to the messages about climate change. It was also important that the messages were clear and accurate: participants expressed preference for knowing exactly what they should or should not do rather than receiving mixed messages.

A report by Keep Britain Tidy (2014) reports on two citizens' juries on recycling. The citizens' juries were conducted in Manchester and London, with participants recruited to reflect the population of the local areas. The aim of the engagement was to draft an action plan for improving recycling rates and events included presentations by local authority and action group representatives across two days of deliberation. The authors describe how participants' attitudes changed in the course of the engagement, with many participants feeling more connected and committed to recycling and gaining understanding of its complexities. According to the authors, the factors that contributed to participants' understanding and awareness of recycling infrastructure and service provision included a presentation on how recycling works; a chance to ask questions from experts; and an inspiration pack that outlined various examples of initiatives developed to improve recycling. The most compelling arguments encouraging greater recycling were ones related either to personal or local benefits of recycling (e.g. that recycling saves money), or to costs that are society-wide but also likely to impact the participant (e.g. we are running out of landfill).

The Biological Science Research Council (BBSRC 2013) engagement described in 3.4.2 highlights the importance of participant understanding of the topic. Feedback forms collected from participants and moderators, as well as analysis of transcripts of the events suggest that the scenarios constructed did not work very well to help participants form opinions on the bioenergy research agenda, as the participants lacked the background information to properly discuss the topic in detail. Participants and moderators called for less complicated scenarios, allowing the different political, ethical and social issues to be separated out more easily and discussed in detail.

Flynn et al. (2008) report on the results of nine focus groups on perceptions of the energy crisis, hydrogen technologies and sustainability. Focus group participants were with members of the public with no close familiarity with energy technologies. During the focus groups, people were asked about their attitudes towards hydrogen energy technologies after being shown slides and visual materials. Participants, however, stated that they

would require much more detailed information about the likely benefits, costs and risks of such technologies before indicating whether they were prepared to approve or support hydrogen.

One study discusses engagement to help participants understand policy options. In this example, externally developed content is provided to participants as the subject of engagement. Shr et al. (2019) investigated whether including images in surveys affected responses. Three surveys were prepared on the landscape attributes of green infrastructure (infrastructure to combat severe environmental problems such as downstream water pollution and urban flooding caused by stormwater runoff: diversity in plant species, presence of water, percentage of green space mowed, and pattern of plantings), asking participants to choose between neighbourhoods with various landscape attributes. One of the surveys described the landscape attributes of the neighbourhoods verbally; another one combined images and verbal description; and the final survey included only images of the neighbourhoods. The study finds that combining images and text helped survey respondents make consistent choices based on the full range of landscape attributes present. According to the authors, this demonstrates that people can better understand planned landscape changes when images and text are used together.

A further example focuses on engagement aimed to explore participants' values connected to environmental issues. Kenter et al. (2014) describe three case studies of values derived from the local marine environment. Workshops took place in different parts of the UK, and included local residents, representatives of community groups and people who regularly use the marine environment for leisure activities, such as angling and diving. They incorporated methods of deliberation, storytelling by participants on their experiences of the environments, and walks in the local marine setting.

Through the case studies, the authors demonstrate that the deliberative techniques employed could clarify participants' own values in relation to the environment, as well as help participants understand values held by others and competing social demands. For instance, storytelling brought out the meaning and experiences associated with participants' values. Values also changed in the course of the deliberative processes: egotistic values reduced in magnitude, while biospheric values and environmental worldviews increased. Deliberation and social learning also led not to the aggregation of individual values, but rather to the creation of joint values, based on which a joint decision on what would bring the most value to the community could be made.

These examples of engagement to change people's attitudes on environmental issues demonstrate that awareness and concern go hand-in-hand. Engagement on climate change and recycling, however, demonstrates that information given to participants can influence their attitudes on these issues, but also that it matters what type of information is made available. Sciencewise (2013) and Keep Britain Tidy (2014) suggest that environmental issues had to be explained clearly to participants, working through the costs, benefits and risks of mitigating action for society and the individual. This is supported by evidence covering engagement on topics that participants consider difficult to approach, such as hydrogen technology (Flynn et al. 2008) or bioenergy (BBSRC 2013), where the thorough explanation of costs and benefits was considered important.

In these cases, the lack of understandable information was linked to incomplete results from the engagement.

The Defra (2016) paper in the previous sub-chapter suggested that striking or shocking information may increase participants' concern over an environmental issue. The authors describe, however, that some struggled to find scientific information on distant issues relatable. The relatability of the information to the participant also appeared important in changing attitudes towards recycling. The arguments that Keep Britain Tidy (2014) describes as most compelling are ones related either to personal or local benefits of recycling or to costs that are society-wide but also likely to impact the participant. In the context of land use and green infrastructure, the presentation of information influenced attitudes, through improved understanding of what the different options entail (Shr et al. 2019). In the particular case of green infrastructure, images were found useful alongside verbal explanation.

Finally, Kenter et al. (2014) show that deliberative techniques can be useful for participants in exploring their own values in environmental issues. Letting participants discuss and share their values and experiences allowed them to understand their relationship with the environment and that of others, based on which joint decisions could be made.

Making use of how people think

A central theme across different areas of psychology and neuroscience states that there are at least two qualitatively different types of processes of human thinking: *intuitive* and *deliberative* (Evans and Stanovitch 2013; Sherman, Gawronski and Trope 2014; Haidt 2001). Intuition is largely automatic, happens outside of conscious awareness and is embodied and rooted in people's individual life experiences. Deliberative, reflective reasoning is rooted in language, is conscious and requires focused attention. Intuitive and deliberative thinking operate side-by-side in all of us; neither of them are wholly rational nor irrational; and both contribute to good as well as bad thinking. In the way these processes interact with each other, "intuitions come first, reasoning second" (Haidt 2001). Often deliberative reasoning is simply used to *justify* intuitions rather than analyse them rationally, but on other occasions, it can override it. People colloquially express the first as "exercising common sense", whereas the latter is expressed as "going against your gut feeling". Whereas it is commonly assumed that reasoning plays the most important role in shaping people's opinions, decisions and behaviour, the available science indicates that intuitive, experiential, automatic processes do much more of the heavy lifting than commonly appreciated.

3.5.3 Discussion

Synthesising the evidence begins to answer the question: *What and who influence people's attitudes and decisions on the environment when they are participating in different forms of public engagement?* This section discusses and synthesises the findings and identifies the gaps in the evidence base.

Synthesis

Participants come into the engagement setting influenced by their existing attitudes. In the above examples, information given to the participants was filtered by participants' trust in the information source, and those with prior experience of energy-saving behaviours were predisposed to accept the information given to them.

Most of the engagement described involves giving participants information about an environmental issue and encouraging them to deliberate on that information. The evidence shows that information provision is linked to changes in attitudes and behaviours, while deliberation is linked to acceptance.

Three factors influenced participants' behaviour in the course of engagement:

- **Underlining participants' personal responsibility for environmental issues** influenced openness to change behaviour in the course of engagement, as suggested by the effects of linking private energy consumption and climate change or encouraging the use of a carbon footprint calculator.

- Providing participants with **clear and achievable suggestions for practical actions** can lead participants to make changes to their behaviour.

- **Activities that practically demonstrated the impact of consumption behaviour** or changes of behaviour, such as a food waste diary or the encouragement to make use of energy-saving tips, were reported to change behaviour in participants.

Engagement on issues climate change and recycling demonstrates that **information given to participants** can influence their attitudes and that awareness and concern go hand-in-hand. However, **environmental issues have to be explained clearly** to participants, **working through the costs, benefits and risks** of mitigating action for society and the individual. This is supported by evidence on engagement on topics that participants consider difficult to approach, such as hydrogen technology: in these cases, the lack of understandable information meant that the desired results were not received from the engagement. There were three further aspects to information highlighted:

- **Striking or shocking information** may alert participants to the importance of issues like climate change, increasing people's concern.

- The **relatability of the information** to the participant appeared important in changing attitudes, as demonstrated by engagement on recycling.

- In the context of land use and green infrastructure, **the presentation of information influenced attitudes, through improved understanding** of what the different options entail. In the particular case of green infrastructure, images were found useful alongside verbal explanation.

In the context of the local marine environment, **deliberative techniques were shown to increase participants' understanding of their own values and those of others and come to joint conclusions**. The marine environment, as portrayed by the study, is a local, personal and concrete issue to participants. Whether these techniques would

work to improve understanding of more distant or complex policy issues is therefore not covered by the evidence.

Gaps and limitations

The evidence discusses a range of environmental issues, including of local, national and global importance. The REA did not find evidence on air, noise and water pollution, shortage of drinking water or extreme weather events.

Most papers discuss engagement where groups of participants are brought together (either face-to-face or online) to discuss or deliberate on an issue, or to receive information on environmental issues. There are also examples of a survey and activity interventions. There were, however, no examples of engagement that only focused on providing information, so the evidence is not clear on whether this alone would prove effective, or whether changes in behaviours or attitudes are more likely when participants deliberate over the information received.

Existing theories of deliberation would suggest that engaging participants in processes of reasoned debate through the provision of accessible and relevant information is likely to result in changes in attitudes (see for example Fishkin 2011), indicating that engagement underpinned by such principles could be more effective.

In terms of what influences participants' attitudes and decisions, there was limited evidence on the pre-existing factors that might determine attitudes. Most papers refer to the type of information provided to participants and how this information is presented, and there is limited evidence on the importance of *who* presents the information or conducts the engagement. With the exception of Shr et al. (2019), the topic of the research question is not the main focus of the papers and is often only touched upon in the evidence. In addition, the variety of the types of engagement and environmental issues considered means that only broad conclusions can be drawn.

4 Conclusion

This report has explored recent evidence linked to the overall aim of the CEE project: to understand the public's environmental attitudes, values and priorities and how they could be involved in informing environmental policy making and implementation in the future. The evidence presented in this report has been generated by exploring questions in these two broad areas (see below) and will be used to help us plan the next stages of the programme. As noted earlier in this report, the evidence reviewed does not allow us to meaningifully conclude differences across demographic or segmented groups.

Public views and attitudes on the environment	1. How do publics' conceptualise the environment? 2. What are the factors influencing public attitudes on environmental issues?
Approaches to public engagement on environmental issues	3. How can different engagement approaches interact with environmental policy decisions? 4. What and who influence people's attitudes and decisions on the environment when they are participating in different forms of public engagement?

Views and attitudes on the environment

The evidence suggests that publics conceptualise the environment in multiple ways, rather than through a universal definition. Whilst nature is predominantly thought of as composed of greenery, the environment more broadly is linked to ideas of offering services and benefits that enrich people's lives. Peoples connection and relationship to the environment was also emphasised in the evidence and often described through attachment to familiar places with positive connotations. However, there is some evidence of a competing narrative, where the environment is considered an external concern; discussed as quite separate to humans with the potential to negatively impact their livelihoods.

When asked to prioritise specific issues, the public tend to focus on the most impactful environmental problems that are local and visible to them. NatCen panel data suggests that in addition to climate change, *growing amount of waste, pollution of the sea and air pollution* are the most frequently selected priorities. We found the importance of these issues to be associated with respondents' age, education and political party support. In contrast, there were few statistically significant differences by region or geography (urban or rural).

Another aspect to prioritisation demonstrated in the evidence is the relative importance the public place on the environment compared to other issues (e.g. health, finances, immigration). However, the evidence does not otherwise offer a clear steer on what topics might be used in the next stages of our programme as people's priorities were fairly diffuse. In the immediate political context of 2019 with EU Exit and contemporary activism such as Extinction Rebellion[19], a further area to be alert to in our research is

[19] https://rebellion.earth/

whether public attitudes are changing in response to these high profile and immediate events.

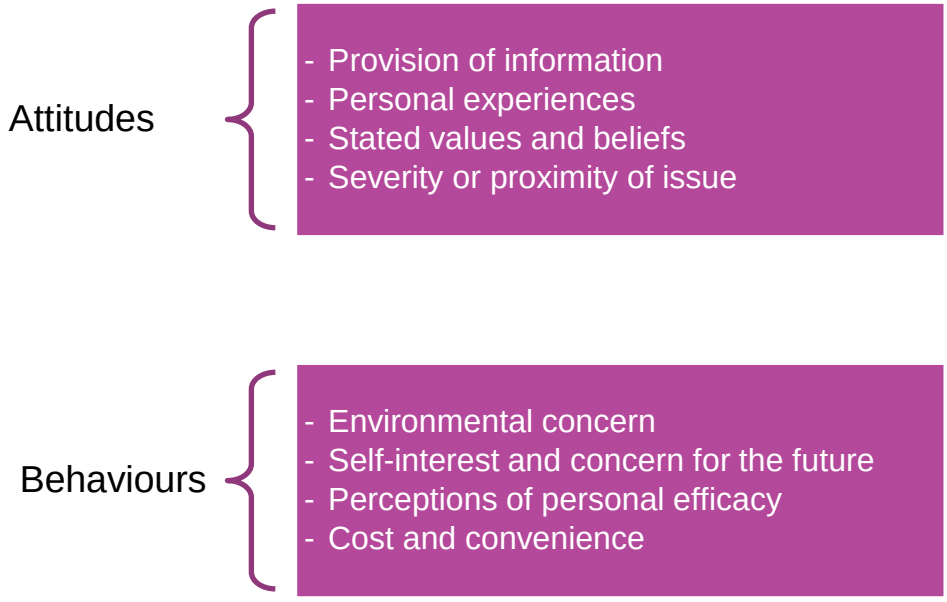
Correlated to evidence exploring factors influencing attitudes - proximity of the issue as well as personal experience also shape how people talk about their environmental priorities. Whilst stated values and beliefs are an indicator of what influence attitudes, most of the studies discussed in the main body of the text do *not* segment participants along value lines. However, taking theories of pre-existing values into account allows us to make additional observations about the studies' findings. For example, studies that show that low importance is given to certain environmental issues often hide the fact that stark attitudinal differences exist between different value groups.

The information people have about the environment and environmental issues unsurprisingly plays a role in shaping what they think and often the amount of media coverage an issue is given influences people's level of concern. In addition to traditional sources of media (e.g. established news channels), the emergence of new technologies and social networks, which are more dialogic in nature, are also identified as a site in which the public form views about the environment.

In addition, whilst the studies selected indicate how important local concerns are, there was less evidence discussing attitudes towards issues at a global scale and the balance between local and global issues will influence our agenda setting for the citizen engagement work we turn to next.

The evidence suggests that factors driving attitudes and behaviours are different (see Figure 4.1), and we have also highlighted that the "behaviour-intention" gap can be contexualised within existing theories of behavior change that incorporate both psychological and sociological understandings.

Figure 4.1: Factors driving attitudes and behaviours



The factors acting on behavior suggest that 'environmental citizenship' is vital for ensuring the public consider their responsibilities in protecting and looking after the environment, but this sits somewhat in contrast with earlier evidence that self-interest is often prioritised over the collective. Perceptions of personal efficacy – the belief that the actions citizens take is likely/unlikely to make a difference – were also tied to how people saw the actions of others. The evidence suggests people are motivated to make changes if they see others doing so. When asked to identify the extent to which a selection of stakeholders take the views of the public into account on environmental issues (via the NatCen panel), the government and big companies and industry were most frequently identified as being least likely to do so, suggesting the public don't view either of these stakeholders as particularly responsive to their views.

The question of who the public think is responsible for taking action and whether this is a factor in decisions about their own behaviours could be valuably developed and we outline in the next section what this might look like in the citizen engagement phase of this programme.

Evidence on the factors influencing behaviours also tends to concentrate on the barriers to action, rather than enablers. There is potential for these factors to be considered in both ways, but further exploration on the values underlying these behaviours as well as how people would consider and respond to trade-offs requires further exploration.

Approaches to public engagement on environmental issues

The evidence reviewed on public engagement clearly demonstrates that the various approaches discussed produced different policy-level results and positioned publics differently in terms of what was being asked of them. The clearest distinction was those activities that focused more on consulting the public on pre-agreed solutions and those with a more deliberative component. That deliberative approaches were associated with influencing participant understanding of and attitudes to a topic suggest them as a format we should prioritise in support of our project aims.

Of the types of interaction explored[20] the evidence also identified factors that could support policymaker's ability to incorporate the outcomes of engagement into decision making (or influence those who could). These related to stakeholder involvement in engagement and that how the information generated was communicated back to decision makers mattered. Short visual materials were found to have the potential to effectively present the different points of view of those participating to aid policy makers' decisions for example.

The studies reviewed demonstrated that participants come into engagement settings influenced by their existing attitudes and engagement approaches had a role to play in both getting to public attitudes and having the potential to modify them. How information – particularly scientific and technical in nature was shared to generate understanding of an issue was significant as was participant trust in the source. For example, participants with strong views on climate change looked for information that affirmed their views and distrusted information that did not. Another feature to this was the influence of people's backgrounds on their attitudes - while natural scientists looked for facts and evidence on

[20] Consulting on pre-defined policy options; participants deciding what should be on the policy agenda; community members opposing policy decisions.

climate change, arts and humanities academics were looking for a structured argument, and members of the lay public were interested in newsworthy stories. That we are actively seeking participants to our expert training from different sectors, to work together through the production of materials and activities, will be an interesting exercise in response.

A further dimension with respect to our programme is that events take into consideration a focus on issues local to participants and in which they might have a stake, as well as being able to articulate how they are part of a bigger process linked to possible change. These were both identified as enablers to engagement influencing policy. We further outline how we intend to respond to this point in the delivery of our programme below.

Engagement that encouraged participants to take action and underlining personal responsibility were deemed effective at influencing openness to behaviour change in the course of engagement. These were often accompanied by a variety of techniques to clarify participants' own values in relation to the environment, as well as help participants understand values held by others and identify competing social demands. For instance, storytelling brought out the meaning and experiences associated with participants' values. This sits in contrast with examples in some cases where scientific information was considered distant and unrelatable and suggests some incompatibility between an overtly scientific approach and more relational techniques. One particular consideration for this point with respect to informing policy is the risk that a hierarchy of evidence could result when deciding on *what* of the information generated is incorporated into policy decisions.

The evidence on engagement also suggests that the tension between intuitive vs reasoned thinking (and the design of engagement spaces to prompt these) is ever present. Given the importance of intuitive and experiential cognitive processes highlighted in the text, and in line with current deliberative theories of participation, public consultations do well to engage as much of the intuitive and experiential as feasible. For example, one study incorporated storytelling and walks in the local environment as part of the consultation process. Maximising opportunities for activating the intuitive and experiential side of people is likely to lead to more robust data than verbal, conceptual and abstract discussion formats alone.

Finally, one general omission from this section of evidence is that none of the studies reviewed included any information on how those participating in the engagement being described found or experienced the approach, beyond evaluative observations of the study's authors. Whilst this is not unexpected, it does point to a general under-representation of citizen's voices in the evidence which is worth acknowledging and could tell us more in the future about for example, whether a particular engagement format works better or worse for different groups of people.

Implications for the next phase

The combination of evidence, survey responses and wider references drawn on to inform this scoping report have highlighted a rich range of implications for the next phase of our project. An original aim with the citizen engagement phase was to design deliberations to access people's underlying attitudes and the findings presented here suggest this is still a sensible ambition. Doing so will help us work in the gap evidenced between

intention and behaviour and learn more about how people consider and prioritise aspects of the environment and associated trade-offs with respect to policy making.

The purpose of this project is not to explicitly test policy options, yet the evidence suggests the value of policy maker engagement in deliberations (or their framing), as well as how the findings of events can feed into policy making processes. We suggest the bridge to policy engagement should be made through a set of cross-cutting questions about policy levers and choices that are relevant to the implementation of Defra's 25 Year Plan (25YEP) and Natural England's strategy Conservation 21 (C21). For example:

- what should government do vs other actors?
- how ambitious should government be?
- how do people feel about market mechanisms vs regulation?
- what are priority areas for investment vs other policy areas?

In the absence of clear evidence to suggest prioritising a particular set of environmental issues, we instead have some flexibility about which issues may be the subject of public engagement and can use these as catalysts for conversations. We do however plan for these issues to correspond to the chapters of the 25YEP.

Much of the evidence on approaches to public engagement resonates with the methods we have in mind for our citizen engagement work. In addition to the policy connections suggested above, this includes designing deliberations to begin with local issues and including the provision of a variety of sources of information with an interest to test how these are received and interpreted. Throughout our programme we also plan to make use of formats that take account of the evidence on capturing deliberative as well as intuitive responses, by designing data collection with this in mind. This can include the use of creative methods in workshop settings to respond to questions and discussions as well as exploring people's views and attitudes when in the environment under discussion, for example, taking a beach walk.

On this basis we have now laid the foundations for the next phase of programme delivery.

Appendix A. List of included studies

Full citations	
1	Adkin, L. E., Hanson, L. L., Kahane, D, Parkins, J. R., & Patten, S. (2017) Can public engagement democratize environmental policy making in a resource dependent state? Comparative case studies from Alberta, Canada. *Environmental Politics*, 26(*2*), 301-321.
2	Beaglehole, J., Patel, R. (2016). Public views on low-carbon heat technologies: Report of the Sciencewise Sounding Board pilot. *Sciencewise.* Retrieved from https://webarchive.nationalarchives.gov.uk/20170712122920/http://www.sciencewise-erc.org.uk/cms/committee-on-climate-change-public-views-on-decarbonising-heat/
3	Benham, C. F. (2017). Understanding local community attitudes toward industrial development in the Great Barrier Reef Region World Heritage Area: Are environmental impacts perceived to overshadow economic benefits? *Natural Resources Forum 41*(1), 42-54.
4	BIS/Sciencewise (2011). Landscapes and Ecosystem Futures Case Study: Public engagement in England, Scotland and Wales. *Sciencewise.* Retrieved from https://webarchive.nationalarchives.gov.uk/20170110132638/http://www.sciencewise-erc.org.uk/cms/public-engagement-on-landscape-and-ecosytem-futures-evaluation-and-learning/.
5	Carmichael, J. T., & Brulle, R. J. (2017). Elite cues, media coverage, and public concern: an integrated path analysis of public opinion on climate change, 2001–2013. *Environmental Politics*, *26*(2), 232-252.
6	Christmas, S., Bloomfield, B., Bradburn, H., Duff, R., Ereaut, G., Miskelly, K., Scorah, K., Whiting, R. (2018). Pollinating insects: what do they mean to people and why does it matter? *Defra*. Retrieved from http://randd.Defra.gov.uk/Document.aspx?Document=14215_PH0523_FinalReport.pdf
7	Dean, A. J., Fielding, K. S., Newton, F. J. (2016). Community knowledge about water: who has better knowledge and is this associated with water-related behaviors and support for water-related policies? *PloS ONE*, *11*(7), e0159063.
8	Dodds, L., Hopwood, B. (2006). BAN waste, environmental justice and citizen participation in policy setting. *Local Environment*, *11*(03), 269-286.
9	Entradas, M., Longridge, E., Middleton, P., Pope, S. (2013). Bioenergy dialogue: Final report. *BBSRC.* Retrieved from https://bbsrc.ukri.org/documents/bioenergy-dialogue-report-pdf/
10	Fish, R. & Saratsi, E. (2015). Naturally Speaking… A Public Dialogue on the UK National Ecosystem Assessment. *Centre for Rural Policy Research,*

	University of Exeter. Retrieved from http://valuing-nature.net/sites/default/files/documents/NEA_Dialogue_Final_Report_final.pdf
11	Fisher, S., Fitzgerald, R., Poortinga, W. (2018). Climate change: Social divisions in belief and behaviour. *British Social Attitudes.* Retrieved from http://www.bsa.natcen.ac.uk/media/39251/bsa35_climate_change.pdf
12	Flynn, R., Bellaby, P., Ricci, M. (2008). Environmental citizenship and public attitudes to hydrogen energy technologies. *Environmental Politics*, *17*(5), 766-783.
13	Giorgi, S., Fell, D., Austin, A., & Wilkins, C. (2009). EV0402: Public Understanding of Links between Climate Change and (i) Food and (ii) Energy Use: Final Report. A report to the Department for Environment, Food and Rural Affairs. *Defra.* Retrieved from http://randd.Defra.gov.uk/Document.aspx?Document=13415_140703EV0402PublicUnderstandingofLinksMainReportFINALJan2016.pdf
14	Gregory, R., Wellman, K. (2001). Bringing stakeholder values into environmental policy choices: a community-based estuary case study. *Ecological Economics*, *39*(1), 37-52.
15	Hannibal, B., Vedlitz, A. (2018). Social capital, knowledge, and the environment: The effect of interpersonal communication on climate change knowledge and policy preferences. *Sociological Spectrum*, *38*(4), 277-293.
16	Ipsos MORI (2013). PREPARE – Climate change acceptability: Findings from a series of deliberative workshops and online survey. *Defra.* Retrieved from http://randd.Defra.gov.uk/Document.aspx?Document=11261_PREPARECA0513Publicclimateriskacceptability-Finalreport.pdf
17	Jarrell, M. L., Ozymy, J., McGurrin, D. (2013). How to encourage conflict in the environmental decision-making process: imparting lessons from civic environmentalism to local policy-makers. *Local Environment*, *18*(2), 184-200.
18	Kaltenborn, B. P., Gundersen, V., Stange, E., Hagen, D., Skogen, K. (2016). Public perceptions of biodiversity in Norway: From recognition to stewardship?. *Norsk Geografisk Tidsskrift-Norwegian Journal of Geography*, *70*(1), 54-61.
19	Keep Britain Tidy (2014). The Ur[bin] Issue: working with communities to improve urban recycling. *Britain Thinks.* Retrieved from http://britainthinks.com/pdfs/Keep-Britain-Tidy-The-UrBin-Issue.pdf
20	Keep Britain Tidy (2018). Water, water, everywhere 2018: Moving from awareness to action on single-use plastic bottles. *Keep Britain Tidy.* Retrieved from https://www.keepbritaintidy.org/sites/default/files/resources/Water%20Water%20Everywhere%202018%20Report%20WEB.pdf
21	Kenny, J. (2018). Environmental protection preferences under strain: an analysis of the impact of changing individual perceptions of economic and

	financial conditions on environmental public opinion during economic crisis. *Journal of Elections, Public Opinion and Parties*, *28*(1), 105-124.
22	Kenter, J.O., Reed, M. S., Irvine, K.N., O'Brien, E. (2014). UK National Ecosystem Assessment follow-on: Work package report 6: Shared, plural and cultural values of ecosystems. *UK National Ecosystem Assessment.* Available at: http://uknea.unep-wcmc.org/LinkClick.aspx?fileticket=NPDIZw2mq6k%3d&tabid=82
23	Kosmopoulos, P., Kantzioura, A., Kosmopoulos, I., Kleskas, K., Kosmopoulos, A. M. (2017). The impact of recession on public attitudes towards energy and the environment. *International Journal of Sustainable Energy*, *36*(3), 209-224.
24	Medd, W. (2016) Evaluation of a public dialogue on the UK National Ecosystem Assessment. *Sciencewise.* Retrieved from https://webarchive.nationalarchives.gov.uk/20170110132607/http://www.sciencewise-erc.org.uk/cms/public-dialogue-for-the-uk-national-ecosystem-assessment/
25	Natural England (2009) Experiencing landscapes: capturing the 'cultural services' and 'experiential qualities' of landscape. *Natural England.* Retrieved from http://publications.naturalengland.org.uk/publication/48001
26	Natural England (2011) Experiencing landscapes: towards a judgement-making framework for 'cultural services' and 'experiential qualities'. *Natural England.* Retrieved from http://publications.naturalengland.org.uk/publication/162029
27	Petheram, L., Stacey, N., Campbell, B. M., High, C. (2012). Using visual products derived from community research to inform natural resource management policy. *Land Use Policy*, *29*(1), 1-10.
28	Rissman, A. R., Kohl, P. A., Wardropper, C. B. (2017). Public support for carrot, stick, and no-government water quality policies. *Environmental Science & Policy*, *76*, 82-89.
29	Rokka, J., Moisander, J. (2009). Environmental dialogue in online communities: negotiating ecological citizenship among global travellers. *International Journal of Consumer Studies*, *33*(2), 199-205.
30	Sciencewise (2013). UK response to climate change: Final report: Findings public dialogue. *Committee on Climate Change.* Retrieved from https://www.theccc.org.uk/wp-content/uploads/2013/12/Hopkins-Van-Mil-Public-Dialogue-Report.pdf
31	Shao, W., Xian, S., Lin, N., Small, M. J. (2017). A sequential model to link contextual risk, perception and public support for flood adaptation policy. *Water Research*, *122*, 216-225.
32	Shr, Y. H. J., Ready, R., Orland, B., Echols, S. (2019). How do visual representations influence survey responses? Evidence from a choice

	experiment on landscape attributes of green infrastructure. *Ecological Economics*, *156*, 375-386.
33	Shuckburgh, E., Robison, R., & Pidgeon, N. (2012). Climate science, the public and the news media: Summary findings of a survey and focus groups conducted in the UK in March 2011. *NERC.* Retrieved from http://nora.nerc.ac.uk/id/eprint/500544/1/lwec-climate-science.pdf
34	Sinclair, A.J., Peirson-Smith, T. J., & Boerchers, M. (2017) Environmental assessments in the Internet age: the role of e-governance and social media in creating platforms for meaningful participation. *Impact Assessment and Project Appraisal*, 35(*2*), 148-157.
35	Steentjes, K., Pidgeon, N. F., Poortinga, W., Corner, A. J., Arnold, A., Böhm, G., Mays, C., Poumadere, M., Ruddat, M., Scheer, D., Sonnberger, M., Tvinnereim, E. (2017). European Perceptions of Climate Change (EPCC): Topline findings of a survey conducted in four European countries in 2016. *ORCA.* Retrieved from http://orca.cf.ac.uk/98660/7/EPCC.pdf
36	Turner, M., & Struthers, R. (2018). Public attitudes to air quality. *Defra.* Retrieved from http://randd.Defra.gov.uk/Document.aspx?Document=14241_DefraBMGResearch-PublicAttitudestoAirQuality-May2018-FINAL.pdf
37	Van Der Linden, S. (2015). Exploring beliefs about bottled water and intentions to reduce consumption: The dual-effect of social norm activation and persuasive information. *Environment and Behavior*, *47*(5), 526-550.

List of additional references

Ajzen, I. (1991). The theory of planned behavior. Organizational behavior and human decision processes, 50(2), 179-211.

Barnes, M. (2008). Passionate participation: Emotional experiences and expressions in deliberative forums. Critical social policy, 28(4), pp461-481.

Berry, L. et al. (2019). *Making space: how public participation shapes environmental decision-making.* SEI Discussion Brief, January 2019. Stockholm Environment Institute. https://www.sei.org/wp-content/uploads/2019/01/making-space-how-public-participation-shapes-environmental-decision-making.pdf

Braito, M. T., Böck, K., Flint, C., Muhar, A., Muhar, S., & Penker, M. (2017). Human-nature relationships and linkages to environmental behaviour. Environmental Values, 26(3), 365-389.

Bratman, G. N., Hamilton, J. P., & Daily, G. C. (2012). The impacts of nature experience on human cognitive function and mental health. Annals of the New York Academy of Sciences, 1249(1), 118-136.

Darnton, A. and Horn, J. (2013). Influencing behaviours - moving beyond the individual. A user guide to the ISM Tool.

Davies, C.J., 2016. *Whose knowledge counts? Exploring cognitive justice in community-university collaborations* (Doctoral dissertation, University of Brighton).

Devine-Wright, P. (2005) Local aspects of UK renewable energy development: exploring public beliefs and policy implications. Local Environment, 10(1), pp57-69.

Dryzek, J.S. & Neimeyer, S. (2012). What is Deliberative Democracy? See: http://deldem.weblogs.anu.edu.au/2012/02/15/what-is-deliberative-democracy/ (Accessed March, 2019)

Eden, S. (1996) Public participation in environmental policy: considering scientific, counter-scientific and non-scientific contributions. Public Understanding of Science, 5(3), pp183-204.

Evans, J. S. B., & Stanovich, K. E. (2013). Dual-process theories of higher cognition: Advancing the debate. Perspectives on psychological science, 8(3), 223-241.

Fischer, F. (2000). Citizens, experts, and the environment: The politics of local knowledge. Duke University Press.

Fox, O. and Stoett, P. (2016). Citizen participation in the UN Sustainable Development Goals consultation process: toward global democratic governance? Global Governance: A Review of Multilateralism and International Organizations, 22(4). 555–74. http://journals.rienner.com/ doi/abs/10.5555/1075-2846.22.4.555

Haidt, J. (2001). The emotional dog and its rational tail: a social intuitionist approach to moral judgment. Psychological Review, 108(4), 814.

Hulme, M. (2016). Weathered: cultures of climate. Sage.

Parkinson, J. (2006) Deliberating in the real world: problems of legitimacy in deliberative democracy. Oxford University Press.

McMahan, E. A. (2018). Happiness comes naturally: Engagement with nature as a route to positive subjective well-being. In E. Diener, S. Oishi, & L. Tay (Eds.), Handbook of well-being. Salt Lake City, UT: DEF Publishers

Rapley, C. G., De Meyer, K., Carney, J., Clarke, R., Howarth, C., Smith, N., ... & Lotto, B. (2014). Time for Change? Climate Science Reconsidered: Report of the UCL Policy Commission on Communicating Climate Science, 2014.

Rose, C. (2011). What Makes People Tick: The Three Hidden Worlds of Settlers, Prospectors and Pioneers.

Schwartz, S. H., Cieciuch, J., Vecchione, M., Davidov, E., Fischer, R., Beierlein, C., ... & Dirilen-Gumus, O. (2012). Refining the theory of basic individual values. Journal of personality and social psychology, 103(4), 663.

Sherman, J. W., Gawronski, B., & Trope, Y. (Eds.). (2014). Dual-process theories of the social mind. Guilford Publications.

Stevenson, H. & Dryzek, J.S. (2014). *Democratizing Global Climate Governance.* Cambridge University Press.

Walker, C., Artaraz, K., Davies, C.J. et al (2018). Building Spaces for Controversial Public Engagement – Exploring and Challenging Democratic Deficits in NHS Marketization. *Journal of Social and Political Psychology*. 6(2), pp759-775

Appendix B. List of websites

The websites were searched during February 2019.

Website source	Link
Arts and Humanities Research Council (AHRC)	https://ahrc.ukri.org/search-results/
Brexit & Environment	https://www.brexitenvironment.co.uk/resources/
British Ecological Society	https://www.britishecologicalsociety.org/search/?q=
British Social Attitudes Survey (BSA)	http://www.bsa.natcen.ac.uk/
Cabot Institute, University of Bristol	http://www.bristol.ac.uk/research/publications/
Centre for Environmental Policy, Imperial College	https://www.imperial.ac.uk/environmental-policy
Defra (gov.uk)	https://www.gov.uk/government/publications
Defra Science and Research Projects Database	http://randd.Defra.gov.uk/Default.aspx?Location=None&Module=FilterSearchNewLook&Completed=0
Economic and Social Research Council	https://esrc.ukri.org/search-results/
ENDS Report	https://www.endsreport.com/
Environmental Performance Index	https://epi.envirocenter.yale.edu/epi-country-report/GBR
Eurobarometer	http://ec.europa.eu/commfrontoffice/publicopinion/index.cfm
Eurofound	https://www.eurofound.europa.eu/
European Centre for Environment and Human health	https://www.ecehh.org/research/
European Social Survey	https://www.europeansocialsurvey.org/
Global Food Security programme	https://www.foodsecurity.ac.uk/
Grantham Institute – Climate Change & Environment (Imperial/LSE)	http://www.lse.ac.uk/GranthamInstitute/publications/?styp=163
Institute for European Environmental Policy	https://ieep.eu/publications
Institute for Public Policy Research (IPPR)	https://www.ippr.org/
Ipsos Mori	https://www.ipsos.com/ipsos-mori/en-uk
Keep Britain Tidy	https://www.keepbritaintidy.org/

Monitor of Engagement with the Natural Environment (gov.uk)	https://www.gov.uk/government/statistics/monitor-of-engagement-with-the-natural-environment-headline-reports-and-technical-reports-2016-2017-to-2017-2018
National Coordinating Centre for Public Engagement	https://www.publicengagement.ac.uk/
Natural England (gov.uk)	https://www.gov.uk/government/publications?departments%5B%5D=natural-england
Office for National Statistics (ONS)	https://www.ons.gov.uk/
Organisation for Economic Co-operation and Development (OECD)	https://www.oecd-ilibrary.org
Royal Society for the Protection of Birds (RSPB)	https://www.rspb.org.uk/
Sciencewise	https://sciencewise.org.uk/projects-and-impacts/project-library/
Society of Biology	https://www.rsb.org.uk/component/search/?searchword=&searchphrase=all&areas[0]=content&Itemid=531
Stockholm Environment Institute	https://www.sei.org/publications/
The Institution for Environmental Sciences	https://www.the-ies.org/
The Natural Environment Research Council (NERC)	https://nerc.ukri.org/search-results/
Tyndall Centre for Climate Change Research	https://tyndall.ac.uk/search/node
UCL Institute for Environmental Design and Engineering	https://www.ucl.ac.uk/bartlett/environmental-design/research/research-projects-0
UK Research Innovation	https://www.ukri.org/
Wildfowl and Wetlands Trust (WWT)	https://www.wwt.org.uk/our-work/wetland-conservation-unit/publications/
Woodland Trust	https://www.woodlandtrust.org.uk/publications/
Word Wildlife Fund (WWF)	https://www.worldwildlife.org/

Appendix C. Search strategy

Database searches were carried out on the 15th of February, through the EBSCOhost platform. Search strings were piloted to ensure accuracy and breadth of results.

Question 1

How do publics conceptualise the environment?

TI ((“public” OR “people” OR “popula*” OR “civic” OR “communities” OR “community” OR “societ*” OR “voter” OR “electorate”)) AND TI ((“concept*” OR “attitude*” OR “value* OR “belief*” OR “understand*” OR “conceive*” OR “framing” OR “opinion*” OR “worldview*” OR “interpret*” OR “mean*” OR “defin*”)) AND TI (“environ*”)

Question 2

What are the factors influencing public attitudes on environmental issues?

Different search strings were run for question 2 for the different environmental issues under consideration. The below search string is an example of the search string used for climate change.

TI ((“climate change” OR “global warming” OR “greenhouse effect” OR “fossil fuels”)) AND TI ((“public” OR “people” OR “popula*” OR “civic” OR “communities” OR “community” OR “societ*” OR “voter” OR “electorate”)) AND TI ((“factor” OR “drive*” OR “explain*” OR “explan*” OR “influenc*” OR “impact”)) AND TI ((“attitude” OR “support” OR “view” OR “percept*” OR “opinion” OR “stance” OR “stand point” OR “position” OR “sentiment” OR “outlook” OR “preference”))

Question 3

How can different engagement approaches interact with environmental policy decisions?

TI ((“public” OR “people” OR “popula*” OR “citizen” OR “individual” OR “civic” OR “communit*” OR “societ*” OR “social” OR “voter” OR “electorate” OR “stakeholder”)) AND TI ((“engage*” OR “involve*” OR “consult*” OR “communicat*” OR “forum” OR “civic” OR “council” OR “neighb*rhood” OR “communit*” OR “participat*” OR “deliberat*” OR “cooperat*” OR “dialogue” OR “assembl*” OR “workshop” OR “focus group” OR “roundtable” OR “panel” OR “hearing” OR “vot*” OR “poll*” OR “referend*” OR “survey” OR “co-production”)) AND TI (((“environ*” OR “natur*” OR “surrounding” OR “habitat” OR “ecol*” OR “land*” OR “wild*”)) AND TI ((“policy*” OR “decision*” OR “legisla*” OR “decid*” OR “govern*” OR “regulat*” OR “rule” OR “negotiat*”))

Question 4

What and who influence people’s attitudes and decisions on the environment when they are participating in different forms of public engagement?

TI ((“factor” OR “drive*” OR “explain*” OR “explan*” OR “influenc*” OR “impact”)) AND TI ((“attitude” OR "accept*" OR “view” OR “percept*” OR “opinion” OR “outlook” OR “preference” OR “behave*”) OR (“decision” OR “decide” OR “agree*” OR “compromise” OR “choice” OR “select*” OR “judgement”)) AND TI (((“environ*” OR “natur*” OR “surrounding” OR “habitat” OR “ecol*” OR “land*” OR “wild*”)) AND TI ((“engage*” OR “involve*” OR “consult*” OR “communicat*” OR “forum” OR “civic” OR “council” OR “neighb*rhood” OR “communit*” OR “participat*” OR “deliberat*” OR “cooperat*” OR “dialogue” OR “assembl*” OR “workshop” OR

“focus group” OR “roundtable” OR “panel” OR “hearing” OR “vot*” OR “poll*” OR “referend*” OR “survey” OR “discuss*” OR “co-production”))

Condensed search terms

Table C presents the condensed search terms used for wesite searches. For each website search, appropriate terms were chosen from the list based on the focus of the website.

Table C: Condensed search terms

Public conceptions and attitudes	Public engagement
Public attitude* Public view* Public understanding* Public perception* Environment* Nature	Public engagement Participat* Consultat* Deliberat* Dialogue Environment* Nature

Appendix D. Extraction template

Broad Category	Category	Further Guidance
Descriptive information	Researcher/Coder	Initials of person completing data extraction
	Title	Record publication title as it appears in document.
	Authors	Record all authors
	Publication date	
	Country	Note down the country where the study is set. If set across multiple countries, record all.
	Study design	Briefly summarise the study methodology used.
	Summary	Brief summary of the study
Question 1 – How do the public conceptualise the environment?	Conceptions of the environment	Briefly summarise information on the public's conceptions of the environment.
	Differences between groups	Briefly summarise any information on differences between groups. Note down here the groups (as defined by the paper) that the conceptions belong to.
	Theoretical frameworks	Note down any theoretical frameworks the paper builds on
Question 2 – What factors influence public attitudes towards the environment?	What is discussed	Is it an environmental issues or policy to mitigate issues? Describe in detail what it is. Is it attitudes or behaviour?
	Factors that influence existing attitudes	Briefly summarise information on factors that influence existing attitudes.
	Factors that change attitudes	Briefly summarise information on factors that drive change in attitudes.
	Differences between groups	Briefly summarise any information on differences between groups.
	Differences across issues	Briefly summarise any differences between environmental issues, using sub-headings for different issues.

	Theoretical frameworks	Write down any theoretical frameworks that the paper builds on.
Question 3 – How do different engagement approaches influence policy making?	Purpose of engagement	Record any details of what the engagement aimed to achieve
	Engagement approaches	List and briefly summarise information on approaches used to engage the public on environmental issues.
	How engagement approaches influence policy making	Briefly summarise information on how different engagement approaches influence policy making (i.e. reasons/factors why engagement did or did not result in a policy outcome).
	Differences between groups	Briefly summarise any information on differences between groups.
	Differences across issues	Briefly summarise any differences between environmental issues, using sub-headings for different issues.
	Theoretical frameworks	Write down any theoretical frameworks that the paper builds on.
Question 4 – What and who influences people's attitudes when they are participating in engagement?	Factors influencing attitudes during engagement	Briefly summarise information on factors that influence attitudes and decision-making of the public in the context of engagement approaches.
	Differences between groups	Briefly summarise any information on differences between groups.
	Differences across issues	Briefly summarise any differences between environmental issues, using sub-headings for different issues.
	Theoretical frameworks	Write down any theoretical frameworks that the paper builds on
Other information	Case examples	List any examples of engagement, that the project team can refer to in the future. Write down the type of engagement, why it is interesting, and the page number where it appears. You do not need to describe the engagement.

Weight of evidence	Quality assessment	-How well is it written? E.g. does it have an academic/formal tone? Is it clear? Are there spelling mistakes? Is it peer-reviewed?
	Methodology	-Do the research methods map onto the aims and objectives? - Are the methods and the rationale discussed? E.g. quantitative methods are used, is this justified? - Is there a section on sampling and ethics? -Are the limitations of the respective approaches discussed?
	Relevance	To what extent does the question address our research questions? E.g. does it speak directly to one or more research questions or only indirectly?
	Overall score	With the questions in mind, rate each category low/medium/high and then determine the final score. When deciding on the final score, consider that each area is weighted equally, i.e. low/medium/high = medium
Reviewer comments	Reviewer comments	Additional notes by reviewer

Appendix E. Weight of evidence template

Area	Quality assessment	Methodology	Relevance
Questions to consider	-Does the article address the research questions outlined? -How well is it written? E.g. does it have an academic/formal tone? Is it clear? Are there spelling mistakes? Is it peer-reviewed?	-Do the research methods map onto the aims and objectives? - Are the methods and the rationale discussed? E.g. quantitative methods are used, is this justified? - Is there a section on sampling and ethics? -Are the limitations of the respective approaches discussed?	- To what extent does the question address our research questions? E.g. does it speak directly to one or more research questions or only indirectly?

Appendix F. Relationships between overall research questions and elements of programme delivery

In what ways do publics conceptualise and attach value to the environment?

REA investigates qualitative studies on public understandings and language use on the environment

Expert training further informs our definitions from a range of stakeholders (academic/policy/NGO)

Citizen Engagement events will put our assumptions to the test through responses to the materials designed and through discussion driven by relevant questions. Data capture will include identifying visions, futures and priorities

What are the factors influencing public attitudes to environmental issues?

REA explores the evidence about existing drivers and the nature and conditions of that evidence (e.g. type of study/groups involved).

Citizen Engagement events designed to probe further, e.g. data capture in distributed dialogues will include scenario activities that test public choices and questions for discussion in public dialogues will be designed to uncover 'subterranean' attitudes.

What are the different ways publics can engage with environmental issues and policy making?

REA identifies range of engagement approaches and how they interact with environmental policy decisions. It also explores available evidence on who publics listen to and are influenced by in different scenarios.

Expert training incorporates the experience of a range of stakeholders (academic/policy/NGO) on tried/tested approaches to engagement with environmental issues.

Citizen Engagement public dialogues will design questions for group discussion that can more deeply explore the findings of the REA. Public and distributed dialogues will also capture perceptions of the value of different approaches through interactive activities and deeper discussion. Participants will receive a range of information from different sources and data capture will collate views on different influences.

Appendix G. CEE Panel Data analysis plan

{ASK ALL}
EnvIssues [MULTICODE: RANDOMISE 1…10]
"{WEB: "Below is"; TEL: "I will now read out"} a list of environmental issues. Please pick the three issues which you consider the most important."

{#G_MultiUpTo3_II1}

1. Decline or extinction of species and natural environments
2. Shortage of drinking water
3. Extreme weather events (e.g. frequent droughts or floods)
4. Pollution of rivers, lakes and ground water
5. Pollution of the sea
6. Air pollution
7. Noise pollution
8. Climate change
9. Growing amount of waste
10. Agricultural pollution (use of pesticides, fertilisers, etc.) and falling soil quality
11. Other (please specify)
12. None of these [EXCLUSIVE]
13. Don't know

{ASK ALL}
EnvViews [GRID: RANDOMISE ROWS; FLIP SCALE]
"{WEB: "Below is"; TEL: "I will now read out"} a list of groups and organisations.

To what extent do you feel each of the following take your views into account when making decisions about the environment?"

{# G_Grid_II1}

GRID ROWS
1. Big companies and industry
2. Your local community
3. Your city/metropolitan authority
4. The government

GRID COLS
1. Not at all
2. Not very much
3. A fair amount
4. A great deal

Dependent variables

Attitudes

'Below is a list of environmental issues. Please pick the three issues which you consider the most important.'

- Decline or extinction of species and natural environments
- Shortage of drinking water
- Extreme weather events (e.g. frequent droughts or floods)
- Pollution of rivers, lakes and ground water
- Pollution of the sea
- Air pollution
- Noise pollution
- Climate change
- Growing amount of waste
- Agricultural pollution (use of pesticides, fertilisers, etc.) and falling soil quality
- Other (specify)
- None of these
- Don't know

5. Perceptions of organisations

'To what extent do you feel the following take your views into account when making decisions about the environment?'

- Big companies and industry
- Your local community
- Your local council
- Your city/ metropolitan authority
- The government

Answer categories:

- *Not at all*
- *Not very much*
- *A fair amount*
- *A great deal*

Explanatory variables

Although the panel routinely collects 18 variables across the following categories we have selected those we think are the priority for analysis.

Demographic	• Sex • Age (categories) • Ethnicity
Social	• None selected
Geographic	• Region • Urban/rural
Socio-economic	• Highest qualification • Subjective income
Political	• Political party identification
Behavioural	• None selected

Analysis plans

Research question	Approach
Which characteristics influence whether or not people consider a particular environmental issue important?	1. **Association between the explanatory variables and importance of environmental issues:** • Run cross tabulations to check whether there are any patterns in who considers a particular environmental issue important. • For example, are those living in urban areas more likely to be concerned about waste than those living in rural areas? • Use a chi squared test to check the statistical significance of any patterns. 2. **Relationship between the explanatory variables and importance of environmental issues:** • To check which patterns pertain, run an iterative regression model, where groups of explanatory variables are added at a time. • For example, first run a regression to see if demographic characteristics are related to considering climate change important. Then check whether any patterns are still present if geographical characteristics are added to the equation. • Check significance of coefficients. (Note: has to be a logistic regression, since the dependent variable is binary.)
What kind of overlap, if any, is there between considering different issues important?	• Run cross tabulations between different issues. • For example, are the people who consider extreme weather events important also likely to be concerned about climate change? • Pick which issues are interesting, since there are many.
Which characteristics influence whether or not people feel that particular organisations take their views into account?	1. Combine response categories to turn the question into an agree/disagree variable (otherwise the regression model is very complex to interpret). 2. **Association between the explanatory variables and attitudes:** • Run cross tabulations to check whether there are any patterns in who perceives that different organisations take their views into account. • For example, are those with higher incomes more likely to perceive that big companies take their views into account?

	• Use a chi squared test to check the statistical significance of any patterns. 3. **Relationship between the explanatory variables and attitudes:** • To check which patterns pertain, run an iterative regression model, where groups of explanatory variables are added at a time. • For example, first run a regression to see if demographic characteristics are related to perceptions about big companies. Then check whether any patterns are still present if geographical characteristics are added to the equation. • Check significance of coefficients. (Note: has to be a logistic regression, since the dependent variable is binary.)
Are they the same or different people who feel that the different organisations take their views into account?	• Run crosstabs between perceptions of different organisations. • For example, are the people who feel that big companies don't take their views into account also likely to feel that the government doesn't take their views into account?