The assessment of cultural ecosystem services in the marine environment using Q methodology

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Abstract

Cultural ecosystem services are generally understood to be the non-material value that can be gained through ecosystems such as a sense of well-being, reflection and spiritual enhancement. These are often linked with a sense of place, culture, heritage and identity. The assessment of cultural ecosystem services, particularly in the marine environment is an inherently complex and difficult task, because they often involve making value judgments which can be hard to quantify. Methods applied to determining the value of these services are often focused on their financial value. Whilst methodologies have been developed to assess the non-material importance of these services, this paper argues that Q methodology provides a highly appropriate way of examining unmeasurable values by being able to convert qualitative, subjective data into quantitative information. The research presents two data sets derived from Q methodology which examined stakeholder views of the cultural values from two marine protected areas; the Pacific Rim National Park, Vancouver Island, Canada and an Area of Outstanding Natural Beauty in Chichester Harbour, UK. The relevance of using Q methodology as a valuation mechanism in this type of study is examined and justified; whilst highlighting the advantages of tackling a subject of values and intangibility, highly qualitative information, with a structured, semi-automated and primarily quantitative methodology. The findings show that the case-study areas hold three predominant 'factors' of value for its stake holders. These include the protected areas; as a place of care for each other and oneself through the natural world; a place of spirituality; and as a place of freedom and refuge. The paper strongly argues for the use of Q methodology in such a study, which ultimately helps to bring about a depth of information that arguably traditional methods are incapable of in the same capacity.

Introduction

The designation of Marine Protected Areas (MPAs) is a common strategy to safeguard what are considered to be valuable and vulnerable habitats and species (Bennett, 2013). MPAs can be designated at international, national and local scales and vary considerably in their purpose and influence. This variation is determined by their location, physical, socio-economic, and cultural characteristics, their policy context, and the specific flora and fauna protected. In order to justify the costs associated with the designation and ongoing operation of MPAs, the wider societal benefits they provide are increasingly being scrutinised. A commonly used approach to categorise the values provided by MPAs is to determine the ecosystem services that they provide. Ecosystem services have been defined by the Millennium Ecosystem Assessment (2005) as 'the benefits people obtain from ecosystems' (MEA, 2005, p. V preface).   Although a broad definition, it illustrates the interconnections between the conservation of ecological processes and the services and benefits provided to society (De Groot, Wilson et al. 2002; Daly and Farley 2004). Marine ecosystems support the delivery of multiple ecosystem services and benefits which are of importance to societal requirements and economic well-being, and include food security, climate regulation, recreation opportunities, raw materials, and medicines (Fletcher 2011; 2012; Bohnke-Henrichs et.al. (2013).

Cultural ecosystem services are present in all ecosystem service classifications (Millennium Ecosystem Assessment, 2005; TEEB, 2014; Fletcher et.al., 2011, Herbert et.al., 2013, Potts et.al., 2014; Bohnke-Henrichs et.al., 2013). Benefits that are generally considered to be in this category include recreation, aesthetics, spiritual experiences, identity, and belonging, improved health, psychological restoration and well-being, and connectedness to nature. Due to the somewhat intangible nature of some of these benefits, assessing the extent of cultural ecosystem service provision is challenging. Some of the benefits (such as recreation and some aspects of health and well-being) can be assessed in monetary terms as they have a market value or cost. Other cultural benefits (such as spiritual experiences, identity, and belonging) are more difficult to assess as they have no readily identifiable metric and no direct link to monetary value. Methods that have been used to assess the values associated with cultural ecosystem services in MPAs include citizen juries, place-based valuations, health valuations, indicator-based approaches, and to a limited extent, Q methodology (Fletcher et.al., 2014).

From its inception as a tool for psychological research, firmly based within a North American tradition, Q methodology has gradually gained credence both internationally and within wider fields where subjective value is a major facet of study. Marine research has used Q methodology to investigate a range of questions, such as gathering views of specific stakeholders such as fishers (Carr and Heyman, 2012; Bacher *et al.,* 2014), establishing priorities and values in a range of contexts ranging from oil spill response to coastal vulnerability to climate change (Tuler and Webler, 2009; Bischof, 2010; Sandbrook *et al.,* 2011; Albizua and Zografos, 2014), exploring various narratives of planning and management (Frantzi *et al.,* 2009), or understanding the role that science has to play in communicating ideas concerning marine conservation (Cairns, 2012). Haggan (2012) suggests that a key advantage of using Q methodology for the assessment of cultural ecosystem services in MPAs is that it enables 'immeasurable values' to be identified and an understanding of stakeholder perception patterns and groupings of MPAs to be elucidated using quantitative data that can be used in statistical analysis (Frantzi *et al.,* 2009). It is an approach that has been used and championed for creating and understanding a range of stakeholder dialogues (Wolf *et al.*, 2011).

This paper aims to explore the use of Q methodology to support the identification of cultural ecosystem services associated in MPAs. It does this through reflecting upon the application of Q methodology at two MPAs, Chichester Area of Outstanding Natural Beauty (UK) and the Pacific Rim National Park (Canada). It examines the way that Q can produce a range of data that demonstrates how different users of a MPA, sometimes those with minority voices, can have different perceptions of the value of cultural ecosystem services available there. This has implications for the management and planning of such areas where conflicts of interests may be highlighted through use of the Q method, but also presents the opportunity for better informed decisions to be made as a result of this data.

Study areas
Chichester Area of Outstanding Natural Beauty, UK
Chichester Harbour, is an Area of Outstanding Natural Beauty (AONB) in the Southern UK. It is 74 km^2 in area, comprised of marine and terrestrial space habitats and has an attractive coastal landscape including mud flats, grazing marshes, salt marshes, dunes and wooded shorelines and inlets (Chichester Conservancy, 2009). The AONB is in close proximity to a dense, urban infrastructure and population.

The Pacific Rim National Park, Vancouver Island, Canada
The Pacific Rim National Park (PRNP) in Vancouver Island, Canada was designated in 1970 to protect three distinct geographical units of significant coastal environments. These include coastal rain

forest, the cultural history of the area's indigenous settlements, surfing beaches and the outstanding and profuse marine life. The National Park's three units consist of the West Coast Trail, Long Beach and the Broken Group Islands (Vancouverisland.com, 2014). This research was conducted in the Long Beach, Tofino area where the majority of visitors stay due to its relatively easy accessibility, being the only section accessible by road, and with any significant infrastructure in the Park (McBeath, 2007). The long beach is 15.5 miles long and is considered to be semi-wilderness with abundant terrestrial and marine wildlife that is regularly seen by visitors.

Method

Q methodology provides the researcher with an opportunity to investigate the variety of accounts participants construct around a research question and is particularly good at identifying the complex interplay between these constructs. Unlike traditional R based analysis, which focuses on the people that construct the accounts, the focus of Q methodology is upon the accounts themselves (Stainton-Rogers, 1995). For example, a conventional questionnaire method will broadly establish which stakeholders think a certain way about a topic, but is constrained by the limited prior understanding held by the researcher of the range of accounts constructed by participants in their engagement with the topic. In-depth interviewing may elucidate useful participant perspectives on the topic but cannot always yield robust clusters of standpoints or accounts. In contrast, Q methodology uses a rigorous approach to deliver an informed and structured semi-quantitative approach understanding the accounts generated by individuals and groups of participants.

Q methodology follows a series of relatively distinct phases, arriving at a set of factors that are judged to represent a variety of participant viewpoints. These phases start with the development of the concourse, defined as a set of statements that encompass all possible responses to the relevant subject (Exel & de Graff, 2005). This is followed by a sifting of the concourse into a smaller set of representative statements for survey use (called the Q set), identification of participants (called the P set), sorting of the Q set (the Q sort), data analysis, and interpretation of factor solutions (Watts & Stenner, 2012).

Concourse development and arrival at the Q set

The concourse is, by definition, large, and the statements can be derived from a broad range of sources, including scholarly articles, blogs, face to face interviews, direct questions and personal opinion. All of these avenues were investigated during the generation of the concourse for this study, with particular note being made to the literature review already undertaken into the cultural values of protected areas by Pike (2010a) and Pike, et.al. (2010b; 2011). These statements were then sorted and thematically grouped. Repetitive statements were removed and confusing statements reworded for

clarity. In particular, statements that often expressed more than one view were split into different statements, so that the participants did not feel that accepting a statement was conditional on more than one value judgement. Once these statements had been sifted into a range of themes, and final edits made, a set of statements was arrived at (the Q set) that reflected a balanced view of entire concourse. The Q set was then peer-reviewed by colleagues unrelated to the project, to check for clarity, conciseness, and to identify any potential themes that may have been omitted. The final Q set of 66 statements expressed the various ways in which people may perceive the value of the natural world, which can be summarised as statements which view the natural world as:

- An economic resource – a place that has exploitable 'goods'
- A geographic resource – a useful location for a range of activities
- A metaphysical space – a place to consider one's place in the wider scheme of things; a place of 'awe and wonder'
- A place to relax, unwind and promote mental well being
- A place to exercise and promote physical well being
- A place for animals, plants, and the sustaining of habitat
- A place of learning
- A place that represents the opposite of urban space; set aside from the 'modern'

The Participant (P) set and the Statement (Q) sort

The P set for this study was derived from two constituencies of people. The first constituency was derived from a mail-shot of approximately 150 stakeholders associated with the management of Chichester Harbour AONB. This yielded a group of 26 participants represented a wide range of views, including parish councillors, local sailors, landowners, dog-walkers, members of the 'Friends of Chichester Harbour users group, those currently or recently involved in the governance of the AONB, education officers, and a representative of the single commercial marina within the Harbour. The second, smaller, group of 14 participants came from a number of visitors and workers within the Tofino region of Vancouver Island, British Columbia.

Participants were asked to sort the 66 statement Q set according to the extent to which the statements most aligned with their own views and values rather than any organisation they may usually represent at other stakeholder meetings. The statements were sorted onto a quasi-normal distribution, with the distribution ranging from integers of +5 ('most like I think') to -5 ('least like I think). Duplicate choices were allowed under each of these choices, as seen in Figure 1. Thus, the advantage of this method is that participants not only sort statements in relation to their own subjective checks and

balances, but must choose how much importance they give each statement in relation to the whole statement set. A short post-sort interview with all participants was conducted to establish further regarding the reasons behind positioning statements at the two extremes of the distribution.
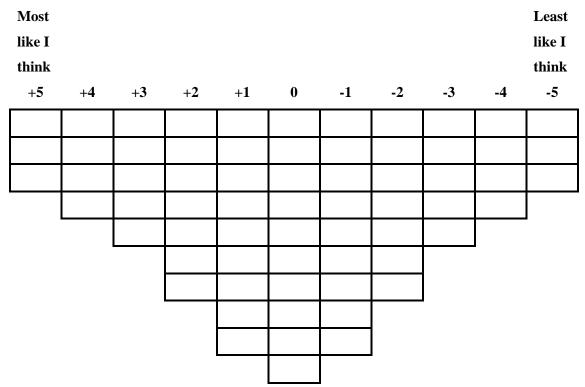
Most like I think +5 +4 +3 +2 +1 0 -1 -2 -3 -4 -5 **Least like I think**

Fig. 1. Q sort grid for this study. Participants are asked to place one item (statement) per grid cell.

Analysis

Analysis of the data was performed using PQMethod (Schmolck and Atkinson, 2002), the software widely used by Q practitioners. Using the scores (+5 to -5) each sorter gives against each statement, correlations between sorts were calculated. Principal components were then extracted from this correlation matrix using Principal Components Analysis and rotated using the VARIMAX rotation approach.

Using the 'broken stick' approach (Shaw, 2003), and keeping in mind the criteria developed by Webler *et al.* (2009) of simplicity, clarity, distinctness and stability (i.e. the same participants loading to the same principal component, or the same discourses coming from principal components irrespective of the solution chosen), a range of solutions were tested. The chosen solution yielded

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three principal components which accounted for 45% of the study variance and 29 of the 39 participants significantly load to these components.

Factor interpretation

Choices about which components to choose yielded a set of scores against each principal component (often termed a 'factor' in Q related literature). These statement scores are shown, for each factor, in Table 1. In the interpretation of factors that follows, the nomenclature used refers to the statement number and its associated factor score i.e. (Statement number: factor score), all of which can be found in Table 1. Using the 'checklist' advice of Watts and Stenner (2012), factor interpretation paid attention to not just absolute orderings of statements, but the position of statements within one factor in relation to other factors. Thus, although a statement may have been ranked, say +2, by one factor it was seen as relatively less important to that factor should the other factors score the same statement at +3 to +5.

Factor 1 – A narrative of 'care'

This factor accounts for 14% of the variance within the data set, with 9 participants' sorts loading significantly to it. This viewpoint suggests that value of the natural world is more obviously associated with the active engagement that one has with it. It appears to be a space for enhancement; personally, intellectually, and societally. The tone is generally optimistic; it does not see the modern world as a barrier to personal and community development, just that the natural environment enhances many of these characteristics. This factor's strongest message is how the natural environment is seen as a significant backdrop for activities and developments that influence the care of ourselves, our fellow human beings, and our planet (28:+5; 27:+4; 33:+4). There is also a sense that the planet provides for us through a range of supporting functions (45:+3; 26:+1; 66:0; 12:0; 24:-1), although supporting humans may not be the most important of these (11:-3). As such the natural world is seen as relatively important in providing the space to undertake a range of active pursuits (17:+2; 22:+1), although it plays down the economic benefits of tourism (19:-1) over its value as the setting for activity.

For participants who closely associate with this narrative the natural world promotes both physical well-being (36:+5; 25:+2) and mental well-being (49:+5; 5:+1). It encourages the intellectual development of people, and is a space for thinking (43:+3; 55:+3; 3:+1; 52:0; 56:0) and personal development (37:-1) in a range of different fields, producing, perhaps, a more settled society (6:+1; 2:+2; 61:-4).

There is a strong sense that the natural world has a positive impact on learning in general (35:+3; 57:+1), learning about nature (10:+1) and the relationships between various facets of the natural world

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and humanity. There is a view that outdoor learning fosters educational outcomes in a less formal way than the study of ecology (62:0; 41:-5). Education within natural landscapes makes learning about the environment more significant for individuals, perhaps by fostering a greater appreciation for it (29:+4; 15:+3). There is also a view that the education outdoors creates better outcomes from the whole process of learning (30:+4; 30:0). It is seen as the place where not only environmental systems are at play and can be witnessed and analysed (40:+2; 34:-1), but also as the space within which the cultural diversity of humanity has existed for many years (32:+2).

This viewpoint places least emphasis on the natural world as being something 'other' or something different from modern urban living (4:-5; 16:-4; 13:-3; 64:-1; 63:-1 46:+1). Since it seems to reject this sense of 'other' it also fails to see the natural world in terms of a dangerous place, rarely seeing environments as truly 'untamed' (39:-4; 53:-3; 65:-2; 14:-1; 38:-2). It does not conform to a, perhaps, pessimistic view that the survival of modernity is predicated upon the natural world (7:-3; 8:-2; 9:-1), nor does it see restrictions on the engagement with the natural world as being crucial to a range of community functions (20:-5; 1:-4; 23:0; 51:0). Whilst being identified as an important space to promote quiet reflection (48:+2; 60:+2) and an internal sense of inspiration (44:+1), this factor rates such values as less important than anywhere else in the data set. It certainly does not value the natural world as a spiritual, contemplative space (47:-3; 54:-2; 50:-2; 59:-1; 42:-2; 58:0). The rejection of this view of the natural world is also emphasised by not considering it just as pleasant 'scenic wallpaper' (18:0; 21:-2). In other words, its value is only realised by active engagement with it.

Factor Two – a narrative of 'spirituality'

This factor accounts for 15% of the variance within the data set, with 10 participants' sorts loading significantly to it. This narrative is largely one of seeing the natural world as a space for spiritual life; be that a religious experience, or through psychological growth. It is focuses upon the meditative and passive, rather than actively about learning, and appears to reject many notions of economic value, however this may be construed. It expresses a strong value of the natural world as a place of spiritual fulfilment and contemplation. At its foremost, the natural world is a place to amaze and inspire (55:+5; 58:+5; 44:+3), and its survival is a precursor to human survival (9:+5). This narrative places much more importance to the metaphysical, suggesting that the natural environment is both a place to become aware of (43:+4) and witness something other than just the observable world (47:+4; 59:+4; 54:+3). Sometimes these thoughts are centred upon more recognisable concepts such as worship (50:+2) and God (42:+2), but these are less important than the purely spiritual strength this viewpoint contends comes from the natural world. There may be some externalisation of this view of the natural world being a supportive, reflective space, by seeking to work to protect such value through becoming an active citizen participating in that environments protection (33:+2).

Unlike the narrative of care, this viewpoint distinctly sees the natural world as something different and separate from humanity, a view that both provokes 'awe and wonder', such that the wildness of a place promotes positive feelings (14:+3; 60:+3; 61:-4), learning (10:+1; 62:+1; 56:0; 31:0; 41:0), and communication (1:-1). Removal of access to these natural spaces is much more important for those more closely allied to this factor (20:-2; 51:0), possibly because such spiritual feelings cannot be gained elsewhere, although specific places are not as important (3:-1), perhaps, as the environment itself. The natural world is most definitely a place to contrast with and avoid modern day life (13:+3; 16:+2; 8:+1; 4:-3; 64:+1), although there is a recognition that modernity cannot be avoided for good (46:+1).

This narrative also suggests that whilst the natural world can provide moments of calm (48:+4), and is nothing to be fearful of or challenged by (65:0; 39:-3; 53:-2; 38:-2), sometimes being subjected to such natural majesty does not, by itself, provide the antidote to stress (5:0). It is appears to find less important the notions of learning (34:-5; 29:+2; 40:+1; 35:0; 32:0; 30:-1; 57:-3; 28:0), recreation and tourism (19:-5; 26:-4; 36:+2; 23:+1; 63:+1; 2:-1; 17:-2; 37:-2; 18:-2; 21:-3; 25:-4; 24:-5) and the support of human communities (66:-1; 12:-1; 7:-3; 11:-4; 45:-1). Those who more closely align to this view suggest that being within the natural world is less important in fostering the connections between ourselves (6:-3), or ourselves and nature (15:+2; 27:-1). This is shown in Table 1, where the scores for statements 6, 15 and 27 are lower for this factor than elsewhere within the dataset.

Factor 3 – a narrative of 'freedom'

This factor accounts for 15% of the variance within the data set, with 10 participants' sorts loading significantly to it. This narrative touches how the natural environment provides opportunities to be free from the strictures of day-to-day living, and as a place to go and explore. It provides a resource that is most manifest in the concept of recreation, rather than serving any other function, and it recognises the economic impacts such activity has. In comparison to the previous two factors, it appears to express a less child-centric view of the value of nature - perhaps that is one of the day-to-day strictures - and feels that that the natural world has less of a part to play as a meditative space.

The major voice in this narrative is one of the natural world providing space for freedom (51:+1) and escape, often through leisure activities (22:+5; 17:+4), be these active (23:+4; 25:0; 24:-1) or reflective (48:+5; 5:+1). This 'escape' is often seen as a counterpoint to modern life (63:+4; 13:+3; 46:+2; 49:+2; 64:+1; 61:-3), but the benefits derived from this are considered to be of utmost importance (9:+5). However, in comparison to the previous two factors, there is less of a sense that the natural world functions differently from the urban world (8:0; 16:-2, 36:2), with facets of natural

defence and physical wellbeing all being considered as less important, than elsewhere within the data set. The major value of the natural world here is about open physical space. However, individual landscapes, and access to them, are not as important as access to the wider natural world (20:-3). There is a secondary idea within the interpretation of this factor, that being one of support; whether that is the natural world as a resource base (12:+4; 7:+3, 66:0; 11:-2), or as a support structure for plant and animal life (10:+1). However, it expresses the importance of habitat in terms of something to visit or witness, rather than having value of and by itself (14:+3; 18:+3; 1:-1). As such the natural world is very much valued in an economic sense (19:+2; 26:1), although its focus appears primarily recreational (45:-2).

There is a recognition that learning can be enhanced by engaging with the outside world (35:+3), although this may be more about learning about oneself (30:+1; 37:-1), and, perhaps, behavioural change (6:0; 61:-4) rather than anything more academic. There is a suggestion that this is achieved through risk and challenge, in an environment that is different to modern, urban living (38:+1; 65:0; 53:-1). There may be a sense that this risk is achieved only by the freedom the natural world gives for 'going it alone' (39:-4). However, there is less importance attached to the natural world as a classroom for more formal learning about nature itself (41:-5; 15:2; 40:0, 27:0; 31:-1, 57:-1; 34:-3), nor about children's connection with nature? or each other (29:+2; 28:-2; 32:-1:1:-1). In fact, this narrative places less importance than any other factor to statements regarding the benefits children derive from being outdoors (for example, 33:0 and 62:-1).

Nor does this narrative feel that the more inward, reflective and spiritual aspects of being within the natural world are as important as elsewhere in the data (43:-1; 52:-2; 56:-2; 3:-3; 58:-3; 59:-3; 42:-4; 54:-4, 47:-5; 50:-5). The factor also suggests that whilst the physical and mental improvements this space and freedom brings are important, they can by no means be an exclusive claim of, nor even enhanced by, being outside. So, whilst the factor does appear to suggest that physical activity and mental wellbeing gives the natural world value, when asked whether these concepts are 'increased', these statements are ranked as less important in comparison to the whole data set (36:+2; 60:+2; 2:0). There is clearly a sense that the natural world is less important as a place of wonder and inspiration (44:+2; 55:+1) when compared to the other two factors

Discussion

As the findings suggest, the combined Q sort, consisting of data input from the Vancouver Island and Chichester sites, produced three distinct factors that explained a narrative of care (of each other and one's self – Factor 1; Spirituality – Factor 2; and Freedom and refuge, recreation and solace – Factor 3. These factors were not unique to one site or the other.

As presented in the results, these factors offer very different accounts personal values held towards MPAs. Although there are three recognisable factors, the individual Q sorts contained a spread of each of them, showing that these 'voices' or narratives exist in all of the respondents to a greater or lesser extent and therefore need to be considered together. Factor 1 and 3 present values which are associated with the engagement of the protected area through the recreational activities that are undertaken there. Although engagement with the natural space is experienced in Factor 2, this is of a more passive nature and does not rely on the use of physical resources. Instead, in this account, the natural environment is a place to just 'be' and reflect and focus on the greater meaning of life.

Q methodology takes note of 'quieter' voices, those that are in the minority of a sample group but who's point of view are equally important when considering the value of a place and the implications these values have on the management of MPAs. Therefore, whilst highlighting the majority and 'louder' voices in the sample group, the methodology also lends itself well to the study of minority voices which here show the significance of stakeholder inclusivity in protected areas which is of increasing important to managers and is often included in their site management plans (Keenleyside *et al.,* 2012). Therefore Q methodology has distinct advantages over traditional survey techniques as it explores the view points to emerge from the datasets and not the person or people group.

The three Q-factors applicable to stakeholders of both study areas demonstrate the complexity associated with managing MPAs. For example, Chichester Harbour, being a small MPA, with a dense neighbouring population, has restrictions on the accessibility and use of the site, for example, there are regulations to ask people to stay on foot paths and keep their dogs on a lead (Chichester Conservancy, 2009). This is interesting when comparing the types of restrictions imposed in, and associated with the Pacific Rim National Park. The Park has access and activity restrictions, including those imposed by National Park status (for example, no fires are allowed in the area); restrictions as a consequence of the indigenous populations and local communities; restrictions through semi-wilderness nature of the area (EG. Occasional extreme weather conditions, dangerous wild animals, including bears); and through the restrictions of the landscape itself (EG. Mountains and dense forest). Access restrictions are of significance to the public and will affect the value an individual places on an area. Through Q it is possible to see the significance of this in Factor 3 where personal freedom to move about an area and find solace and solitude, usually away from others, is important. Understanding how the public use and value space, in this case a MPA will have significance implications for the management of such an area.

Protected area management is relatively straight forward when something can be counted and controlled. For example, it becomes relatively straight forward to be able to count the number of people surfing on a beach or buying an ice cream and respond to the data accordingly. However, if value is realised by enjoying a stunning view, or the smell and sounds of the seaside, it becomes much

harder to manage an area where peoples' values are unquantifiable and therefore harder to control. Although this research does not provide answers to these managerial dilemmas, it does emphasise potential areas of where users express different values and provides data for consideration and to better inform decision makers of these protected areas and others like them.

The application of Q methodology in the study areas has demonstrated that cultural ecosystem services can be clearly identified and expressed in semi-quantitative and narrative forms using this approach. The sensitivity of the factor analysis demonstrated that it was possible to distinguish evidence related to aesthetics of the MPAs, spiritual experiences, a sense of belonging and identity, improved health (linked to recreation opportunities), psychological restoration and well-being, and connectedness to nature. In addition, these qualities were able to be rated in comparison to each other and how they compared between sites. A particularly strong advantage of Q methodology noted in this study was its capacity to represent the voices of groups who may be in a minority, but for whom the cultural significance of a site or feature might be critical.

CONCLUSION

The research discusses the applicability of the Q method in obtaining important, yet sometimes minority view points which can enable managers of MPAs to better understand the users of the designation and incorporate their values within site management and planning. Although the Q method approach does not provide solutions, it does give a very thorough picture of the views of stakeholders, and therefore can better inform decision makers ensuring that all view points, minority or otherwise are 'heard'.

There is much evidence to support Q as a relatively new and increasingly accepted method of examining and expressing the values invested by groups and individuals towards the natural environment. As demonstrated by this research, Q methodology lends itself well to the examination of cultural ecosystem services which are difficult to measure using established approaches. The Q method can handle qualitative, perception data and produces quantifiable results through the Q-sort and analysis software. These are helpful in translating values and perceptions which can then be used to inform decision makers by illustrating the value and needs of their users or stakeholders, to facilitate better management and ultimately protection of the area.

In this study the Q method helped to identify three predominant factors of cultural ecosystem services. These collectively included the MPAs as a place to promote the health and wellbeing of one's self through the natural environment; a place of spirituality and greater meaning; and as a place of sanctuary and freedom. Understanding where and how stakeholders of MPAs place value on cultural

ecosystem services ultimately provides the evidence needed by managers of these areas to make informed decisions based on a wider opinion base than would necessarily be gathered by traditional methods of data collection.

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Table 1: Statement and Statement Number	Factor 1	Factor 2	Factor 3
1. Trees in public spaces encourage a sense of community and communication between people	-4	-1	-2
2. Natural environments can increase the sense of pleasure, comfort and satisfaction	+2	0	0
3. The natural environment is associated with 'place attachment' somewhere you want to return to time and time again or perhaps a place of memorial for a lost loved one	+1	-1	-3
4. The natural environment is a norm from which artificiality can be measured	-5	-3	-3
5. Contact with nature and natural environments helps people to cope with and recover from stress and aids recovery from illness and mental fatigue	+1	0	+1
6. The natural environment tends to make us more friendly, playful, elated, and affectionate	+1	-3	0
7. Whole communities have become dependent on certain natural resources	-3	-3	+3
8. The natural environment is a lung for the cities	-2	+1	0
9. The value (of the natural environment) is infinite: globally, the integrity of natural environments is key to our longer term-survival	-1	+5	+5
10. Being in a natural environment informs us of the natural cyclical processes (such as the seasons, bird migrations etc.)	+1	+1	+1
11. We (humans) are attracted to natural environments because of the valuable resources that they may provide for human survival, such as water, food and shelter	-3	-4	-2
12. The natural environment provides us with important natural resources	0	-1	+4
13. It is important to go and experience places where the direct influence of humans is very limited and where nature 'rules' as opposed to places where humans 'rule'	-3	+3	+3
14. Pleasure is derived from being able to explore and enjoy a truly wild environment and being able to see animals, birds and insects interacting in an unspoilt habitat.	-1	+3	+3
15. The natural environment keeps us in touch with nature and fosters a connection with nature	+3	+2	+2
16. The natural environment is life itself. The concrete jungle is something that we have put on top of the natural environment that often strangles life	-4	+2	-2
17. The natural environment provides a valuable resource for leisure, tourism and recreation	+2	-2	+4
18. The natural environment provides habitats for wildlife which is valued by people because it adds interest to countryside activities and for its very existence	0	-2	+3
19. Rural tourism provides enormous economic value	-1	-5	+2
20. Value of the environment is lost when public access rights are denied to the countryside for various reasons despite there being other similar landscapes in the area to visit	-5	-2	-3
21. The natural environment is a scenic backdrop which makes visiting such an area more pleasant	-2	-3	-1
22. The natural environment provides valuable locations for our holidays and leisure activities	+1	-1	+5
23. Walking in the countryside is of great value	0	+1	+4
24. The natural environment provides a valuable environment for	-1	-5	-1

activities such as shooting, hunting and fishing			
25. The natural environment provides a valuable environment for activities such as mountain biking, rock climbing and pot holing	+2	-4	0
26. The natural environment has an important impact on local and regional economic development	+1	-4	+1
27. Outdoor education can bring participants into a closer and more caring relationship with nature	4	-1	0
28. Learning in natural environments helps to encourage caring attitudes and values so that each person develops a sense of responsibility for his or her own actions and empathy with the environment	+5	0	-2
29. Educating children within the natural environment helps them to develop a sense of place and wonder for the world around them	+4	+2	+2
30. Learning in natural environments can be more fun and enjoyable than learning in the classroom	+4	-1	+1
31. Learning in a natural environment can facilitate personal development and increase motivation resulting in increased educational performance	0	0	-1
32. The natural environment is the source of much of our learning, about our history, culture, about our place in the natural world and our relationships with each other	+2	0	-1
33. Children who have been introduced to their local natural environment and understand how to look after it are more likely to develop into active citizens later in life; receive more from their community and be able to participate in a democratic society	+4	+2	0
34. There is no substitute for a child seeing, smelling, listening to and touching the natural world hands on	-1	-5	-3
35. Field work in the natural environment can improve long-term memory and enables a high order learning	+3	0	+3
36. The natural environment provides an important place for physical activity and improving physical health	+5	+2	+2
37. Outdoor activity is absolutely fantastic for children. It's good for their health and it's good for character building	-1	-2	-1
38. Life is full of risks and challenges. The importance of risk assessment and management can be introduced through interaction with the natural environment	-2	-2	+1
39. Properly managed outdoors activities can help participants understand personal risk and necessary associated control measures, thereby equipping them to deal with the risks inherent in life	-4	-3	-4
40. The natural environment represents the real world 'laboratory'	2	1	0
41. By experiencing real animals and plants in a variety of habitats people can develop a real understanding of ecology and its everyday applications	-5	0	-5
42. The natural environment was, and still is, the setting for divine acts of grace: revelation, nurture, and preparation. Wilderness has always been the setting for intense encounters with God	-2	+2	-4
43. Being in the natural environment is the best way to appreciate our connection to all things in the Universe	+3	+4	0
44. The natural environment can inspire and uplift us	+1	+3	+1
45. The natural environment is an important source of food and medicine.	3	-1	-2
46. The natural environment is somewhere we can escape from our modern lives, our offices, phones, TVs and computers	+1	+1	+2
47. The natural environment is the meaning of life itself; it is the basis of our very existence.	-3	+4	-5
48. Natural environments provide peace, solitude, tranquillity, balance and calm	+2	+4	+5

49. The natural environment provides a means of stress relief and opportunities to quietly reflect, contemplate and relax	+5	+1	+2
50. The natural environment provides an opportunity for worship and whatever else the soul needs at the time	-2	+2	-5
51. The natural environment is associated with a strong sense freedom	0	0	+1
52. The value is that it provides somewhere to sort your thoughts out	0	-1	-1
53. The natural world can instil a sense of fear	-3	-2	-1
54. The natural environment causes us to reflect on being a tiny speck in a large universe and creates a sense of connectedness with something greater and more powerful than ourselves	-2	+3	-4
55. Nature instils us with a sense of awe and wonder	+3	+5	+1
56. The natural environment allows us to become totally absorbed in our ongoing activity, such that we become lost in the moment	0	0	-2
57. Observing nature can facilitate concentration, productivity and problem solving	+1	-2	-1
58. The vastness and beauty of nature stirs the soul	0	+5	-2
59. The natural environment can take us beyond the ordinary or everyday and gives us a connection with a deeper meaning of life beyond ourselves	-1	+4	-3
60. Feelings of tranquillity, serenity and positive mood are increased in response to open spaces, vegetation and trees	+2	+3	+2
61. Natural environments discourage anti-social behaviour	-4	-4	-4
62. Natural unkempt areas are environments that encourage active and imaginative play in children and increase attention span and memory	0	+1	-1
63. Outdoor recreation in natural spaces becomes more important as urbanisation increases	-1	+1	4
64. The natural environment enables us to escape humans and technology which allows us to deal with life's stresses.	-1	+1	+1
65. The natural environment can allow you to test yourself against something you have no control over; it can be exhilarating and exciting.	-2	0	0
66. The natural environment provides a natural defence system and can lower the risk of flooding in certain areas.	0	-1	0