Re-storying marine conservation: Integrating art and science to explore and articulate ideas, visions and expressions of marine space

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Abstract

Art-science collaborations are proliferating as the benefits of bringing artists and scientists together are increasingly recognised and supported. This paper documents an example of an artist and scientist with overlapping (as opposed to the more usual mutually exclusive) practices, in terms of artistic and scientific approaches to the research material. It illustrates how a collaboration between a marine social scientist (the author) and a visual artist helped to inspire a different approach to a marine protected area dispute between the Scottish Government and the small Scottish island community of Barra, Outer Hebrides, Scotland. The art-science collaboration resulted in Sea Stories, an interactive, online, cultural map of the sea around the island of Barra. The participatory mapping process to create the Sea Stories map involved visions and expressions of marine space being constructed through constant interaction between the research team and research participants. It revealed different ways of knowing the marine environment, hitherto not visible or acknowledged within the marine policy environment where the protection of biological diversity was the focus. The acknowledgement of a rich and diverse cultural heritage bound up with the marine biological diversity opened up possibilities for the design of a community-led and government-supported co-management process that recognises the social relations which form part of the island's socio-ecological system.

1. Introduction

Increasingly, voices from the arts, humanities and social sciences are underlining the importance of an integrated approach to addressing contemporary societal challenges such as climate change, resource scarcity, food and energy security, and environmental degradation

(including biodiversity loss, ocean acidification and marine pollution) (e.g., Holm et al., 2015; Holm and Winiwarter, 2017; Ohlmeyer, 2016). The question of whether environmental change is good or bad is decided by different human value systems – it is a matter of societal choice how the world we live in ought to be (Brennan, 2018; Cote and Nightingale 2012; Cronon 1992; Mee et al., 2008). However, the conservation policy narrative tends to be presented as what is objectively needed, without questioning the politics of the particular ways in which conservation issues and policies are framed (see, for example, Dove et al., 2011; O'Neill, 2001; Nightingale, 2013; Schultz et al., 2005). It does not usually acknowledge that this narrative is, necessarily, underpinned by normative assumptions, specific worldviews and value systems that may conflict with values held by those who have not shaped the policy narrative. The arts, humanities and social sciences have a crucial role to play in providing deeper insights into human motivations, values, worldviews and choices (Holm et al., 2015). Connecting these insights with the natural and technological sciences opens the door for interdisciplinary dialogue to “engender plural representations of Earth's present and future that are reflective of divergent human values and aspirations....this might insure publics and decision-makers against overly narrow conceptions of what is possible and desirable as they consider the profound questions raised by global environmental change” (Castree et al., 2014, 762).

Bringing together the practices of the arts, humanities and sciences (social, natural, technological) is gaining support (e.g., AHRC, 2017; Jeffries, 2011; Mulrooney Eldred, 2016; Mundus maris 2017; Pomeroy, 2012). The benefits from these interdisciplinary collaborations include: making scientific knowledge more accessible to its publics, in addition to creating new publics ('publics' meaning different communities of people who engage with such knowledge, including citizens and interest groups), for example by creating spaces for people to visualise complex data or to discuss the role and impact of science in society; making science more innovative and more accountable to society; expanding artistic practices through artists using scientific tools and technologies; creating participatory spaces that connect the production of scientific knowledge and other forms of knowledge of non-expert citizens (such as 'subjective' experiential knowledge); connecting diverse stakeholders as well as different cultural, political and institutional contexts; helping critical spaces to emerge that draw attention to the politics and ethics of scientific practices and processes, question the power of science and stimulate deeper engagement with complex problems; and challenging accepted ways of framing the people, objects and concepts that artists and scientists engage with by opening up different ways of looking at scientific issues and related societal challenges (Born and Barry, 2010; Hawkins and Marston, 2015).

Almost three decades ago, Art & Science Collaborations, Inc. (<https://www.asci.org/>), was established to encourage dialogue and collaboration between the different fields and to increase the visibility of art-science work. More recently, the STEAM movement has championed the integration of the arts into the well-known STEM quartet of science, technology, engineering and mathematics (<http://stemtoteam.org/>). The concept of art-science collaborations has garnered high-profile support. For example, since 2011, the European Organization for Nuclear Research (CERN) has implemented an arts programme (Arts@CERN) supporting art-science collaborations via the COLLIDE International Award. In

2016, a partnership between CERN and the Foundation for Art and Creative Technology was established “to influence an international and flourishing scene of art and science [and] to explore crossovers and dialogs between artists and scientists at CERN” (CERN, 2017). It has even been suggested that, beyond the cross-disciplinary dialogue created by art-science collaborations, a ‘Third Culture’ is emerging through the ‘new art movement’ that fuses art with science and technology (Miller, 2014). Although the term ‘art-science collaboration’ usually brings to mind a natural/STEM scientist working with an artist, collaborations between artists and social scientists also exist. This is hardly surprising given that social scientists and artists actively study, reflect on and critique society and social relationships to open up new perspectives on complex societal challenges. This paper illustrates how a collaboration between a marine social scientist (the author) and a visual artist that combined art and social science research approaches helped to inspire different ways of approaching a marine protected area dispute between a small island community in Scotland and the Scottish Government. It documents an example of an artist and scientist with overlapping (as opposed to the more usual mutually exclusive) practices, in terms of artistic and scientific approaches to the research material. Specifically, this collaboration involved a participatory mapping process that resulted in an interactive, online, cultural map of the sea (Sea Stories) based around the island of Barra, Outer Hebrides, Scotland. It was developed by the artist and scientist in association with a local community organization, and involved school pupils in interviewing local Barra fishermen and older members of the community. This map was created during a time of tension, when many of the islanders were resisting the proposed designation of two European-driven marine protected areas off the coast of Barra. These marine protected areas were proposed to protect an inshore cold water coral reef complex (*Lophelia pertusa*), sub-tidal sandbanks, sub-tidal rocky reefs and harbour seals (*Phoca vitulina*), as part of the Natura 2000 network under the European Habitats Directive (92/43/EEC).¹

¹ <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:01992L0043-20070101&from=EN>.

It is rare to find communities' cultural connections with the sea included in marine spatial planning processes, even though the importance of ‘cultural values’ is increasingly recognised (Gee et al., 2017). Participatory planning processes (including mapping) have the potential to aid dialogue around marine and coastal environments and related spatial planning by recognising and making visible the social relations, cultural diversity and divergent value sets which form part of the relevant socio-ecological system (Cormier et al., 2016). For example, a participatory mapping process might highlight a fear that a conservation initiative could result in loss of local control over marine resources and/or change the prevailing socio-cultural context. There is increasing recognition that marine spaces are socially produced (see Brennan, 2018; Levine et al. 2015; Rossiter et al., 2015). Maps can produce reality as much as represent it through the choices made about what is, and is not, represented on a map (Crampton, 2001; Smith and Brennan, 2012). What is intertwined in everyday life is often represented as separate (Eden et al., 2000; Latour, 1993). The creation of a conservation map involves a deliberate choice of particular species, habitats, ecosystems, geographic areas, biological concepts and understandings of nature over others (Harris and Hazen, 2006). It is arguable that participatory mapping in conservation can be used to complement existing conservation maps. This of course

depends on the power relations, positionalities and potential for genuine cooperation between the different 'mapmakers'. Parker (2006) suggests that the process of creating a 'community map', whereby issues of place and representation are negotiated amongst members of the community, is as important as the map itself, but cautions that such maps can marginalize 'outsiders' in the community who do not agree with what the map portrays. To the extent that community maps can help to "challenge map silences that imply the absence of peoples or resources, heighten consciousness, and counter deficit maps" (Parker, 2006, 477), they have the potential to reflect a representation of the social networks intertwined with the bio-physical environment, to broaden conceptions of how the world we live in ought to be and to draw attention to diverse ways of valuing a particular environment.

Even with participatory mapping, it is extremely difficult to capture the dynamism inherent in a system of complex human behaviours, culturally specific values and worldviews and mobile species and to articulate the complexity of the marine space (see Levine and Feinholz, 2015; Sullivan et al. 2015). In addition, maps of bio-cultural diversity tend to be terrestrial (e.g. Stepp et al., 2004) and do not normally encompass marine socio-ecological systems, although such diversity has been shown to exist in the tropics, around coral reefs and in coastal areas of linguistic diversity (Stepp et al., 2004; St. Martin, 2012). There are limited examples of the mapping of marine bio-cultural diversity. In Northern Norway, various projects on mapping private and collective rights to marine resources have remapped Northern Norwegian fjords as sites of language, knowledge, history, culture and practices specific to the Sami (Brattland, 2010; Brattland and Nilsen, 2011). An Inuit atlas of the Northwest Passage shows an intricate series of trails across the sea ice that intersect and join places where Inuit have lived (Pan Inuit Trails, n.d.). The purpose of the atlas is to provide a sense of how the waters and adjacent lands of the Northwest passage were used by Inuit and to challenge typical perceptions of the Arctic as uninhabited and sparsely populated (Rogers, 2014). Recent work by O'Donnell et al. (2013) has identified a range of values, from economic to intangible, in relation to fishing communities on Canada's Pacific North Coast. Other recent work includes participatory mapping for coastal and marine planning in Australia (L.V. 2016), and the inclusion of cultural data in the Shetland Marine Spatial Plan (SIMSP, 2015), although the focus was on the tangible elements of cultural ecosystem services such as recreation and aesthetic appreciation (ICES, 2013).

Visual participatory methods encourage reflexivity by speaking directly to the subconscious and, as such, can help participants shift their perspective on how they are located in the world (Harper, 2002; Mitchell, 2011). They allow participants to tell their stories in a way that can express several layers of meaning, depending on who the viewer is. From 2011 to 2016, the author collaborated with visual artist and film-maker, Stephen Hurrell, on four art-science projects ([www. mappingthesea.net](http://www.mappingthesea.net)). Collaboration started following a joint participation in a 2011 Cape Farewell art-science expedition (www. capefarewell.com), which involved sailing to islands in the Outer Hebrides, Scotland, to explore ideas around sustainability in the context of climate change. It became evident on that expedition that the situated or contextualised research methods used by the author as a social scientist to explore the dispute on Barra closely resembled working methods used by Hurrell in his socially-engaged art practice. At the time, the author was engaged in preliminary qualitative fieldwork on Barra to gain insights into

the roots of the marine protected area dispute through exploring the cultural, social and historical context of the local community. The author's research design supported an inclusive approach that involved members of the local community and the policy environment working together to acknowledge and include local relationships with the sea as a meaningful part of the conservation and natural resource management process. The Sea Stories art-science collaboration was guided by this research, and by an initial art-science collaboration (Connecting Coastal Communities) that explored the cultural roots of maritime conflict on Barra and on another small island community (Arranmore, Ireland). The Connecting Coastal Communities collaboration (between the author, Hurrell and social scientist Iain MacKinnon) resulted in *Belonging to the Sea*, an illustrated publication featuring photography by Hurrell (MacKinnon and Brennan, 2012). The material from this first collaboration was subsequently integrated and expanded into *Sea Stories* (Hurrell and Brennan, 2013).

This paper makes two main arguments. (i) Planning and management of the marine environment requires innovative combinations of methods (such as art and science) to address the complexities of socio- ecological systems and to manage conflicts in ways that incorporate an understanding of local socio-cultural contexts. Current approaches to environmental planning, management and conflict are underpinned by the dominant assumptions and frames of natural scientific knowledge. Alternative frames of understanding are necessary to move intractable conflicts to a space where the parties can develop different narratives so that imaginative ways forward can emerge. (ii) Combining art and social science methods and approaches can enable different forms of knowledge to become visible within a mainstream conservation discourse that privileges natural scientific knowledge. Examples from the Barra case study are used to show how combining art and social science methods brought these different knowledges into view. They created space for islanders to articulate and value aspects of their cultural heritage which co-exist with the bio-physical heritage being protected by the (then) proposed marine protected areas. This acknowledgement of different ways of knowing the marine environment encouraged and supported a dialogue between the Scottish Government and key people on Barra that eventually led to a government-supported and community-led co-management process for the Sound of Barra mSAC that recognises the social relations which form part of the island's socio-ecological system (see Brennan, 2018).

This paper adopts a narrative format. Sections 2.2 and 2.3 provide an overview of the research design and methods used. However, the details of the application of these methods are embedded within the main narrative of the paper in section 3, which documents how a participatory mapping process revealed different ways of knowing the marine environment, hitherto not visible or acknowledged within the marine policy environment where the protection of biological diversity was the focus. Although this format is more in keeping with the style of an arts and humanities journal, it was deliberately chosen in order to provide the reader with a more realistic experience of the research process which cannot be neatly compartmentalised into separate components.

2. Combining art and social science approaches to elucidate plural understandings of a nature conservation dispute

2.1 General context

The small island of Barra in the Outer Hebrides lies 76 nautical miles off the north-west coast of Scotland (Fig. 1). Buffeted by the Atlantic sea and perched at the periphery of the most westerly inhabited islands in Scotland, Barra is linguistically different to mainland Scotland (Scottish Gaelic is widely spoken alongside English). It is religiously distinct from much of the rest of the Hebrides (80.2% of Barra's residents are Roman Catholic (GRO, 2003) compared to less than 10% in the northern (mainly Free Presbyterian) Hebridean island groups). Barra bears the psychological legacy of nineteenth century Highland Clearances (mass evictions of local populations to make way for sheep-farms and hunting-estates). Today, the designation of Barra as economically fragile underscores the need for sustainable development opportunities which combine economic, social, cultural and environmental attributes (HIE, 2014). Many people on the island have more than one job in order to generate enough income to survive. For example, fishers on Barra are often crofter-fishers (a crofter is a small-holder farmer), meaning that the fishing is supplemented by crofting (usually sheep-farming). Renewable energy is likely to form an important part of Barra's future – in recent years, two medium term options for offshore wind energy have been identified in close proximity to Barra as well as a number of proposed wave and tidal areas.

Over the years, this small island (with a population of approximately 1200 people) has accumulated a variety of nature conservation designations, on land and at sea. Many people in the community have resented these perceived intrusions from a distant policy environment. From 2000 to 2014, a bitter dispute raged between islanders on Barra and the Scottish Government, with key members of the local community fiercely resisting the proposal (and eventual designation) of two marine Special Areas of Conservation (a type of marine protected area pursuant to the European Habitats Directive (92/43/EEC)) off the coast of the island. These areas were proposed for designation by Scottish Natural Heritage (SNH), the government agency responsible for nature conservation in Scotland. The Habitats Directive requires the establishment of a Natura 2000 network of marine protected areas as part of an ecologically coherent network of special areas of conservation (SACs). Site selection must be based on scientific criteria and best expert judgement (McLeod et al., 2005; European Commission DGXI, 1995). Social and economic criteria cannot be taken into account when selecting and designating sites.² While social and economic considerations can inform the development of a management plan for a site, very few mSACs have one as there is no obligation to create one. The process of site selection and designation of SACs under the Habitats Directive effectively isolates the natural dimension of ecosystem conservation from the human dimension. This framing of conservation collided with a distinctive way of knowing and sense of belonging on Barra, shaped by social, historical and cultural influences. Government maps depicting the proposed areas for designation focused exclusively on physical features and biological diversity. The cultural diversity of these areas was neither visible or formally considered (Brennan, 2018).

² See, for example, Case C-355/90 Commission v Spain [1993] ECR I-4221; Case C-67/ 99 Commission v Ireland. ECR I-5793 and Case C-71/99 Commission v Germany ECR I- 5814.

Figure 1. Location of Barra

Barra was chosen as the case study site for several reasons. Its rich maritime heritage suggested the presence of embedded community values related to the surrounding sea. These values appeared to be colliding head-on with the conservationist values driving the marine Special Area of Conservation (mSAC) designation process. The contentious, protracted, multi-layered, polarised and seemingly intractable nature of the dispute promised a rich vein for exploring how a socio-ecological system responded to perceived challenges from the policy environment at a variety of scales, from local to international. Underlying the dispute on Barra were an array of competing narratives. Most prominently, there was a European-driven policy environment narrative of the need to designate two mSACs off the coast of Barra to protect the biodiversity of the marine environment (meeting the requirements of the Habitats Directive) and to ensure sustainable use of marine resources. In direct contrast, one of the island narratives insisted that the people of Barra were already looking after their pristine marine environment and did not need or want marine protected areas which they perceived as shifting control of 'their' marine resources to distant powers-that-be with no understanding of life on the island (see Brennan, 2018).

On Barra, there was a sense from many respondents that a policy-driven conservation narrative was trying to muscle its way in to dominate and even obscure the different narratives of the local community (which were by no means homogenous). In particular, these respondents

perceived the policy environment as ranking environmental interests as more important than human interests. At the very least, the policy-driven conservation narrative was perceived as insisting that it should exist alongside the community narratives. At the same time, the policy-driven conservation narrative reinforced a dominant narrative within the community – a continuation of a historically-rooted pattern of the imposition of a change by “outsiders” that was not necessarily welcome by many islanders (see [Brennan, 2018](#)). If such a change was inevitable, it was therefore important for members of the local community to retain as much control as possible in implementing that change.

Early in the research process, the author advised that members of the local community would need to engage with the Scottish Government's policy obligations relating to designation of the mSAC in return for members of the community being supported by the Scottish Government to take the lead on managing their natural resources in the sea surrounding Barra. Responding to a Scottish Government consultation on the Sound of Barra proposed mSAC, Brennan et al. (2011, 4) advised:

“The overall vision of the [Habitats] Directive would stand a better chance of being achieved through harnessing the independent spirit and sense of ingenuity that is inherent in the local community in Barra to find ways of identifying threats to important features in the coastal environment and devising ways of managing such threats in partnership with the regulating authorities. This however can only be done effectively if there is a recognition by the community of the statutory commitment (via the Directive) to deliver conservation outcomes and if there is agreement by the local community to assume responsibility for helping to deliver this commitment.”

This comment was relied on by the Scottish Government the following year when they decided to place Scottish Natural Heritage (SNH) in the background and task a civil servant from Marine Scotland³ with liaising with key people within the local community (key because they were actively involved in the dispute and were willing to dialogue with the policy environment as (now) represented by Marine Scotland). In March 2012, a meeting of the Western Isles Council Fisheries Joint Consultative Committee (shown in Fig. 2 (N) below) included four local councillors, island fishermen (including Barra fishermen), SNH and Marine Scotland. Meeting minutes show that they discussed an ‘extract from the SAMS [Brennan et al. (2011)] submission’ and made an explicit reference to the recommendation made in that submission to take advantage of an opportunity to create ‘an exemplar co-management agreement regime that would help to address local concerns and help achieve the achieve the Special Area of Conservation’ (FJCC, 2012: n.p.). This marked a key moment of recognition and acceptance by different players in the dispute that there were different narratives at play that needed to be negotiated. The first meeting between the Marine Scotland civil servant and Barra community representatives took place on Barra in July 2012 (shown in Fig. 2 (O) below). During the time that the author was researching the dispute, the focus of the dispute was on the most contested of the proposed mSACs (the Sound of Barra). The second mSAC (East Mingulay) will not be discussed further in this paper.

Figure 2. Research process ‘tree’ illustrating how the art-science collaborations integrated with the author's social science research. (Visualisation by Michael (Mysh) Rozanov). A. Participant observation; B. Compiling fieldnotes; C. Unstructured interviews; D. Participant photography and in-depth semi-structured interviews resulting in a photo essay booklet on islanders’ understandings of ‘conservation’ (photo essay booklet included in supplementary material); E. Transcribing interviews and fieldnotes; F. Data analysis (using Nvivo qualitative data analysis software); G. Public research meeting to identify research participants; H. ‘Make Your Voice Count’ research participant workshop to probe the deeper and unspoken needs underlying the dispute; I. Connecting Coastal Communities art-science collaboration resulting in *Belonging to the Sea* illustrated publication (MacKinnon and Brennan, 2012); J. Sea Stories art-science collaboration resulting in an online cultural map of the sea around Barra (Hurrell and Brennan, 2013). J1. High school workshop run by the author and Hurrell to train students in interviewing and video-making techniques to gather sea stories from members of Barra’s population; and presentation of Sea Stories project to elderly people in Barra’s local care home to prepare the ground for student engagement to gather sea stories. J2. Presentation of prototype digital map of the sea to community steering group for Sea Stories project. J3. Launch and hand over of control of Sea Stories map to the Barra community and Siar Media (Barra’s community media company). K. Participation in a community public event (the bi-annual Clan MacNeil Gathering) to launch and distribute the photo essay booklet, the *Belonging to the Sea* illustrated publication (MacKinnon and Brennan, 2012) and to introduce the Sea Stories project as a continuation of the Connecting Coastal Communities project. L. Marine Scotland lunchtime seminar where the author presented the policy relevance of the combined art and social science research approaches in the art-science collaborations to Marine Scotland civil servants. M. Response to consultation for the proposed Sound of Barra mSAC (Brennan et al., 2011) submitted to Scottish Natural Heritage. N. Western Isles Council Fisheries Joint Consultative Committee meeting. O. First meeting and official start of dialogue between Marine Scotland civil servant and representatives of the Barra community.

P. Author participated with representatives of the Barra community in a workshop on community-led management of the Sound of Barra mSAC. This workshop was organised by Dr. Margherita Pieraccini and Dr. Emma Cardwell (University of Bristol) as part of a socio-legal study on UK marine protected areas. Q. a “case story” (Flyvbjerg, 2006, 23) of the contested mSAC designation process contextualised in the underlying historically and culturally situated social processes. The turquoise ‘trunk’ of the research process ‘tree’ branches into blue non-visual methods and policy-related events on the left and green visual methods on the right, including the art-science collaborations. The blue dashed line on the left illustrates events related to community-led management of the Sound of Barra mSAC that were linked to the author’s research (through the consultation response (M)) but that did not directly form part of the author’s research design. The letters in circles indicate ongoing research processes while the letters within the ‘petals’ indicate an outcome or completion of a process.

³ Marine Scotland is the Scottish Government agency responsible for the marine environment in Scotland.

Buijs and Elands (2013) underline the importance of expanding communication within conservation from predominantly normative (how we value nature) to include emotional connotations of nature (how we experience it emotionally). Understanding how people connect to the sea emotionally is important to successfully engage people in sustainable use and management of the marine environment (Fletcher et al., 2012; Jefferson et al., 2015; Vincent, 2011) and to inspire a sense of stewardship towards the marine environment (Alexander et al., 2017; Laffoley, 2014). At the outset of the research process, the author assumed the likelihood of finding an emotional connection between people and place on Barra, with the intention of trying to understand how, in Barra, people and place function together within, and as, a socio-ecological system (Berkes, 2004; Maffi, 2007). This guided the research into a focus on understanding the cultural, social, historical and political contexts on Barra (Turner, 2004). It became apparent that intangible cultural heritage (Maffi, 2007; Lenzerini, 2011) was intertwined with the biophysical marine environment and that this created a sense of belonging to, and responsibility for, the homeplace (see MacKinnon and Brennan 2012; Brennan, 2018). It was further evident that exploring local understandings of conservation required a method which would go beyond words and into the realm of images. During discussions with social scientist MacKinnon, the idea of a dynamic map of the sea emerged, to reflect intergenerational knowledge, fishermen’s ways of knowing the sea and the intangible cultural heritage contained in the sea surrounding Barra. Visual artist Hurrel joined the conversation and proposed the idea of an interactive digital map. This was subsequently developed by Hurrel and the author as an art-science team, together with local community organization Voluntary Action Barra and Vatersay (VABV), as a way of bringing to life, and making visible, the rich culturally infused relationship between people on Barra and the surrounding sea. The Sea Stories online cultural map of the sea (www.mappingthesea.net/barra) revealed, in a visual and interactive way, this sense of belonging to the sea through the intangible cultural heritage contained in the sea surrounding Barra.

2.2 Research design

The flexibility and diversity of qualitative research approaches lend themselves well to in-depth understandings of complex processes, such as the mSAC dispute on Barra. Qualitative data generation methods are non-standardised and adaptable, enabling a more sensitive approach

to the social context of the research issues and resulting in rich and complex data. Qualitative data analysis retains complexity by remaining open to emergent concepts and by focussing on a plurality of understandings rather than trying to produce a 'right' answer. Qualitative approaches therefore provide in-depth and contextualised understandings of the social worlds of research participants, while acknowledging the role and perspectives of the researcher in the research process (Ritchie et al. 2014). The research design used by the author to explore the dispute on Barra took the form of a single extended case study within a phronetic social science framework (Flyvbjerg, 2001) which examined the larger social, historical, cultural and political context in which the dispute was embedded and considered how the dispute on Barra had been shaped by those forces. Phronetic social science is a pragmatic and context-sensitive methodology which recognises the existence of different worldviews from which different 'realities' are constructed, and which prioritises the production of socially-relevant knowledge which can facilitate change. Its aim is to produce situated (contextualised) knowledge about how to understand and respond to certain contexts by probing and reflecting on different sets of values, interests and power relations, and how they shape and influence human (and human-nature) relationships (Flyvbjerg, 2001; Flyvbjerg et al., 2012). As the phronetic social science framework enabled exploratory and intuitive inquiry, this facilitated the integration of combined art and social science approaches into the framework to identify and articulate a representation of the cultural diversity in the seas around Barra, and the ways that it is intertwined with the biological diversity of that environment. These combined approaches made visible different knowledge systems in a form which could be seen, heard and understood by the policy environment and members of the community alike.

2.3 A mixed method approach

An emergent mixed method approach to data collection and analysis was used by the author to explore the dispute. Methods included participant observation, in-depth interviews, and visual participatory methods. The latter involved participant photography to explore local understandings of the meaning of the emotionally charged concept 'conservation', together with the two related art-science collaborations introduced in section 2.1 above. Fig. 2 illustrates the research process (with further detail available in the supplementary material). A five-stage interactive and sequential approach combining art and social science methods and approaches (Fig. 3) emerged as the author's re-search into the dispute and the art-science collaborations were carried out in parallel and continuously informed each other (as illustrated in Fig. 2). The methods and combined art and social science approaches used in the author's research and in the art-science collaborations, made visible a plurality of narratives (described in section 2.1), both within the local community and the policy environment. The following section provides detail on islanders' articulations of aspects of the cultural diversity that co-exist with the biological diversity in the seas around Barra. It illustrates how the relationship between people and place on Barra cannot be neatly compartmentalised into separate social and ecological categories.

Figure 3. An interactive and sequential approach combining art and social science methods, developed by the author and Hurrell. Note: The arrows in the diagram are not intended to indicate cause and effect. They indicate a sequential flow through stages 1–5.

3. Insights from the research process combining art and social science approaches

3.1 “Nature and the universe do not tell stories; we do”

During the exploratory research phase, it became evident that there was a striking contrast between the map used by Scottish Natural Heritage (SNH) to portray the proposed mSAC in the Sound of Barra and the ‘maps’ of the same area in the minds of local people. The SNH map was static and bounded, with a line drawn around the area of the proposed mSAC (Fig. 4). This same area was portrayed as alive and ever-changing by the local respondents interviewed. For the fishermen in particular, drawing a line around a section of ‘their’ sea simply did not make sense. Harris and Hazen (2006) have observed that conservation maps typically run counter to the inherently dynamic ecological environment portrayed as they give the impression of ecological processes and relationships being fixed in space and time, regardless of changes in features or species under protection. On Barra, there was local opposition, in particular, to the listing of seals as a reason for designating the Sound of Barra as an mSAC on the grounds that seals are highly mobile and their population in the Sound of Barra fluctuates. The point here is not to argue that the Sound of Barra seal population should or should not be protected – scientific data have underpinned their inclusion – but rather to give a practical example of the clash between the marine environment as expressed by conservation maps on the one hand, and as understood and experienced by islanders on the other.

Figure 4. Sound of Barra candidate special area of conservation (mSAC) map (SNH, 2016).

Time spent fishing with local fishermen (Fig. 5) brought into sharp relief the inability of one representation alone to capture this dynamic and complex environment. These ‘conversations in context’ also highlighted that the marine environment is far more than simply a context or setting for human (political) action or culture. Rather, it can be seen as a ‘vibrant’ force (Bennett, 2010) which shapes, and is shaped by, those social relations through space and time (Nightingale, 2014). The mutual relationship between islanders and the surrounding sea cannot be neatly divided into separate social and ecological categories:

“Author: The more I’m hearing about the way you see the sea, understand the ocean and name it, the more I’m realising how unique it is...”

Fisherman: ...it’s all intertwined, you can’t separate it, and you can’t tamper with some of it without affecting the rest of it...” (Excerpt from interview 20.10.11)

There is a local practice of naming features and areas of the sea around Barra, highlighting the importance of contextualised knowledge there. For example, the Sound of Barra is entered through a narrow sea channel called ‘caolas boga’ mara– ‘the narrows of the dipping sea’, so named, explained the fisherman, because “it gives you the impression of the dip into the sea as you go through it.” While the north side of the narrows is always calm, it is very different on the south side if there is a south or south-easterly wind, as the boat dips into a head sea on the south side within a few boat lengths. The dipping of the creel boat provided an embodied sense

of how the names for reefs, rocks, channels, gullies and other coastal features naturally emerged from human interaction with the marine environment, and an insight into this more dynamic 'way of knowing'. This simple, but evocative, story behind the name 'caolas boga' mara' was subsequently developed as an illustrated 'sea story' in the Sea Stories map. Another local fisherman described an area named The Supermarket, which refers to a creeling area off Barra's north coast. It is called The Supermarket because, said the fisherman, "you could go in there on a Monday and there'd be nothing there and on Tuesday it would be teeming." The original fisherman who coined the name did so because, according to him, "it's worse than the bloody Co-op [supermarket] in Castlebay!" where the shelves are often empty. The problem was, it was impossible to know when it would be 'delivery day' in The Supermarket (MacKinnon and Brennan, 2012).

The same fisherman told of another name for a fishing area off the coast of Barra that refers to Amsterdam's notorious red light district. 'The Dam' was the name given to a small creeling area about a quarter of a mile square. It was called this when the fishermen in the three boats creeling this area agreed between them to V-notch and return any berried lobsters (females carrying eggs) they caught. As notched lobsters are not marketable, the V-notch (a 'V' cut into the lobster's tail) protects the female from being landed until her eggs have hatched, by which time the notch has grown out. The fishermen's theory was: "if the women are there, the boys will walk" (i.e. the male lobsters would migrate towards a concentration of females). According to the fisherman telling the story, the experiment worked. The year after they started doing this "you could go out with a hairnet and catch a dozen lobsters!" However, the Dam no longer exists. When one of the fishermen started keeping the unnotched berried lobsters, the other fishermen decided there was no point in continuing with the notching as the effectiveness of the whole scheme had decreased for all of them, with fewer berried females being notched and returned overall. According to one of the Dam fishermen, the system fell apart because of one fisherman's greed (MacKinnon and Brennan, 2012).

Figure 5. Fleet of creels being hauled, rebaited and prepared for re-shooting. Creeling is a static fishing method that uses ‘fleets’ of small cages or baskets (called creels) to capture shellfish. In Barra, creels are used to fish for crabs and lobsters. Image: Stephen Hurrell.

Figure 6. Mapping the sea around Barra with local fisherman Neil MacNeil (Neil ‘Handy’). Image: Stephen Hurrell.

This is a good illustration of the difference between shared and social values on the one hand, and individual values on the other (Kenter et al., 2015). In this case, the shared and social values of this group of fishermen which supported stewardship and conservation of the worked environment gave way to the assertion of the clashing, individual values of one of the fishermen. This had the knock-on effect of the entire group of fishermen thereafter asserting

their individual values in relation to the Dam. This small community at sea (St. Martin, 2006) co-existed with another reality of fishermen as utility-maximising individuals. The free-riding actions of one member of this community re-shaped the 'map' of the Dam into one inhabited by individual competing fishermen. In time, this produced an ecologically (and socially) different Dam, as berried lobsters were no longer conserved. It is also arguable that the increase in lobsters as a result of the initial conservation approach of the community at sea may have triggered the greed of the fisherman who started to catch the berried lobsters. The work of Elinor Ostrom identifies, and underlines the importance of, diverse forms of self-governance systems for common pool resources based on trust, cooperation and collective action, both individual and institutional. The complexities of each case dictate at what scale a common pool resource problem can be addressed most efficiently and sustainably. Such scales can range from large scale institutional arrangements to smaller-scale, informal, individual solutions (Ostrom, 1990, 2010). This highlights the importance of acknowledging and attending to complexity in socio-ecological systems and moving away from the presumption that people working with common pool resources are all self-interested individuals. Although the story of the Dam ended with a group of self-interested individuals, this does not necessarily support Hardin's (1968) 'tragedy of the commons' assumptions that resource degradation ensues from common-pool resource use. Rather, it illustrates the politically and culturally driven nature of marine re- source management (see Levine et al., 2015).

3.2. Local stories revealed diverse socio-cultural spaces

Building on these preliminary unstructured interviews, visual participatory methods revealed more about the relationship between people and place on Barra. The participant photographs (see section 2.3) that were used by the author to explore local understandings of the meaning of 'conservation' were compiled, accompanied by captions taken from the in-depth interviews discussing the photographs, into a short photo essay booklet (*What Lies Beneath*) in 2012 (see supplementary material and Fig. 2 (D)). The images and text provided by participants showed the rich and diverse nature of the socio-ecological system on Barra and represented a different reality to the bio-physical maps used to show the delineation of an mSAC under the Habitats Directive. Their significance is in their visual portrayal of a more nuanced understanding of the meaning of conservation, by making visible, through their eyes and through their words, the relationship of people on Barra with the surrounding sea. This provided a localised understanding of these subjective human relationships and helped to probe different sets of values and interests (Flyvberg, 2001; Flyvberg et al., 2012) and how they shape human (and human-nature) relationships.

In February 2012, the art-science team of the author, Hurrell and MacKinnon brought photocopied admiralty charts of the sea around Barra to several fishermen. The fishermen filled the charts with the names and locations of fishing marks, reefs, rocks, caves, gullies, and associated stories, like an invisible world emerging from beneath the water's surface (Fig. 6).

These admiralty charts were then used to develop the Sea Stories map featuring sound, image, story and naming, and articulating a version of the rich local knowledge, language and culture based on people's relationships with the sea around Barra. The design team consisted of the

art-science team comprising the author and Hurrell, together with a user interface designer, computer programmer, and two other artists. As the form of the map took shape (Fig. 7), the author and Hurrell worked closely with local community organization Voluntary Action Barra and Vatersay (VABV), and with teachers and students from the local high school, in the recording and editing of new audio-visual material gathered by them. For example the school-children recorded themselves singing Gaelic songs about the sea which became 'floating sea stories' contained in bottles which float around the Sea Stories map.

Figure 7. Sea Stories online cultural map of the sea (Hurrell and Brennan, 2013).

A detailed view of the map below (Fig. 8) shows some of the icons used on the map (e.g., navigational buoys). Each icon can contain names and active media (such as video, audio, photographs, text, animations).

The marker buoy icons (Fig. 9) indicate 'fishing marks'. Once the buoy is clicked blue lines are drawn. These lines connect to features on land that local fishermen use to triangulate their position at sea, and to find their 'fishing marks'.

The story of the Rusty Lobsters (which can be found by clicking on the shipwreck called the 'Cullen' (to the east in Brevig Bay)) is an animated text and audio piece based on an anecdote from a local fisherman (Fig. 10).

Clicking on a navigation buoy called Bò Chlàirich (the Reef of the Priest), also on the east coast of the map, leads to the story of how that reef got its name. The story, called the Altair Mòr, is narrated by local historian Calum MacNeil and is illustrated in an adventure-comic-book-style (Fig. 11).

Figure 8. Detailed view of Sea Stories online cultural map of the sea (Hurrell and Brennan, 2013).

The Sea Stories map was officially handed over to the people of Barra at a launch event in Barra's Heritage Centre on 16 November 2013. The map is now a permanent feature within the Barra community and will continue to be added to as further 'sea stories' are gathered by Castlebay School's media students and the wider community throughout the years. It is accessible to the public via the Internet at www.mappingthesea.net/barra.

This mapping exercise started to create a visual representation of some of the hitherto invisible intangible cultural heritage bound up in the biological marine environment. St. Martin (2001) sees fishermen's place-names as evidence of the existence of rich and diverse social spaces created and maintained by those who fish the marine environment. The Sea Stories map shows how these socio-cultural spaces in the marine environment are created not just by fishermen, but also by other members of the community who have a relationship (working or otherwise) with the marine environment, for example by local children singing Gaelic songs about the sea around Barra.

Figure 9. Fishing marks (Hurrel and Brennan, 2013).

Figure 10. The story of the Rusty Lobsters (Hurrel and Brennan, 2013).

Figure 11. The story of how Bò Chlàirich (Reef of the Priest) got its name (Hurrell and Brennan, 2013).

Mixed feedback from board members of Barra's local Heritage Centre to an initial prototype for Sea Stories highlighted that the marine environment is not understood and experienced by all local people in the same way. Some board members were very supportive of the Sea Stories concept and keen to suggest people who could contribute stories, but one member felt strongly about keeping the heritage of the island in the tangible and traditional form of books and images in the local Heritage Centre. For this member, it seemed that inclusion of the stories in an online map was too clinical and took something away from the heritage of the island. Just as the SNH map delineating the mSAC boundary could not fully capture that environment, the Sea Stories map can only ever be a partial representation of that environment. Nonetheless, it is important to make this visible as a counterpoint to the dominant conservation narrative of the marine environment as a natural ecosystem in need of protection and restoration. This is not to say that the marine environment does not need protection and restoration. It clearly does. However, the dominance of one narrative, presented as fact-based (and therefore, the only) truth, obscures the existence of political and ideological issues underpinning this narrative. Honest and open dialogue that acknowledges the validity of multifaceted views of marine and coastal systems is essential to shaping effective and multi-scale institutions for governance of the marine environment. The exclusivity of one dominant narrative impedes such honest dialogues from taking place in a constructive manner (Cormier et al., 2016).

In conflict situations, it is critical to be able to understand the thoughts, beliefs and feelings of the other party/parties (Rothman, 2014). Since management of natural resources is carried out at a variety of local socio-cultural contexts, cultural understanding is a necessary foundation for such management (Peterson and Feldpausch-Parker, 2013). As such, the value of the methods and methodology applied in this research lies, in particular, in the insights provided into multi-

faceted values underlying, perceptions of and behaviour towards, marine and coastal systems. These draw attention to the absence of different ways of framing human-nature relationships within the mainstream conservation discourse in a way that makes sense within that discourse. Equally, those who have different ways of knowing the marine environment need to be able to engage and work with, rather than push away, the policy discourse. For this to happen, new 'frames' of environmental understanding are needed.

3.3. Creating new frames that recognise a multifaceted view of marine and coastal systems

According to frame theory, the ways that parties in a conflict construct their understanding of a contested issue (their frames) are shaped by experiences such as past social interactions and attitudes towards the contested issue (Peterson and Feldpausch-Parker, 2013, Riemer, 2004). Riemer (2004) contends that the acknowledgement, by parties to a conflict, of diverse ways of framing a situation is a necessary part of creating new frames. Lakoff (2010, 72) suggests that presenting fact and emotion together are necessary for creating new frames of environmental understanding:

'In short, one cannot avoid framing. The only question is, whose frames are being activated – and strengthened – in the brains of the public.

There are limited possibilities for changing frames. Introducing new language is not always possible. The new language must make sense in terms of the existing system of frames. It must work emotionally.... And, of course, negating a frame, just activates the frame....'

The articulation of the different frames that parties bring to a conflict can be used by a conflict intervener (in this case, the researcher) to encourage a shift in the relationships between the parties by developing alternative frames (Gray, 2003, Peterson and Feldpausch-Parker, 2013). An important goal of the Sea Stories map was to recognise and articulate the socio-cultural relationships bound up with the 'natural' environment. Visions of space produced by maps generated by Scottish Natural Heritage (SNH) conflicted with local visions of space that emerged from embodied ways of knowing the marine environment on Barra (for example, through fishing). The Sea Stories map's portrayal of the local community as intertwined with the marine environment was a deliberate contrast to the SNH map (Fig. 4) with its designated area for protection of relevant species and habitats. It seems that the recognition and celebration of cultural heritage in the participatory mapping process opened the door for a different frame of environmental understanding to become visible. It is crucial to find ways to activate different frames, not least because the resistance of an existing frame simply serves to strengthen it (Lakoff, 2010). As such, if the only or dominant environmental frame that is activated (or accepted) in the marine conservation policy domain is one which depicts nature as needing protection from humans, then this strengthens the perception of local coastal users (such as fishermen) as harmful to the environment and does not leave space for a frame which views them as stewards of this environment. The eventual designation of the mSAC in the Sound of Barra in August 2013 did not (and was never intended to) prevent local creel fishermen from fishing in the sheltered waters of the Sound. Nevertheless, the designation was underpinned by the dominant narrative of the islanders using the Sound of Barra as

(potentially) harmful to the environment. On its own, this narrative is not conducive to meaningful dialogue or strengthening a locally-rooted stewardship ethos (which, in the case of Barra, already exists).

Experienced mediator Jay Rothman (2014, 450) has observed that when “parties hear that the other side is motivated by hopes and fears that often resonate with those of one's own...a new and potentially unfreezing “analytic empathy” may emerge between them” whereby similarities between opponents become visible. Importantly, such analytic empathy does not require emotional empathy or trust to exist between parties. The particular individuals in the Scottish marine policy environment (from SNH, Marine Scotland, various Environment Ministers) that were personally involved in the conflict did not contest that people on Barra have cared, and are capable of caring, for their environment. This was not, however, the message conveyed to the people of Barra by the conservation process that civil servants and policy makers were bound to administer. This process unhelpfully framed the islanders as separate from an environment with which they were actually, on a day-to-day basis, intertwined. It created the illusion of a ‘people vs nature’ binary, with the Scottish Government framed as the protectors (and managers) of nature. It has taken vision, and risk, on the part of all parties to move beyond the separating conservation policy framework. Analytic empathy is arguably visible in the Scottish Government's support for members of the Barra community to take the lead in designing a management structure for the Sound of Barra mSAC that integrates local knowledge systems into the conservation policy framework. As such, the people of Barra are recognised as planners and stewards of the marine environment, a role that the conservation policy framework accorded only to civil servants and policy makers.

Since 2012, a slow transformation in the relationship between key government officials and leading members of the Barra community has resulted in the emergence of a community-led co-management process for the Sound of Barra mSAC, facilitated by the engagement of key Barra islanders with the policy environment, through dialogue with Marine Scotland (Brennan 2015, Fig. 2 (N, O)). A conversation started that laid a foundation for different narratives, worldviews and value sets to co-exist, albeit not without constant tension. It seems that key people on Barra have realised that having control of their marine resources requires them to be open, through dialogue, to coming to mutually acceptable ways of describing this control. There appears to be an emerging acknowledgement that control of marine resources in the Sound of Barra may not look like what it has looked like in the past, before the conservation area was designated. Both policy-makers and the people of Barra appear to be moving towards more dynamic conceptions of management and stewardship of the marine environment. The government-funded delegation of management responsibility to local people suggests that policy-makers are recognising and acknowledging the relationship between cultural diversity and biodiversity expressed in local people's relationships with their marine environment. The people of Barra are slowly in the process of finding a way to articulate the management of local marine resources in a way which respects these relationships and existing social structures and also meets the needs of the policy environment (specifically, the satisfaction of the conservation objectives associated with a marine Special Area of Conservation under the Habitats Directive).

3.4. Critical reflections on the research approach

A formal evaluation of the combined approaches used in this research process was not carried out as part of the research process. However, at the research participant workshop in 2012 (Fig. 2 (H)) research participants provided feedback on why they were continuing to participate in this research, providing insights into research participant reflections on the research approach. An overview of their collective feedback is set out in Table 1. The photo essay booklet (see supplementary material), the *Belonging to the Sea* publication (MacKinnon and Brennan, 2012) and the *Sea Stories* map (Hurrell and Brennan, 2013) have provoked reflection on Barra about the islanders' relationships with their marine environment. For example, at a public event in August 2012 (Fig. 2 (K)), an islander who worked in the merchant navy commented that he was inspired by the talks given by the author, Hurrell and MacKinnon at that event and that he would look at going back to sea in a different way, reminded of where he belongs. This supports Harper's (2002) observation that working with images can help people shift their perspective on how they are located in the world. At the Heritage Centre event for the hand-over of the *Sea Stories* map, the photo essay booklet (see supplementary material) was presented as a slideshow, followed by a presentation of some of the sea stories on the *Sea Stories* map, which featured the voices of some members of the audience. Although this provoked much discussion (and laughter) about other sea stories (as yet unrecorded) it prompted one islander to remark "you're very close, you've got underneath my guard." The slight discomfort of this islander in relation to the *Sea Stories* articulation of aspects of the cultural diversity in the seas around Barra underlines the sensitivity that is required of the researcher in conducting this kind of research. The need for such sensitivity is noted by O'Riordan (2001) as one of the difficulties of an intuitive research approach.

Qualitative research approaches require critical self-reflection on the part of the researcher, particularly where the research process is inductive and intuitive. O'Riordan (2001: xxi-xxii) has recognised the importance of intuitive methodology, 'where each stage can only be interpreted in the context of its predecessor', in allowing new ways of examining and interpreting relationships to emerge. Intuitive methodologies such as phronetic social science fit within a view of scientific knowledge as 'contextual empiricism'. This perspective highlights the relevance of context in constructing knowledge (Longino, 1990). Context takes the form of background assumptions by the scientist which support her reasoning and the social and cultural context within which the research is conducted:

'The intellectual practices of observation and reason do not exist in a purified form.... If we understand integrity not as purity but as wholeness, the integrity of the scientist is honored when she permits her values to play a role in her scientific work. The role is not to overwhelm the observational and experimental data but to guide interpretations and suggest models within which the data can be ordered and organized' (Longino, 1990: 219).

As a researcher with background assumptions and values, the data I gathered and interpreted were to some extent constructed by the research process that integrated art and social science approaches. My presence in the field as an observer (and the presence of artist Hurrell and social scientist MacKinnon) may have influenced the behaviour and activities I was observing

(Ritchie et al., 2014). This was particularly relevant initially, when people were more suspicious of me/us and unsure as to what my/our purpose was. As time went on, as I became more of a familiar face on Barra, people were more relaxed around me so my influence on their behaviour, conversations and activities was modified. I constantly reflected on this in my fieldnotes, which provided a rich source of observational data. I was, however, aware that my background (a white Irish woman from a scientific institute) and the ways I connected with people (for example, by playing music in a pub rather than playing sport in a field) were influencing the kind of data I was collecting both in terms of how I approached and related to people and how they responded to me. If anyone else was to attempt to replicate this research on Barra at another point in time they would necessarily come up with different observations (Burawoy, 1998). The subjective nature of the qualitative data-gathering process was addressed by triangulating data from different sources wherever possible, meaning that data from my observations (fieldnotes), interviews and other archival data (e.g. media, third party surveys) were analysed to see if they converged in what they were saying about the mSAC conflict and the social, historical, cultural and political contexts of life on Barra. There is support for the view that if different sources of data tend to agree with each other, this indicates the reliability of the data (e.g. Burawoy, 1998; Yin, 1994). Rather than assuming reliability from convergence, I reflected (in fieldnotes) on the rapport with each interviewee. At times, the fieldnotes indicated a suspicion that the interviewee might be telling me what they thought I wanted to hear. Rather than dismiss such data as unreliable, they were reflected on further during data analysis. As such, they informed the exploration of the dynamics of the conflict.

4. Conclusions

This paper has argued for the integration of approaches from the arts, humanities and sciences in the context of the planning and management of the marine environment. It has illustrated through the Barra case that such innovative approaches are needed to fully engage with the complexities of socio-ecological systems and to manage disputes in ways that incorporate an understanding of local socio-cultural contexts. The sharing of the material generated by the related Connecting Coastal Communities and Sea Stories art-science-community collaborations reflected back not only the characteristics of a place, but also the complexity that exists in how different people may use, understand and interact with their surrounding sea. This form of creative socio-cultural engagement functions as a bridge, or meeting point, between different (and sometimes polarised) communities of interest. It helps make visible different forms of knowledge that are often invisible within the policy environment, and has the potential to aid dialogue around marine environments and related spatial planning. A particular feature of this art-science collaboration was that the crossovers in the socially-engaged practices of the art-science team transcended the boundaries between art and science and crossed over into the realm of policy-makers. It opened up new spaces in which both art and science could become active by participating in addressing concrete policy issues in a practical manner (as well as analytically). It also contributed to opening up new spaces for more constructive dialogue between members of the local community and the policy environment, demonstrating how the arts and social sciences can have social and political impact on the ground. This, in turn, highlighted how “participation in the environmental policy context is intensely political and always linked to power relationships and deeply felt values” (Peterson and Feldpausch-Parker,

2013, 527). This paper has also contributed to the literature documenting different cultural constructions of the marine and coastal environment, and the implications for its management (e.g. Stocker and Kennedy, 2009; Voyer et al., 2015).

Representations of the marine environment for the purposes of marine planning would, in practice, ideally reflect a plurality of value systems and thereby help make more explicit the trade-offs which are required as part of the planning process. It would also facilitate different forms of knowledge to become visible within a mainstream conservation discourse that privileges natural scientific or 'expert' knowledge. This undoubtedly makes for a messier, more complicated and more time-consuming planning process. Guidance on how to implement this in practice can, however, be found in an emerging body of literature. For example, Voyer et al. (2015, 101) suggest that insights gained by planners from a greater understanding of the dominant 'cultural models' influencing social responses to marine protected areas could be used "to identify and nurture areas of common ground within contested planning processes whilst building respect for alternative values and points of view in areas of conflict." The UK's National Ecosystem Assessment Follow-On has developed a handbook for decision-makers which provides suggestions on when and how shared, plural and cultural values can be taken into account in their decision-making (see Kenter et al., 2014). This work recognises that people's shared, plural and cultural values inform and shape a concept of the common good and should be taken into account by decision-makers in order to better represent the values of those affected by decisions taken (Kenter and Reed, 2014). Kenter et al. (2015) use a variety of participatory and deliberative methods (such as citizens' juries, multi-criteria analysis, participatory mapping and subjective well-being indicators) to capture the diversity of ways in which people relate to nature.

Voyer et al. (2015, 93) have noted that "new and innovative approaches to participation and management" are needed for planning processes to incorporate a plurality of value systems, worldviews and different 'cultural models' in addition to the predominant ecological cultural model that values 'expert' evaluations and practices. This supports the argument in this paper that current approaches to environmental planning, management and conflict are underpinned by the dominant assumptions and frames of natural scientific knowledge. It also supports the argument made in this paper that alternative frames of understanding are necessary to move intractable conflicts to a space where the parties can develop different narratives so that imaginative ways forward can emerge. This paper has responded to the call for such new and innovative approaches by testing a creatively combined art and social science approach to articulate a plurality of narratives that exist around management of the marine environment, including the marine policy conservation-driven narrative. It is not suggested that interactive cultural maps of the sea are a panacea and should be created as a matter of course. Rather, the Sea Stories map is presented as one outcome of an imaginative combination of art and social science approaches that makes visible different representations and perceptions of the marine environment. The Barra case illustrates that it is important that these pluralistic narratives are articulated and acknowledged. Doing so enables governance of the marine environment to be shaped and guided by the local socio-cultural context by recognising the social relations which form part of the relevant socio-ecological system. This is a necessary precursor to harnessing

and/or inspiring a sense of stewardship towards the marine environment. On Barra, this sense of stewardship is encapsulated in the Gaelic concept of *dùthchas*, described by the Scottish Gaelic scholar John MacInnes (2006) as a form of 'emotional energy' of belonging to a homeplace (MacKinnon and Brennan, 2012). Art-science approaches that speak to the heart as well as to the mind, and that can translate into the policy arena in practical ways, are needed to bring this 'emotional energy' to planning and conservation processes for the marine environment.

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