

The Cooperative Participatory Evaluation of Renewable Technologies on Ecosystem Services (CORPORATES)

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CORPORATES

The Cooperative Participatory Evaluation of Renewable Technologies on Ecosystem Services.

Project Report

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OF ABERDEEN



marine scotland



The James
Hutton
Institute



SAMS

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Webpage for CORPORATES

www.corporatesproject.co.uk

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CORPORATES

The Cooperative Participatory Evaluation of Renewable Technologies on Ecosystem Services.

Executive summary

Background and aim

1. This report provides the background, the process and the outcomes of an interdisciplinary project entitled “The Cooperative Participatory Evaluation of Renewable Technologies on Ecosystem Services: CORPORATES”, funded by the UK Natural Environment Research Council (NERC). The aims of the project was to exchange knowledge between researchers and a range of public and private sectors stakeholders around the understanding of marine ecosystem services (ES), in the context marine spatial planning (MSP) decisions around marine renewable energy (MRE).
2. The project developed a pilot study located at the Firth of Forth, Scotland, considering current development of a number of large windfarms in an area important to both fishing and nature conservation. The project included the involvement of a wide range of highly experienced stakeholders over the course of two day-long workshops in November 2014 and March 2015.
3. While the process centred on a ‘live’ decision-making case study, the focus of the CORPORATES project was to provide an example of a decision support tool for knowledge exchange around ES rather than influencing decision-making in the Forth.
4. The project design and delivery was highly transdisciplinary, involving experts with backgrounds in ecology, oceanography, marine management, policy, law, environmental psychology, anthropology and ecological economics as well as public and private sector stakeholders.

Methods

5. MRE industry representatives and regulatory/advisory partners were brought together with representatives of fishing organisations, non-governmental organisations (NGOs), tourism operators, recreationalists, and local government.
6. The pair of workshops (Figure 1) introduced the concept of ES and linked these to the activities of, and benefits derived by, all stakeholders from the supply of these ES in the case study area. The workshops included the following components:

- i. Sectoral representatives (fisheries, conservation and recreation) mapped areas and activities of importance to their sector and then shared their maps across sectors, allowing everyone using the environment to show their areas of interest to each other (1st workshop).
- ii. Short knowledge exchange interludes on ecology, oceanography, law and policy were used to create a shared baseline of ecological and policy knowledge (1st and 2nd workshop) and a context for decision makers.
- iii. The sector groups created lists of benefits derived from the mapped activities and these were compared amongst the different sectors to identify commonalities as well as differences (1st workshop).
- iv. The benefits identified by stakeholders were grouped by the research team (in between workshops) into broader categories which were then associated with three key ES (following UK NEAFO¹ conceptualisation): *fish & shellfish*, *climate regulation* and *seascape*. Four key features were also identified that could be linked to these benefits: *Degree of naturalness*, *wildness and vastness*, *habitat diversity*, *species diversity*, *number of cultural/historical features*.
- v. Participants from different sectors worked together in small groups to link the different categories of benefits back onto the three key ES of fish & shellfish, climate regulation, and seascape (2nd workshop).
- vi. Each mixed sector group created their own conceptual system model (CSM) in order to explore interactions and feedbacks between ecological processes, ES and associated features, benefits and activities/actions. The development of the CSM started from ecological processes that constitute the base of the food chain up through species and habitat diversity to ES, benefits and activities such as current fishing, future windfarm development, and MPAs and showing the links between all these aspects (2nd workshop).
- vii. Using their CSMs as a starting point, the mixed groups discussed potential impacts of policies concerning fisheries (Common Fisheries Policy [CFP], establishment of Inshore Fisheries Groups), climate change (Renewables Directive, 2030 Climate Framework) and conservation (Marine Strategy Framework Directive [MSFD], Natura 2000 regulations) on the different activities and benefits in the area (2nd workshop).
- viii. Written narratives allowed individuals to express their personal opinions and beliefs regarding possible future changes to ES-benefits-activities (2nd workshop).

¹ UK National Ecosystem Assessment Follow-on phase, completed in 2014, <http://uknea.unep-wcmc.org>

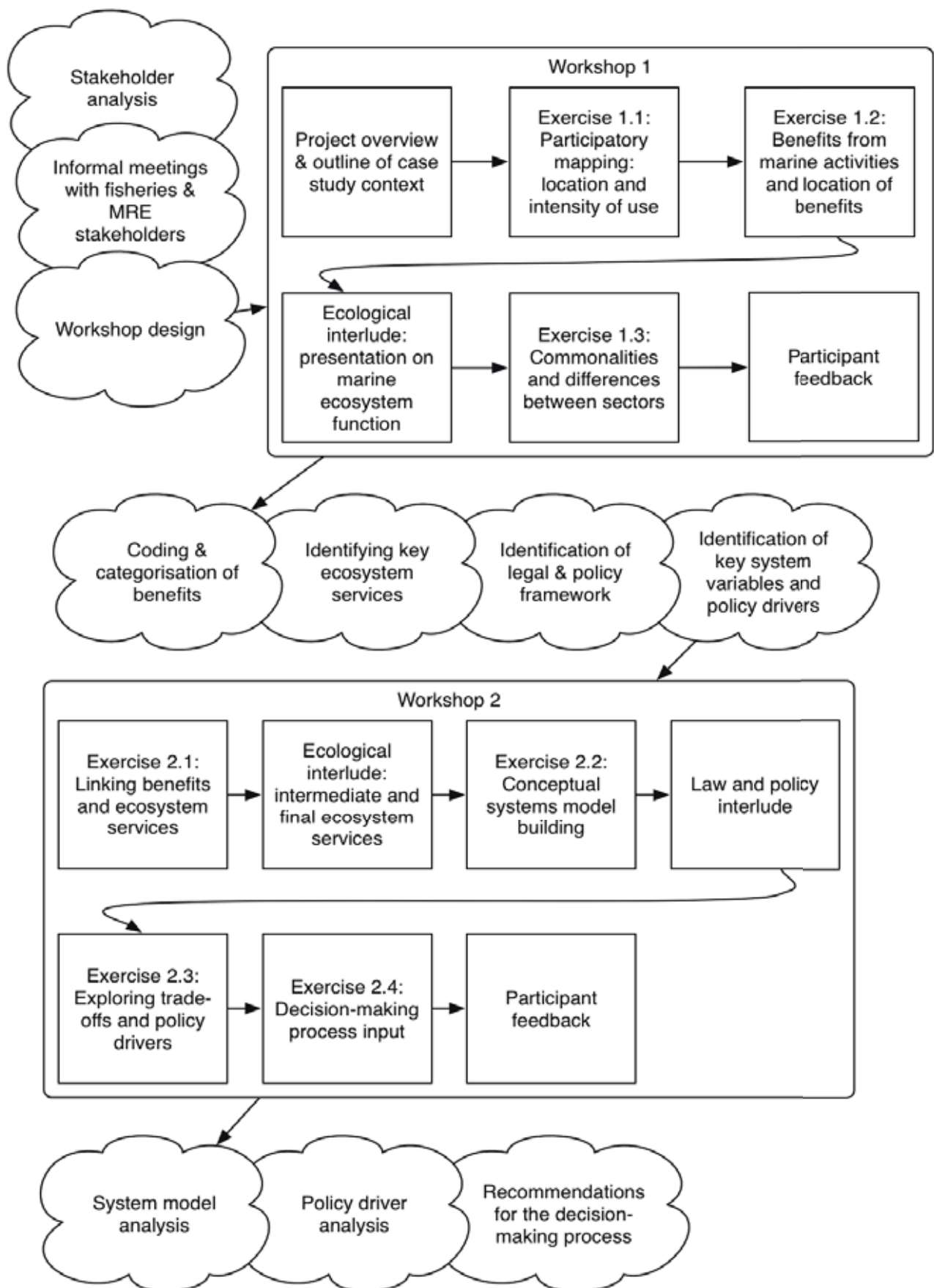


Figure 1. Outline of the CORPORATES methodological process.

Results and discussion

7. Formal and informal feedback indicated that the first workshop was deemed moderately successful. The second workshop was highly successful in the eyes of participants, who specifically mentioned such aspects as gaining knowledge on a range of topics, quality of discussion and workshop delivery.
8. During the first workshop, more than 100 ES benefits were generated across the different sector groups. Sharing and discussing the sector-specific lists of benefits in mixed groups allowed for a recognition that the different sectors valued many of the same benefits. For example, commercial fishing groups were similar to recreational groups in saying that they enjoyed personal well-being from being at sea.
9. Participant feedback indicated that the process of working in mixed sector groups of stakeholders to link the categories of benefits to ES had been useful to help understand how ecosystem services and benefits interrelated.
10. Although the CSMs were challenging to participants and time consuming, more than 90% of the participants said that they had learned something valuable from this exercise. Working in mixed sector groups, with most of the same people that had met in the 1st workshop, allowed cross-sector realisation that most other sectors understood and agreed with the linkages being drawn between ecological issues and the range of potential positive and negatives effects at the level of ES.
11. The CSMs were also helpful when the focus shifted from the more abstract level to the concrete issues of the potential consequences for the sectors of different future policy scenarios (in relation to the CFP, Renewables Directive, 2030 Climate Framework, MSFD and Habitats Directive). Throughout the process, there was explicit acknowledgement that the current regulatory framework is complex. Part of the knowledge exchange delivered by the project was recognition of both the ecological complexity and the multiple relationships between law, policy and the environment.

Conclusions

12. The project incorporated cooperative learning and shared development into the creation of a decision-support system. The system was found to be highly relevant to energy developers, fishing organisations, NGOs and tourism businesses, government regulators and policy makers as well as community-level stakeholders. This process built a greater and shared understanding between developing industries and existing stakeholders of the ecological and policy interlinkages and interactions between different ES, benefits, activities, and economic, social and cultural values.

13. The feedback from the workshops affirmed that this process – which placed ES and ecological trade-offs at the heart of the discussion – was helpful in increasing understanding of these issues between a wide range of stakeholders. It enabled joint sector deliberation, as required by law, and showed this can be done in the context of an ES framework. Consequently, the combination of deliberative techniques as worked through in the workshops can help to facilitate planning of marine uses in the face of uncertainties, and may reduce the risk of conflict.
14. A conclusion from the consultation process with stakeholders post the workshops suggests that this decision-support system would be most helpful early in the planning process. The CORPORATES team are currently preparing to provide a workshop on training Marine Planners on how to provide this this approach in 2016.



Image 1. Stakeholder discussion in workshop 2, exercise 2 during the construction of the conceptual system model depicting the ecosystem and human activity in the Firth of Forth Scotland.

CORPORATES Report

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1 Introduction

1.1 Project Context

The 2012 World Business Council for Sustainable Development report 'Biodiversity and Ecosystem Services—scaling up business solutions' (World Business Council for Sustainable Development 2012) highlights the inherent linkages between businesses and ecosystems. The report emphasises the need to raise awareness and educate companies about the concept of ecosystem services (ES); to partner with local stakeholders, environmental experts and government regulators; and, crucially, to collaboratively identify, measure, map and manage ecosystem impacts and seek to cooperatively improve services provided by biodiversity. In the UK, the legislative framework for marine licensing decisions (UK Marine and Coastal Access Act 2009, Marine (Scotland) Act 2010) requires the concept of sustainable development and its relationship with ES. Additionally, there is now a legal requirement for stakeholder engagement and public participation such that the decisions to pursue developments in particular locations and submit licensing applications requires stakeholders to have contributed to the decision-making process and for outcomes of consultations to become part of the decision making process (Anon a and b 2013).

The CORPORATES project was instigated to introduce ES concepts into marine spatial planning (MSP) decision-making by bringing together ecological, economic, socio-cultural and legislative experts with marine renewable energy (MRE) industry and regulatory/advisory partners to exchange knowledge with a range of stakeholders from the fishing industry, NGOs, environmental consultancies and recreational groups as well as local government. There is a clear demand for a framework that balances ease of application with the ability to deal with complex social-economic-ecological issues, and a decision-support system that incorporates stakeholder values and establishes the links between these values and measurable ecological changes. Enabling effective deliberations on ecological trade-offs and making socially robust decisions in the face of uncertainty can enhance business, policy and legislative implementation (UK NEA, 2014). As understanding of how the ecological trade-offs will affect economic, social and cultural values increases, better joint understanding by industry and stakeholders of what will change with (and without) the proposed development can reduce the risk of conflicts and resistance to the growth of MRE (Kenter *et al.* 2014). Within this project, and in collaboration with a wide range of expert stakeholders, we have developed and tested a decision-support system incorporating participatory mapping of benefits to a range of stakeholder groups from the use of marine ES and building a shared conceptual model of the social-ecological system, using the Firth of Forth, Scotland, as a case study.

1.2 Background

Expansion of the offshore wind sector is an important policy area across the UK and is attracting substantial inward investment. The UK is legally committed under the EU Renewable Energy Directive (2009/28/EC) to meeting 15% of its total energy demand from renewable sources by 2020. Within Scotland, the Scottish Government has set a target of 30% by 2020, with renewable sources satisfying 100% of domestic electricity demand (Scottish Government. 2011). However, the use of large areas (100s of km²) of the marine environment for renewable development may change biodiversity-ES relationships that society and business currently access from coastal and marine systems. While there are a number of useful and spatially explicit optimisation and planning software tools (e.g.

Marxan: www.uq.edu.au/marxan, MaRS: www.thecrownestate.co.uk²) available what is considered to be the 'optimal' outcome or solution also depends on the values and priorities of the local user groups affected. Marine areas such as the Firth of Forth are important to a large range of stakeholders who pursue different activities and may be differently impacted by new developments such as windfarms and designated Marine Protected Areas. To achieve socially robust decisions, we argue that it is necessary to have a transparent decision-making process and for stakeholders to arrive at a shared understanding of the links between ecological processes, human activities, and benefits derived from ES.

Wong *et al.* (2014) have identified an integrated decision-support system as being urgently needed for the assessment of stakeholder perceptions and valuation of ES trade-offs brought about by ecological changes that large-scale offshore developments will produce. One of the novelties of the CORPORATES project was the ability to focus this pilot study on a real-life example of how ES could potentially change, working with highly motivated stakeholders at the point in time when large-scale windfarm developments are being designed. The case study is the Firth of Forth, Scotland, which is also an area that has the potential for the co-location of windfarms with a newly designated Marine Protected Areas (MPA) in 2014.

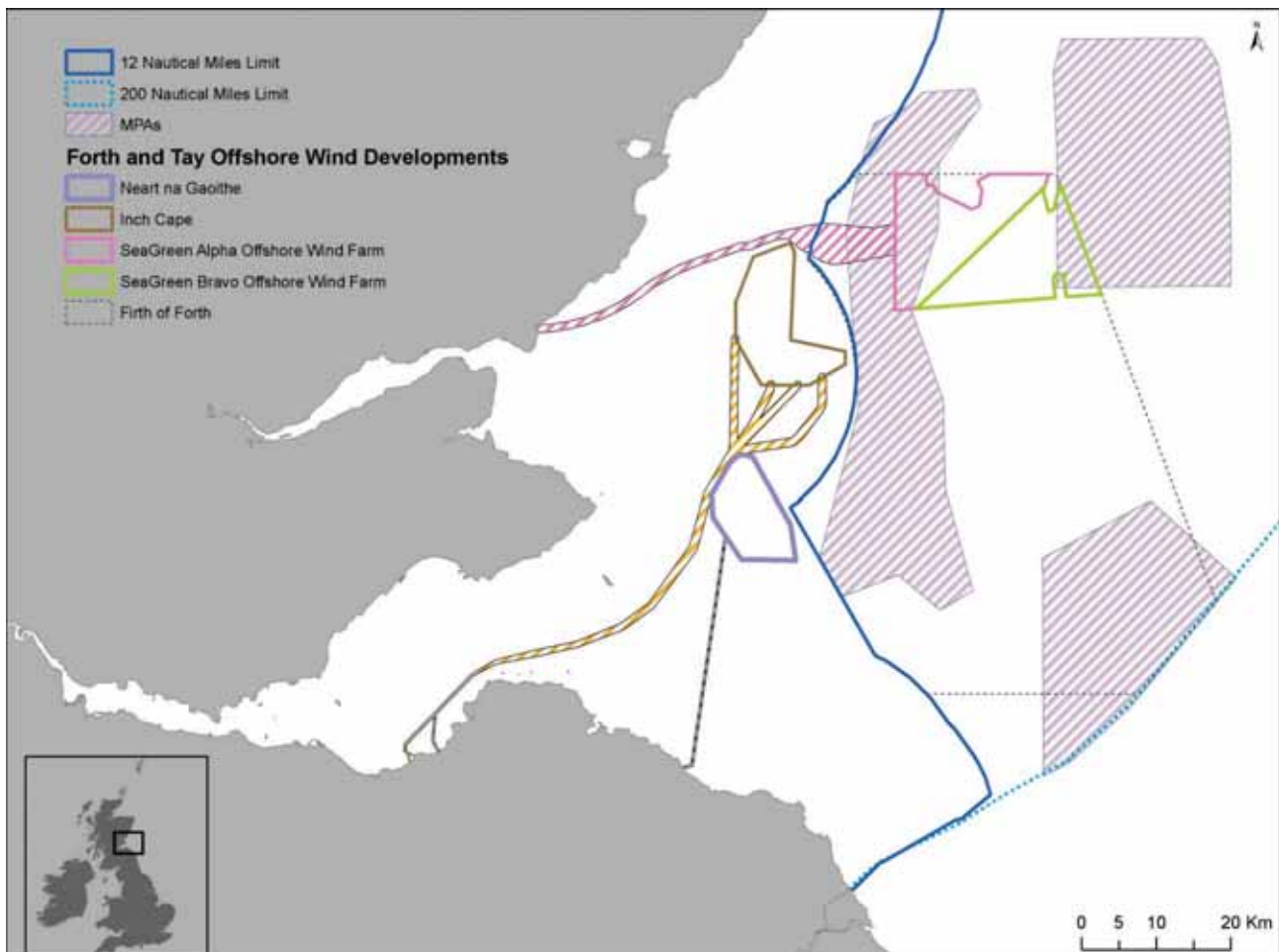


Figure 2: Windfarm complex of 4 developments totalling 335 turbines: Seagreen, (collaboration of Scottish & Southern Electricity & Fluor), Inch Cape Offshore Limited (Repsol), and Neart na Gaoithe (Mainstream Renewable Power). Including the Firth of Forth Banks Complex, now a designated Marine Protected Area (MPA).

² The portal to MaRS is temporarily offline at the time of writing (Oct, 2015)

The Firth of Forth is a site of national economic, ecological and societal importance (Figure 2). Four offshore windfarms - Inch Cape Offshore Limited, Neart Na Gaoithe, Seagreen Alpha and Seagreen Bravo – have recently been consented in the Forth and Tay area. The Neart na Gaoithe windfarm east of the Fife Ness coastline will have up to 75 turbines, generating 450 megawatts (MW) of power. The Alpha and Bravo Seagreen developments combined will consist of up to 150 turbines, around 27-38km off the Angus coastline, and could generate 1050MW. The Inch Cape development, also off the Angus coastline, will total no more than 110 turbines, with a total capacity of 784MW. The developments in the Forth and Tay region could provide 2.284 GW of power and will involve a total of up to 335 turbines. If these projects go to completion, this amount of renewable energy production would be a considerable milestone in advancing the UK's low carbon economy. Yet the Forth supports a range of other uses, including merchant shipping, defence, fishing as well as tourism and recreation. The site is also of major ecological significance, being the location of designated (EU Birds Directive) Special Protection Areas on the Forth Islands, and three areas off shore (see hatched areas in Figure 2) have recently been designated as a series of MPAs. This plurality of uses raises the potential for considerable conflict between users. Although there is a robust consultation system in existence with the use of environmental impact assessments (EIA) procedures for all large offshore developments, the current potential for large proportions of our seas to rapidly have demands for multiple uses provides an urgent need for the identification of the scale and spatial extent of ecological, economic and cultural ES provided by marine biodiversity. The current EIA system is a more linear approach which struggles to evaluate the ecosystem level effects of human induced changes and an evaluation of their significance to different stakeholders to allow appreciation of ecological trade-offs to be made in a more explicit and transparent way. To achieve this, the project built on recent conceptualisations of marine ES (Turner *et al.* 2014), cultural services (Church *et al.* 2014), and shared values and deliberation (Kenter *et al.* 2014) that were developed as part of the UK National Ecosystem Assessment Follow-On phase (UK NEA, 2014).

The project also linked to current research conducted by the University of Aberdeen and Marine Scotland Science that is exploring the functional relationships between the spatially explicit changes to primary production up through the trophic chain driven by the changes in hydrodynamic processes that large scale, potentially gravity-based wind turbines will generate. Predicting the change in these bio-physical dynamics is thus crucial for understanding how windfarm design configurations and size of foundation may affect provisional, regulating and cultural ES.

An important part of the project was taking a social-ecological systems approach to characterise the relationship between ecosystems, their services and benefits, and drivers of change. Systems are a way of describing interrelated sets of elements or entities (Van Gigh 1991). Complex systems, such as social-ecological systems, are characterised by emergent behaviour, i.e. complex behaviour, properties and patterns that arise from the relatively simple elements of the system through positive and negative causal feedback loops (Kay & Regier 2000; Richardson 2005). A key method used in the project was participatory conceptual systems modeling (CSM), where system models are developed by groups of stakeholders or the public.

Participatory CSM has been used in a wide array of contexts, as summarised by Kenter *et al.* (2014). Examples include endangered wildlife management (Beall & Zeoli 2008), climate change adaptation (Bizikova, Dickinson & Pintér 2009), watershed management (Brown Gaddis, Vladich & Voinov 2007; Videira, Antunes & Santos 2009), water resource planning (Cockerill *et al.* 2006; Kallis *et al.* 2006), land use planning (Prell *et al.* 2007; Jones *et al.* 2009), sustainable forest management (Standa-Gunda *et al.* 2003; Mendoza &

Prabhu 2006), tourism management (Patterson *et al.* 2004), balancing conservation and development goals (Sandker *et al.* 2010), coastal realignment (Kenter *et al.* 2013, 2014, Under review) and public sector administration (van den Belt *et al.* 2010). However the technique has not been applied to marine renewables or knowledge exchange around marine biodiversity and ES. This project also included a strong legal and policy context in the development of the participatory CSM technique. In practice, participants consider a system by discussing variables that can either increase or decrease (such as species diversity) and establishing how they interrelate through causal links.

Motivations for this kind of approach include a desire to pay attention to process as well as to content issues, a realisation that identification and description of problems is based on subjective judgement and a desire to negotiate a joint understanding and arrive at an 'inter-subjective' description (Lane & Oliva, 1998). When such agreement is attained, it should engender a desire to act to make improvements and to be committed to such actions (Ackoff, 1977; Eden & Sims, 1979; Lane & Oliva, 1998). Thus, participatory CSM exercises can be thought of as a process of learning, but also trust-building and exchange of values and beliefs through structured collaborative analysis.

1.3 Central aim

The aim of the project was to develop a process for exchange of ecological, legal, social, economic and cultural knowledge around marine Ecosystem Services (ES), involving researchers and a wide range of public and private sector stakeholders that could serve as a decision-support tool for MSP.

1.4 Key objectives

1. Engage with commercial, government and community stakeholders to identify locally important benefits that ecosystem services (ES) provide, considering multiple domains of evidence and value (ecological, economic, social, cultural).
2. Identify and map key elements of spatially explicit marine biodiversity in the wider Firth of Forth and Tay offshore region that stakeholders agree contribute to spatially identifiable provisioning, regulating and cultural ES.
3. Explore the stakeholder evaluation of the impacts to ES of different scenarios of change through windfarm development, introduction of Marine Protected Areas (MPA) and climate change (including their combined impacts).
4. Evaluate the changes in hydrodynamic processes that the introduction of large scale windfarms may have on local primary production and the indication of possible links to changes in higher trophic levels and hence and consequent changes on ES.
5. Identify and exchange knowledge in relation to the legal framework and key policy drivers for decision-making in the study area.
6. Evaluate the knowledge exchange process as a decision-support tool to improve stakeholder engagement and uptake of ES knowledge in MSP decisions, particularly in relation to planning MRE.

1.5 Outline of the process

Objectives 1 through 3 were accomplished through two paired workshops. Objective 4 was accomplished as a stand-alone research project by members of the team and is currently being reviewed for publication in a peer-review journal. Objective 5 was conducted by members of the team and is presented in summary form in the section: Background on Identification and linkages of Law (Page 31). A paper to be submitted to a peer-review journal is in production.

Objective 6 was partly accomplished from the formal evaluations of the workshops in sections Evaluation of Workshop 1 (page 25) and Evaluation of Workshop 2 (page 60) and will be completed with the evaluation from the stakeholders of the comments on the contents of this report. Two pre-workshop meetings were also held, one with the MRE Industry developers and the second with the fishing sector interest groups to provide informal information exchange about the aim and objectives of the project and to discuss concerns about the possible effects, if any, of the project on the current consenting process. The offshore windfarm projects were given consent by Scottish Government by 10th Oct 2014. <http://news.scotland.gov.uk/News/Consent-for-offshore-wind-development-1139.aspx>

The first workshop took place on the 14th of November 2014 at the Scottish Government Building, Victoria Quay in Edinburgh, Scotland and was attended by stakeholders from Renewable Energy Developers, Fishing, Ecological and Recreational/Tourism sectors. The main objectives of the first workshop were to develop a common understanding between the range of stakeholders and to allow a sharing of their experiences and knowledge of the Firth of Forth region. The first workshop focused on three aspects: (1) Participatory Mapping, (2) Benefits, and (3) Interactions and Impacts. The second workshop took place on the 6th of March 2015 also at the Scottish Government Buildings, Victoria Quay in Edinburgh, Scotland. The same local stakeholders and representatives from the MRE industry and regulatory/advisory partners were invited to attend the second workshop. The main objective of the second workshop was to provide a process to exchange knowledge and enhance understanding around the links between benefits and final and intermediate ES. The second workshop consisted of four aspects: (1) Linking Local Benefits to ES, (2) Conceptual System Model (CSM) Building, (3) Exploring Trade-Offs and Policy Options and (4) Decision-making Process.

The remainder of this report provides detail of the workshops, the actions, outcomes and evaluations as well as the processes that took place to design the two workshops and final conclusions on what elements a decision-support system for the MSP should include and why.

1.6 Research Team

The research team headed by the University of Aberdeen included the Scottish Association for Marine Science (SAMS) and the James Hutton Institute (JHI) and a partnership with Marine Scotland Science (MSS); Marine Scotland is the Scottish Government directorate responsible for marine planning and licensing of devolved marine activities in Scotland, including marine renewables. This group together represented a strong multi-disciplinary team of researchers, with international reputations in their respective fields of ecology, human geography, marine renewable policy, marine ecosystems, law, oceanography, ecological economics, environmental psychology and anthropology.

1.7 Stakeholders

Stakeholders were identified as groups that had a vested interest in the Firth of Forth area inclusive of financial/livelihood, governance/management and personal reasons. The list was compiled on the basis of a combination of names provided by public and private sector partners, a previous stakeholder analysis for a recent ES valuation project in the Forth (Kenter, 2013), individual contacts of the research team, and internet searches and phone inquiries to try and increase the number of stakeholders in areas that tend to be underrepresented; particularly different types of recreation and tourism stakeholders. The list was also cross referenced with the licence application consultation process to ensure we had representatives of both statutory and non-statutory consultees for offshore renewable developments. Most stakeholders, with the exception of some of the recreational groups, were well accustomed to the Environmental Impact Assessment process for this region.

For the type of interactions that were to take place in the workshops, we limited the number of participants to between 25 and 30. Stakeholders were drawn from the following sectors: Renewables, Fishing, Ecological and Recreational/Tourism. Several additional stakeholders were invited due to their direct relevance to the case study. Table 1 details the organisations from whom a representative was present at either one or both the workshops.

Table 1 –Stakeholders who attended either one or both of the CORPORATES workshops.

Renewables (MRE) SeaGreen Mainstream Inch Cape Offshore Limited	Fishing Scottish Fishermens Federation (SFF) East Coast Inshore Fisheries Group Salmon Fishery Boards (Tay District)
Conservation British Trust for Ornithology Marine Conservation Society RSPB Whale and Dolphin Conservation JNCC SNH Isle of May Bird Observatory Hartley Anderson Enviro Centre	Recreational/Tourism Isle of May Boat Trips Royal Yachting Association Port Edgar Watersports Lothian Sea Kayak Club SFSA Marine Quest
Additional Relevant Stakeholders Marine Scotland The Crown Estate Forth Estuary Forum Local Council South East Scotland	

2 Process: Workshops

This section provides details for the two workshops including: (i) objectives; (ii) structure of the individual components; (iii) outcomes; and (iv) evaluations. Given the considerable effort that goes into design of a workshop, particularly when a new process is being developed, we offer a comprehensive account in an effort to facilitate future use of the process piloted in this project.

Both workshops consisted of a mix of knowledge exchange presentations and focused activities. The project team held multiple full day meetings and utilised shared online platforms for iterative discussion to clarify what was to be achieved and to develop the individual components. There was at least some degree of 'practice' for each component whereby content, flow, logistics for exchange and recording of information, room and seating arrangement, materials (e.g. maps, markers) and make-up and size of groups (e.g. small/large, sector specific/mixed) were considered. A facilitator and scribe were incorporated into each working group; each activity had an overall facilitator and time-keeper.

2.1 Workshop 1

The focus of the first workshop was to provide a forum through which sectoral groups could contribute their own knowledge about activities and important locations in the case study site to the existing body of scientific information (Exercise WS1-1a & WS1-1b); to identify benefits (Exercise WS1-2a & WS1-2b) and exchange insights and knowledge across sectors about these benefits (Exercise WS 1-3a); to examine linkages between benefits and ES (Exercise WS 1-3b); and to explore possible effects on these activities and benefits that might occur through windfarm developments, MPAs and climate change (Exercise WS 1-3c).

The specific objectives were:

- Develop understanding between the range of stakeholders and to allow a sharing of experiences in how stakeholders evaluate the range of important ecological, economic and cultural/social benefits and services (i.e. the food, recreation and energy resources which together are called the ES) that the Firth of Forth provides
- Map uses / activities and associated benefits / filling data-gaps around recreational values & activities
- Develop an understanding on how different ES, activities and uses relate to components of biodiversity of the Firth of Forth
- Facilitate interactions between different stakeholders to determine potential trade-offs between different ES
- Evaluate the workshop as part of a model for future Marine Planning participatory evaluations

The workshop commenced with a project overview (please see all presentations on www.corporatesproject.co.uk) including knowledge exchange presentations, one from Windfarm developers and the other from Ian Davies (MSS) and Roger May (MS). These presentations sought to 'set the stage' for the project and clarify the current situation for consenting issues before proceeding to use the Firth of Forth and Tay region for this pilot study.

2.1.1 Exercise WS1-1: Participatory Mapping

This first exercise clustered participants into sector/interest-specific groupings – Fishing & Maritime activity, Recreation & Tourism (including recreational fishers), Conservation, Heritage & Community – with the addition of a windfarm developer in each group. By having a within-sector discussion, and people of similar vested interest at the same table, we hoped that discussion would be easier to commence and go into greater detail for discussion and mapping of the important activities and locations in the region. The box below details the exercise's structure as a whole which consisted of two activities.

Aim	Explore the location and spatial footprint of local activities by sector. Mapping included identifying uses of the region, ground truthing and refining existing maps. While substantial data exist, the focus of the exercise was to increase discussion and awareness across participants and prepare for further mapping of benefits and interactions.
Materials	Each group was provided a hard copy of 3x A0 admiralty chart showing the location of windfarm, cables sites and MPA designations along with supplementary A1 size maps of existing spatial information by sector. Additional existing data layers from National Marine Planning Interactive which can be found on the following link: www.gov.scot/Topics/marine/seamanagement/nmpihome (NMPi-shown on laptops) were also provided. Participants were asked to review existing information, provide additional data and information on the intensity of use.

Activity WS1-1a

Validating and mapping activities: Guided by a facilitator, each group mapped out spatial activities and sites of importance across the region (see Image 1). The following information was mapped for each group, with flexibility for additional sites to be added by users:

- Fishing and Maritime: key fishing grounds by species and gear type; seasonal sites; recreational fishing sites; coastal infrastructure; shipping and ferry routes, sea angling;
- Recreation & Tourism: kayaking small boat sailing sites and access points; key sailing and racing areas; dive sites; board sport areas; locations and tracks for wildlife tourism;
- Conservation, Heritage & Community Sites of cultural importance, sites of historical importance; areas for visual amenity and viewing; significant wrecks; sites of importance including and in addition to SPAs and SACs; other areas of ecological importance.

Activity WS1-1b

Intensity of activities: Where feasible participants were asked to identify the intensity of use for the activities. A standardised key was presented grading intensity of use from 1-5 (i.e. infrequently to frequently).

During both activities, participants were encouraged to discuss issues around mapping and data as well as interaction between the activities. In addition, any issues of concern expressed over interactions with windfarms were captured on flip charts with a 'parking' system for issues not directly related to the activity at hand.



Image 2. Stakeholders incorporating their knowledge onto existing spatial information for the Firth of Forth region.

OUTCOMES: Exercise WS1-1 Participatory Mapping

The spatial data collected from Exercise WS1-1 were digitised using spatial mapping software ArcGIS. This created an electronic format of the spatial data which could then be added to the current database of knowledge of the Firth of Forth. An example map for the Fisheries sector is provided in Figure 3 which illustrates the new knowledge identified about activities in the area. Figure 4 shows the way in which both activity and intensity of activity were combined into a single digitized map through data provided by the Tourism & Recreation group. The map generated by the NGO & Ecology sector can be found in the discussion of outcomes for Exercise WS1-2 (Activity b and c) to illustrate the combined spatial maps created to capture activities, benefits and intensity into one digitised map.

The within-sector grouping generated very detailed maps and rich discussions on what may have been missing for various reasons from official maps and why it was important. Thus our hope that clustering people of similar vested interest could help facilitate conversation and deep engagement was very much supported and rewarded by the outcome of this exercise.

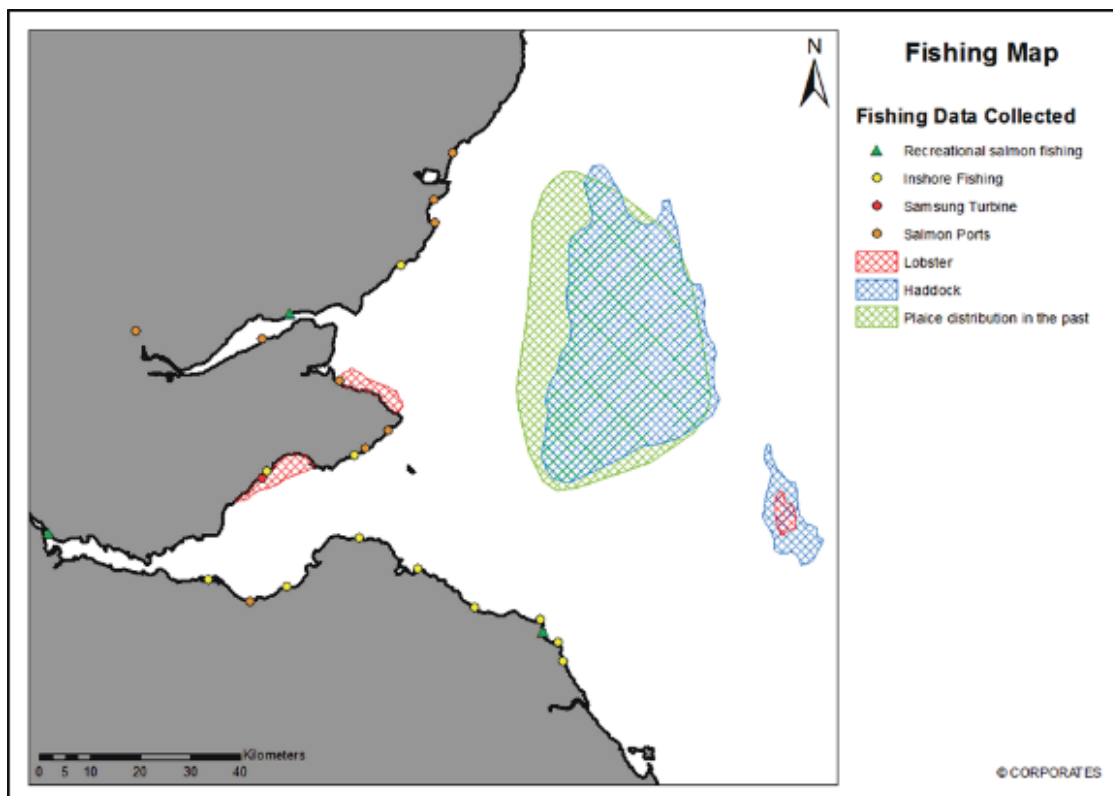


Figure 3. Fishing Sector Map. Representing information about commercially fished species that is not currently on the publicly available maps of scallop and nephrops fisheries. (available at www.gov.scot/Topics/marine/science).

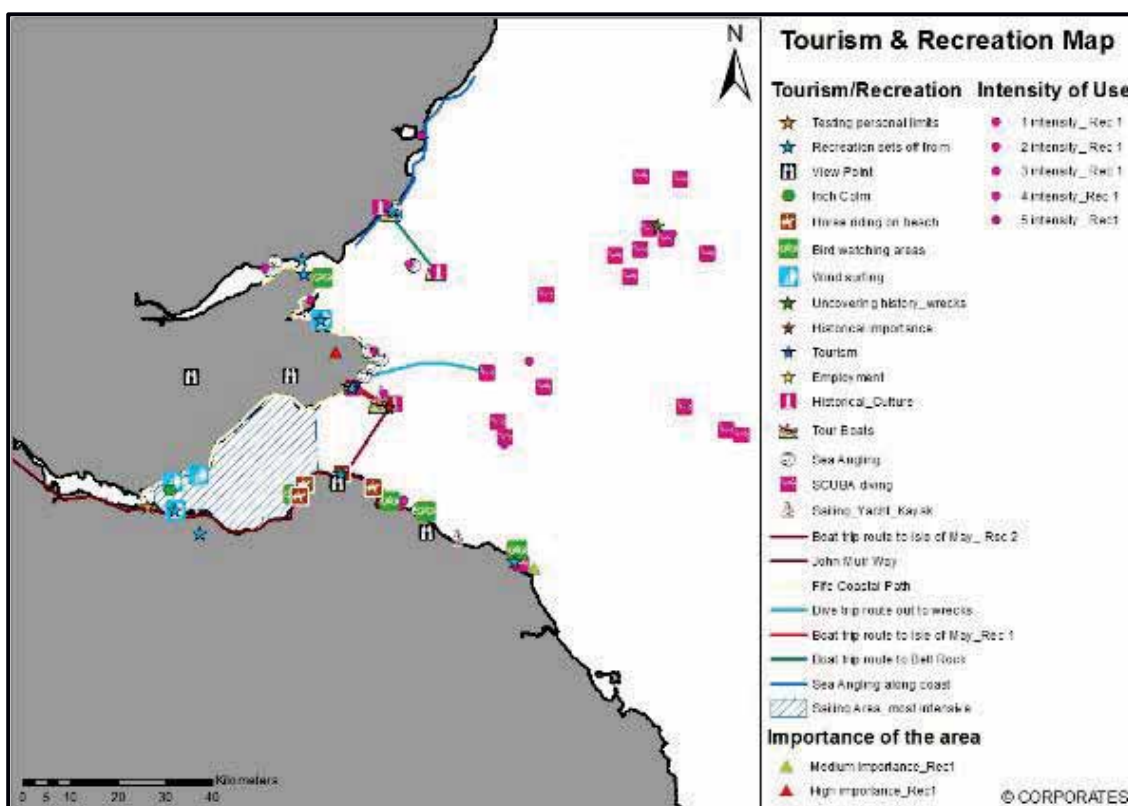


Figure 4. Recreation Sector Maps (combined groups) illustrating activity and intensity of use. [Note: importance of the area refers to data collected through Activity WS1-2 (Activities a and b).]

2.1.2 Exercise WS1-2: Benefits

The second exercise consisted of three activities which are detailed below. Participants remained in the same sector/interest-specific groupings as used in the first exercise.

Aim	Highlight the benefits local stakeholders are getting from marine activities
Materials	Each participant recorded their benefits on post-it notes. The post-it notes were then placed on a flipchart. Sticky dots were used to mark specific locations on the map.

Activity WS1-2a

Benefits identification. Participants were asked to individually write benefits linked to their sector-specific activity on post-it notes. Benefits are defined as important ecological, economic and cultural/social benefits and services (i.e. the food, recreation and energy resources which together are called the ES) that the Firth of Forth provides. The activity was described as one which drew on the previous Exercise with a focus on benefits rather than specific activities. Facilitators introduced the activity using the following guiding language:

“In the previous exercise you indicated on the map where you do what. Now we would like you to think about and write down the benefits that those activities provide either for your particular interest, for society as a whole, or for biodiversity. These can be material benefits but they can also be non-material things.”

Participants were then asked to share their identified benefits with the others at the table. The post-it notes were then placed on a flip chart and grouped according to activities; a process that was stakeholder led. After having heard and worked through the initially identified benefits, participants were given opportunity to add further benefits. We used a pre-prepared ‘check-list’ of benefits to prompt for additional benefits developed from existing literature (e.g. Irvine *et al* 2013). An example prompt provided to facilitators was:

“You haven’t mentioned anything about sense of place. Is fishing important with regard to what people see as being characteristic or being an important part of what makes up the of the Firth of Forth?”

OUTCOME of Activity WS1-2a

The lists of benefits identified by each sector table were rapidly compiled (over lunch) into a combined set of benefits, by sector, for use in Exercise WS1-3a. The benefits were more carefully arranged into categories when the research team undertook further analysis in between the two workshops for additional use in Workshop 2 –see the Section *Grouping of Benefits* (page 27)

Activity WS1-2b

Location of specific benefits. Participants were asked to identify which – if any – of the benefits linked to particular spatial locations and or habitats. These were marked with numbered sticky dots on the maps and the reason – e.g. what are the particular characteristics of those locations that the benefits depend on – was recorded on a flip chart. For example, a benefit might be associated with a specific location. As needed, facilitators prompted discussion with question such as: “Would you say that kayaking

makes you feel relaxed no matter where you go or is it only when you go to particular places?”

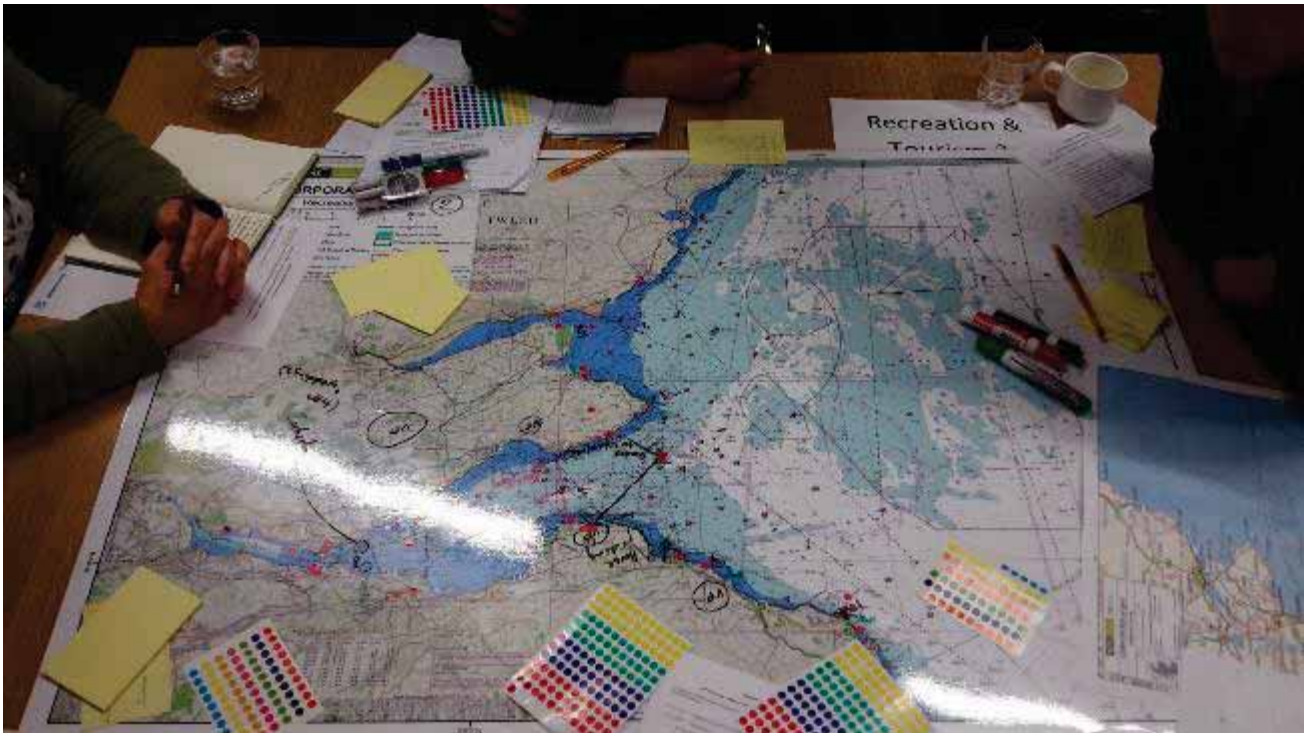


Image 3. Stakeholders using sticky dots to record benefits that were linked to specific places.

Activity WS1-2c

Importance of a location to specific benefits. Participants were asked to evaluate/weight different areas/locations (as 'low, medium, high' importance) according to the identified benefits.

Example of question: "With regard to seeing wildlife, would you say that this area is of low, medium or high importance"

OUTCOME of Activity WS1-2b and c

Any information about the spatial location and the importance of location for specific benefits were combined with the spatial data about activities (from Exercise WS1-1) to create digitized, electronically available maps. Data about the location and intensity of activities (Exercise WS1-1), and the specificity and relative importance of particular places for benefits, were combined into a single representation for the NGO & Ecology sector group (Figure 5). The map presented in Figure 4 illustrates this for the Tourism & Recreation sector groups.

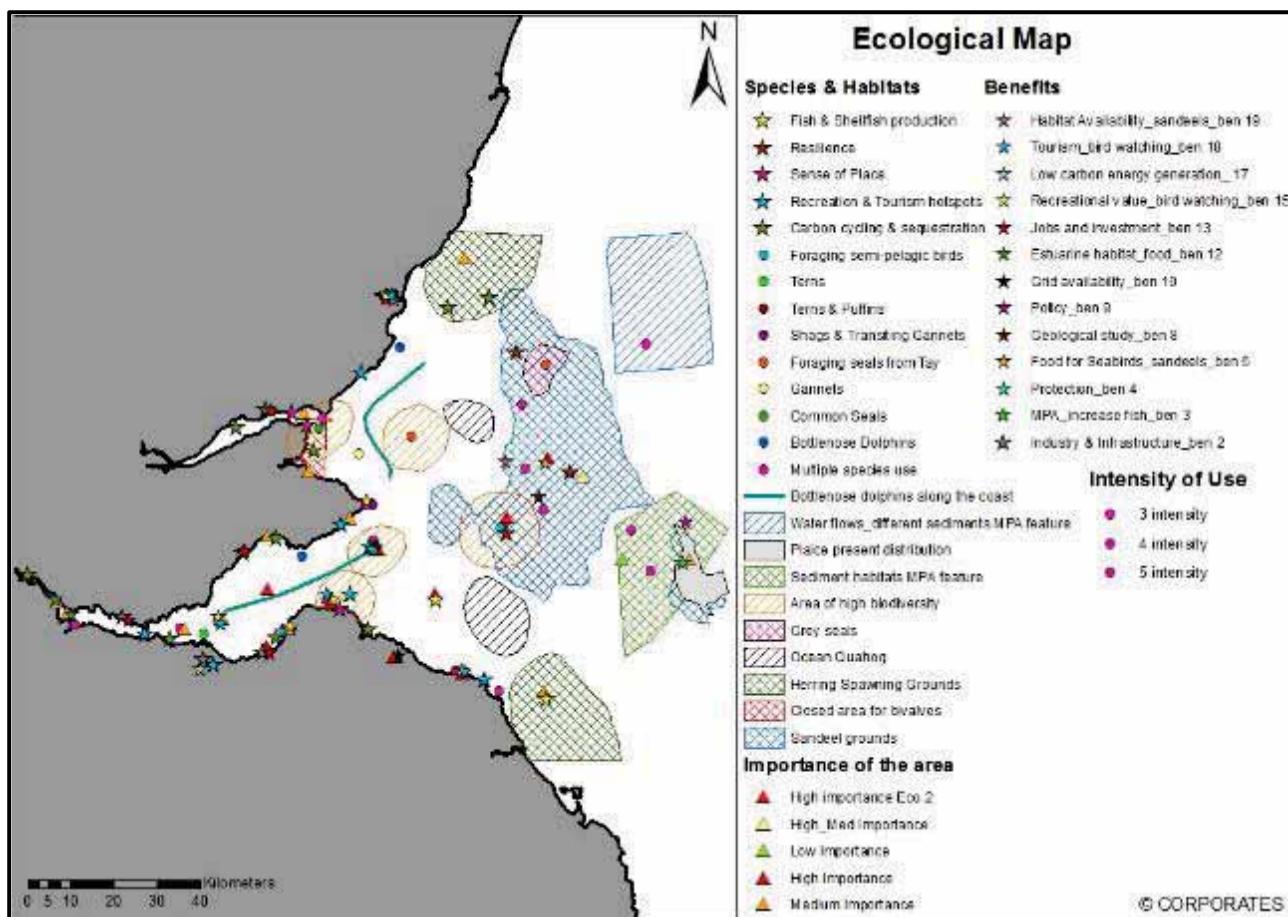


Figure 5. NGO, Ecology Sector Map (combined groups). Maps of seabirds (JNCC ESAS <http://jncc.defra.gov.uk/page-1547>) and seals were already available to the groups <http://www.gov.scot/Topics/marine/science/MSInteractive/Themes/seal-density>

2.1.3 Ecological Interlude [see slides in www.corporatesproject.co.uk

Presentations provided basic background on how marine ecosystems function, the types of linkages between climate change, ecosystem function and the food web and how these linkages may operate in different locations. The premise of introducing some ecological background is that we believe that to better manage our oceans on an ecological basis it would be best if we all understood more about marine ecology.

Overview of Ecological Interlude session

- What may change with introduction of Windfarms, MPAs and Climate Change
- An example: Plankton biomass
- Building the Linkages

2.1.4 Exercise WS1- 3: Commonalities and Differences

This third exercise consisted of three activities focused on identifying, learning about and discussing similarities and differences between the sectors represented at the workshop. Participants had an opportunity before the exercise to view the maps of activities and spatially located benefits generated by all sector groups. Exercise WS1-3 was carried out in mixed sector groups. After having generated their own lists of perceived benefits, participants had an opportunity to view the maps of activities and spatially located benefits as well as read through the list of all benefits that had been generated by all sector groups.

Aim	To explore the links among local marine activities within all sectors, the benefits and the underlying natural (ecological) processes. Assist knowledge exchange between sectors.
Materials	Scribes were issued with notebooks and a pen to record the discussions. A flip-chart and marker pens were used to record the main points of the discussion.

Activity WS1-3a: Commonalities and differences between sectoral Benefits.

Participants were provided with a combined list of benefits by sector (generated from Activity WS1-2a) and asked to consider what similarities and or dissimilarities they observed across the benefits identified by different sectors. Participants were encouraged to 'unpack' and discuss these. Examples of questions asked by facilitators as starting points included:

- a. What benefits are shared among the groups?
- b. What was meant by each group for the benefits?
- c. What are the differences?

Sub-Aim: To encourage the participants to think back to how their benefits, from their activities, rely on natural processes.

OUTCOMES: Activity WS1-3a: Commonalities and differences in benefits perceived by the different sectors

Commonalities in benefits that were noted included: food, employment, recreation, communities, connections with others, education, well-being, relaxation, enjoyment, calm, closeness to and appreciation of the intrinsic value of nature, fishing, and tourism. Not all these commonalities were noted by all groups; food and employment were two benefits that were identified as present for all sectors.

The disparities amongst benefits considered to be shared between sector groups seem in part to reflect differences in how narrowly or broadly the listed benefits were interpreted by the groups. For example, one group identified 'wellbeing' as a shared benefit yet not all groups had used that term, instead using terms such as 'feel good factor'. Interestingly, some sector groups included items/benefits in their list of shared benefits which had not been mentioned during the Benefits Identification activity (WS1-2a). For example, a fisheries group identified 'relaxation' as a benefit common to all sectors despite not having included this amongst their own list of benefits. This may be reflective of a shift in perspective away from a sector specific focus to considerations at a broader scale.

Several sector groups reflected on the potential for synergies and conflicts amongst the different activities and/or benefits. Discussion highlighted the reality that these cannot always be seen as clear cut but rather are dependent on the particular circumstances or the ways in which things were implemented. Conservation and fishing, for example, were seen as being at odds in instances where fishing bans were introduced, but were also seen as sometimes having shared interests, such as when Marine Protected Areas helped conserve important spawning grounds for fish.

Activity WS1-3b: Linkage between benefits and the ecosystem

This activity specifically sought to examine the linkages between the identified benefits and the ES that provided them. Participants were asked to again review the full list of identified benefits from the region and discuss how they link back to natural (ecological) processes and the ecosystem. Participants were encouraged to consider both positive and negative linkages. Example questions asked by the facilitators include:

Please consider how:

- a. Availability of prey for birds is linked to ES and underlying ecological processes
- b. Wildlife watching is linked to underlying ecological processes e.g. key habitat sites; areas for foraging; food webs.
- c. Availability of fish is linked to ecological processes e.g. availability of plankton; sea temperature; nursery sites.

Sub-Aim: To encourage the participants to consider the potential impact (positive or negative) of various types of change on the benefits they identified and the activities associated with them.

OUTCOMES: Activity WS1-3b: Linking benefits back to ecosystem processes

This second part of Exercise WS1-3 asked participants to consider how the benefits that had been identified were linked to ecological processes. The 'going backwards' from benefits to processes took quite some time and prompting to get started. It seemed to require a shift in thinking for most of the participants and appeared to be less intuitive than going the opposite way, as was done in the second workshop.

Several of the groups emphasised that not all of the listed benefits could in fact be linked back to ecological processes. An example given was that of the thrill of surfing. For some of the benefits, the links seemed easier to identify and more unequivocal than for others. For example, tourism that relied on the presence of charismatic animals such as puffins was linked back to the production of fish by several groups. Other connections were, however, seen as more ambivalent. One of the recreation groups, for example, mentioned that scuba diving could be both negatively and positively influenced by plankton production; increased plankton could mean lower visibility for divers yet it could also mean a greater abundance of marine animals to see when diving. An additional type of linkage noted was for benefits such as those provided by fishing; these were seen as interconnected to and with complex processes that could not be easily disentangled and described in an exercise such as this.

2.1.5 Activity WS1-3c: Impacts of changes to benefits and activities from Climate Change, Windfarms, Marine Protected Areas

This part of the exercise examined the possible effect of natural, man-made and policy generated change for the region. Participants were asked to consider the potential impact of various types of change, including climate change, windfarms, and MPAs, on the benefits identified and the activities associated with them. Discussion also included mitigation measures and other factors influential of change. Facilitators drew on the following example scenarios / issues for discussion:

- a. Climate Change e.g. more frequent high intensity storms, sea level rise, sea level temperatures
- b. Windfarms e.g. construction, interactions
- c. Marine Protected Areas e.g. displacement of fisheries, overspill of animals into other areas; tourism opportunities.

OUTCOMES: Activity WS1-3c: Impacts of changes to benefits and activities from Climate Change, Windfarms, Marine Protected Areas

Discussion focused on possible mitigation measures and identification of any additional factors that might influence change. It took some time and prompting for most of the groups to start this discussion. This may reflect the challenge associated with moving from the abstract to the more specific, particularly when there has been little direct experience, e.g. of an MPA.

Unsurprisingly, each group identified both positive and negative impacts which cut across the different sectors, although there were some similarities across groups. For example, in discussion of MPAs, the restrictions or displacement of activities associated with fishing and recreation were commonly identified as potential negative impacts. A concomitant potential positive impact of increased species richness and abundance for these two sectors was commonly noted as well. The breadth of potential impacts identified is notable, taking into consideration not only individual sectors (e.g. entanglement of fishing gear with undersea windfarm infrastructure) but also wider community and societal impacts. Examples of the latter include the potential loss of trust that could occur if the claimed environmental benefits of MPAs do not occur and the wider economic (e.g. jobs) and social (e.g. educational) benefits of windfarm development are not realised.

2.1.6 Workshop 1 Evaluation – Summary

Workshop evaluations sought to understand what learning might have taken place, to what extent new knowledge had been gained from the various activities, an assessment of the workshop structure (e.g. materials, delivery, quality of discussion) and the overall experience of each workshop as a whole.

Feedback forms

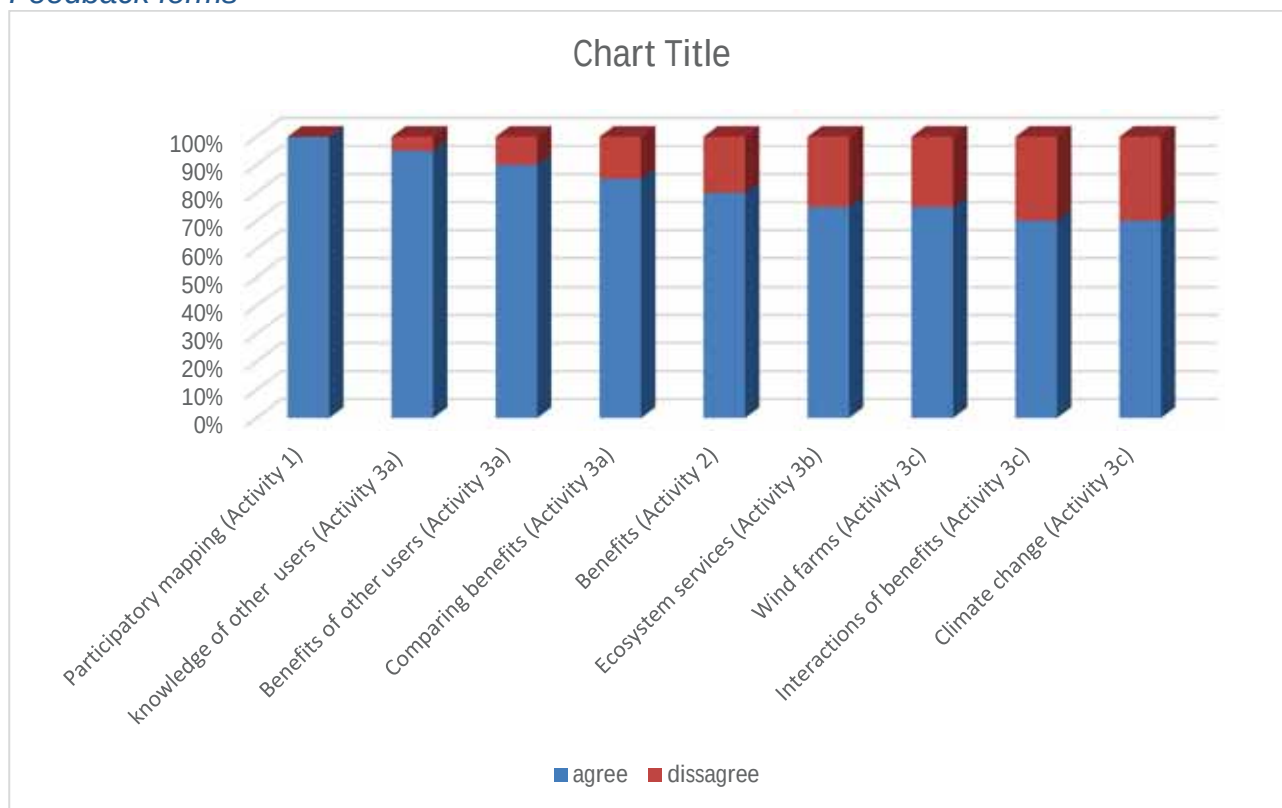


Figure 6. The Percentage of participants that that either agreed or disagreed with the statement that they gained knowledge from each of the stated activities

Figure 6 shows participants' assessment of knowledge gain about activities, benefits and ES and the extent to which specific activities might have facilitated learning. Participants were largely in agreement that they had learned something about the activities of and benefits gained by other users in the region. With respect to ES, there was greater divergence; responses from a quarter of the participants (5) suggested no new information had been gained about this topic. Written comments from several of these individuals, along with a review of the organisation to which these five individuals are affiliated, suggest that this may reflect a previously existing level of familiarity with the topic due, for example, to their current or previous work. The opportunity for reinforcement of this existing knowledge and for hearing other people's perspectives was noted as both appreciated and valuable.

With regard to specific workshop activities and the extent to which participants' felt they had learned something new from the activity, inclusion of this evaluative question was to serve two purposes: to gain insight into the effectiveness of the activity itself as one for facilitating knowledge exchange and into whether learning might have occurred. Results from these questions are also illustrated in Figure 6. As one might expect with a diverse set of stakeholders, there was a divergence of opinion although, overall, the evaluations show a high level of agreement/strong agreement that learning had occurred from the activities. This was particularly true for the participatory mapping (Exercise WS1-1) where all participants noted that they had learned something new from the activity. No specific comments were provided by participants as to why such an activity might facilitate new knowledge. A review of scribe notes taken during the activity suggests a breadth and depth of discussion was present within the sector groups as well as during the time that sector groups viewed one another's annotated maps. A reflective assessment of the activity by the project team noted the animated, candid and engaged level of exchange present during this activity.

The two activities which focused on benefits – identification of (Exercise WS1-2) and comparison between sector groups (Exercise WS1-3a) – received similar assessment in terms of learning with most participants indicating that they had gained new knowledge. With no specific comments as to what was valuable about these activities, it is difficult to tease out what aspects might or might not facilitate learning. Of those who disagreed, several of them were the same participants who had indicated minimal learning about ES, and so there may have been a degree of familiarity present for benefits from ES as well. One participant noted surprise that benefits had featured so early in the workshop while another commented on the difficulty of parsing the large number of benefits that had been identified in Exercise WS1-2a in order to meaningfully compare across sectors. This latter observation was also raised during the project team's reflective assessment which also noted that the process of locating benefits on the map and ranking their importance posed challenges, particularly for benefits that were spatially distributed and/ or whose importance varied temporally, e.g. weather, season.

The final three activities sought to explore linkages among benefits, activities and ecological processes (Exercise WS1-3b) along with potential impacts of various drivers of change, specifically climate change, windfarm development and MPAs (Exercise WS1-3c). Roughly two-thirds of the participants agreed that they had learned something from these. The only specific comment provided as to why these might have facilitated learning was the participant who noted that '[it was] helpful to gain better understanding of links'. For those who did not gain new insight, the level of previous knowledge again appears as a factor with several individuals noting an existing awareness of and indeed immersion in the interactions and issues explored in these activities. For example, in relation to MPAs, one participant noted: '[I] would have ticked *agree* if the option were extended to [learning

about] views of local stakeholders' going on to explain that the principles of MPAs, multi-use, non-use were not new to them thus '[I] couldn't absolutely say learnt 'new' information'. Two comments shed light on how the design of the activity might have impacted learning. One person noted their disagreement with having learned something from the exploration of interactions was 'only because [there were] too many parts to consider'. This sentiment was echoed by another participant who noted that the 'interactive task was muddled, partly due to the enormity of the task'. During the project team's reflective process, there was a general agreement that these activities were trying to cover too much ground in too short a period of time.

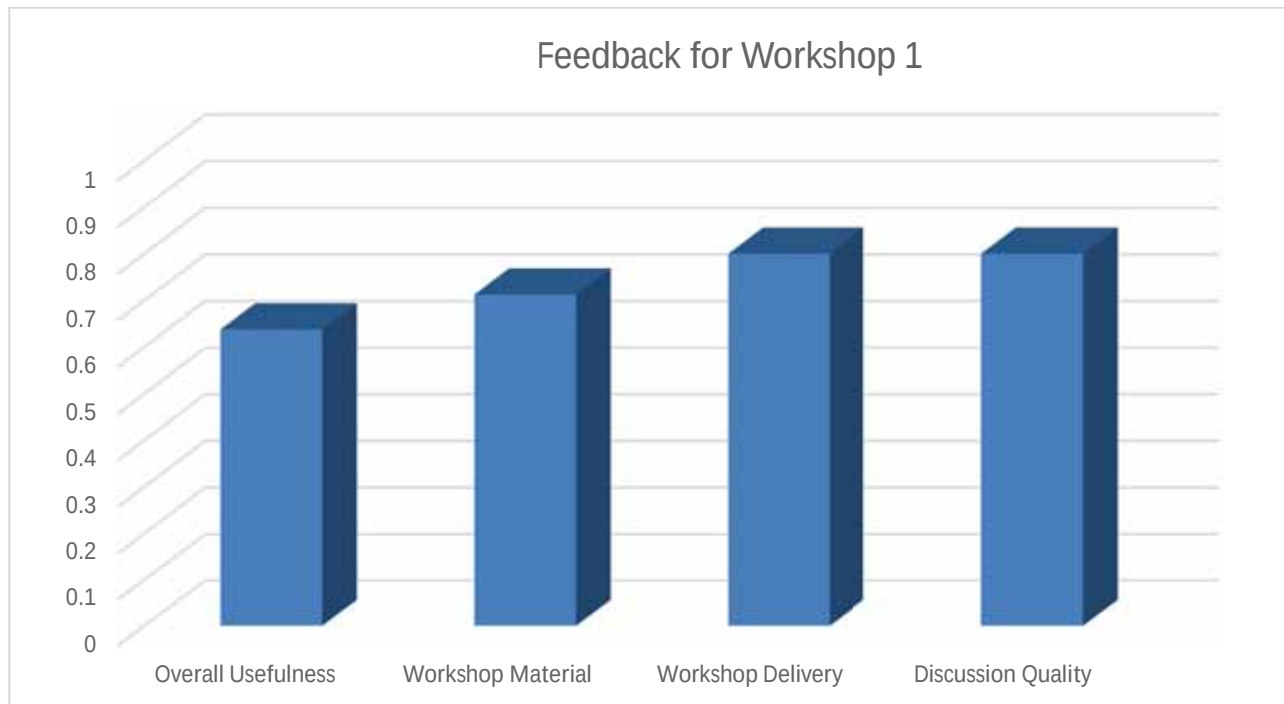


Figure 7. Quality of the workshop 1 / out of 1.0

Evaluations of the workshop as a whole were positive (Figure 7). Half the participants considered it useful or very useful (the remaining indicated it was somewhat useful); the vast majority (18 out of 20) evaluated both the delivery and materials as 'above average' with one individual noting it would have been valuable to receive some materials or an outline of activities in advance.

Almost all (17 of 20) evaluated the quality of discussion as above average (the remaining considered it average) and all but one felt they had been able to contribute knowledge to the discussions (no comment was provided as to why).

Comments about the quality of discussion and the workshop in general highlight the value of (re)meeting and learning from and about other stakeholders' perspectives, the challenge of applying ideas and moving discussion to implementation and the opportunity for identifying common ground as well as gaining new insight (see Table 2 for examples).

Meeting people, learning from & about others Useful to meet stakeholders of the region although we knew a lot of them Useful to meet people and for different stakeholders to understand each other's drivers / concerns
Quality of discussion Found more common interests with 'other' user interests than expected Very positive afternoon discussions – candid, constructive and in good spirit
Application of material from workshop Some interesting and useful discussions but relatively little that was original / unique. Some new information may have been gathered and the discussions may have been novel to some of the participants but it is difficult to imagine how outputs will be used Feels a little bit of a talking shop with no real insight or direction as to how it may be developed or implemented in terms of the ecosystem approach
New insight I hadn't thought of impact assessment this way before. Very thought provoking

Table 3. Some example comments from Stakeholders regarding different aspects of the workshop.

2.2 Analysis and construction between Workshops

Considerable analysis and planning took place between workshops in order to review and prepare the rich information provided by stakeholders for use in the second workshop. The CORPORATES research team held multiple meetings to review and discuss which aspects of activities worked well and which did not, such that we could revise and construct the strategies for the second workshop (See Figure 1 and Table 2). The following sections detail work undertaken in preparation for Workshop 2.

2.2.1 Grouping of Benefits Exercise WS1-2: Benefits

Over 100 different Benefits were identified by the stakeholders in Workshop 1 (see Table 1 in the Appendix for a list of all the Benefits). The approach taken in the first workshop – to collate and summarize the large number of benefits identified in the morning (Activity WS1-2a) during the lunch break for use in afternoon – was, while heroic, too ambitious. Given the volume of information, both facilitators and participants simply did not have enough time to absorb and summarize the information in a way to make it fully useful in the afternoon discussions. Therefore one of the clear recommendations of this process is that a second workshop is needed some time after the first; the discussion section of this report provides guidance as to how long a period might be needed between the two workshops.

To reduce the large number of identified Benefits into a fewer number of categories, the research team undertook an iterative discursive process. An initial set of categories were identified followed by discussion (using face-to-face and online platforms for dialogue) to reach agreement on both the meaning of overall category terms and a final set of 12

categories. (Table 4). The 12 categories were used to design Exercise 1 in Workshop 2 (for further information on their use in workshop 2 see section Exercise WS2-1).

B1 Local Economic Benefit	B7 Escape
B2 Employment	B8 Health
B3 Cultural Heritage	B9 Adventure and challenge
B4 Social Bonding	B10 Knowledge and skills
B5 Healthy Climate	B11 Connection to Nature
B6 Ecosystem Health and Resilience	B12 Aesthetics and Scenery

Table 4. Summative set of twelve categories of benefits derived from participant generated benefits from ES in the Firth of Forth, Scotland.

The 12 categories of benefits were further summarised to four benefit domains which were also used in the second workshop, specifically Exercise WS2-2. The categories were combined to form the domains in the following way:

- Local Economic Benefits (made up of B1 and B2)
- Cultural Heritage (made up of B3 and B4)
- Ecosystem Health and Resilience (made up of B5 and B6)
- Personal Wellbeing from Nature (made up of B7-B12)

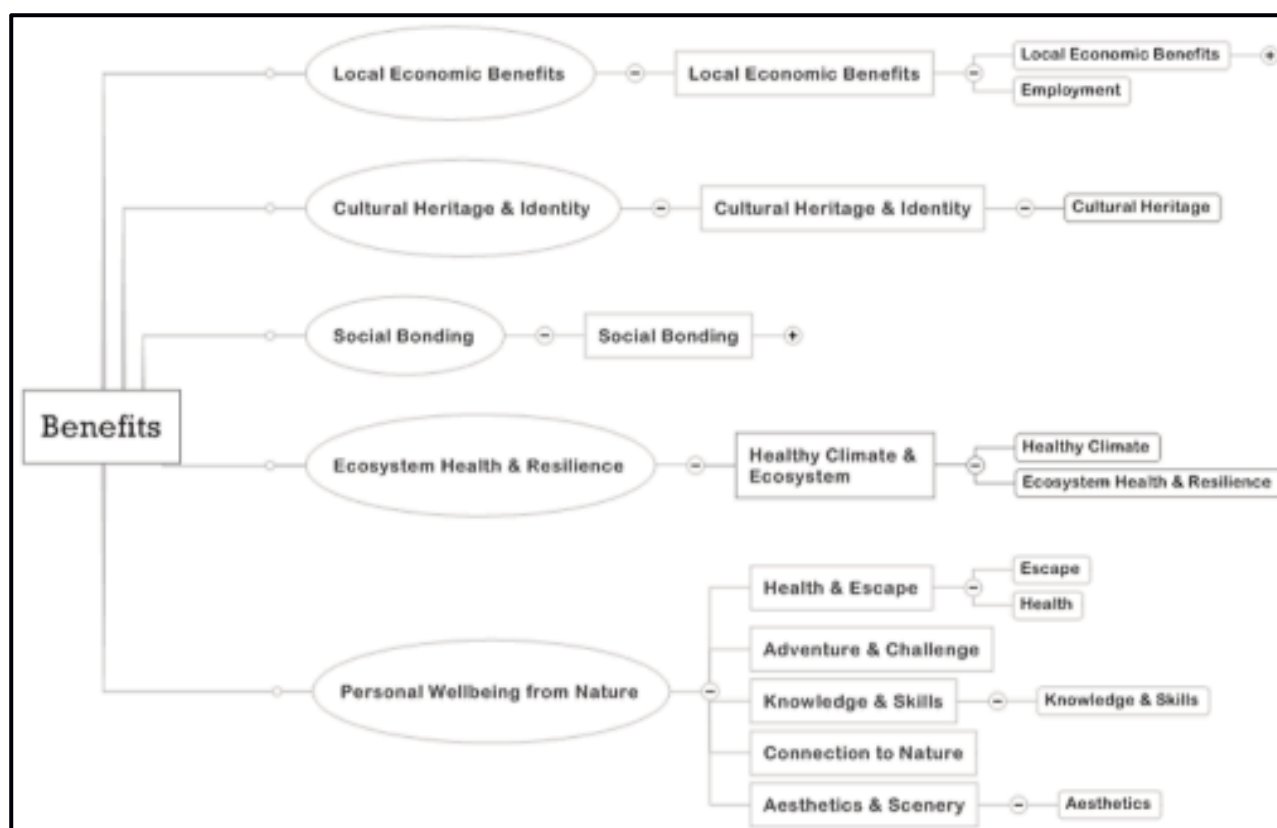


Figure 8. Diagram showing how the benefits were grouped under 4 domains; Local Economic Benefits, Cultural Heritage & Identity which includes Social Bonding, Ecosystem Health & Resilience and Personal Wellbeing from Nature.

The agreed definitions of the set of 12 and set of 4 categories were defined using a range of sources that included international United Nations Educational Scientific and Cultural Organisation (UNESCO, www.unesco.org), Wikipedia(www.wikipedia.org) and national level guidance; UK National Ecosystem Assessment (Follow-on) UK NEAFO (Church *et al*, 2014; Turner *et al* 2014).

2.2.2 Assessing how different stakeholder groups valued different Benefits.

During Exercise WS1-2, we kept track of which sector suggested each benefit. Once agreement had been reached on categories and domains of benefits, we sought to understand the importance of the different benefits to each sector. Figure 9 illustrates the relative interest that sectors had within the 4 benefit domains; this information was shared with Stakeholders at the start of the second workshop.

Stakeholders were clustered into the following sectors: Fishing/Maritime, Renewables, Recreation & Tourism, Conservation & Ecological (Human) and Conservation & Ecological (Animal). The sub-categories within the Conservation & Ecological sector indicates that the benefits were identified from the same conservation groups but differentiated as benefits directly to humans or directly to animals.

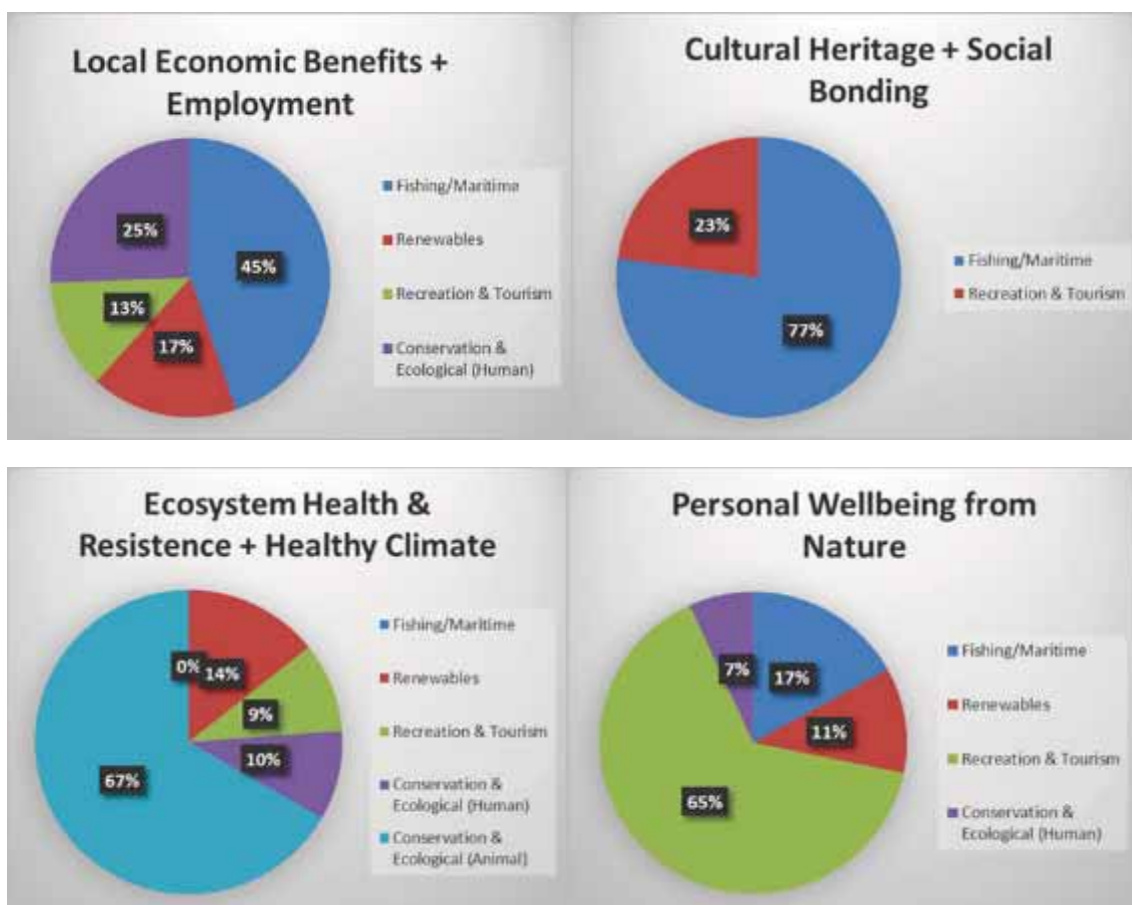


Figure 9. Pie charts showing the number of benefits, in percentage, that each sector group identified. The percentages have been corrected for the number of people in the room of each sector group.

2.2.3 Identifying local ecosystem services for Workshop 2

We used the UK National Ecosystem Assessment Follow-On (Figure 10) to define what terminology we would use for ES in Workshop 2 Exercise WS2-2. The UK NEAFO document provides guidance on dealing with the definitions of Ecosystems and has marine examples as well as definitions of intermediate services. We identified 3 main ES of importance for this area and they were:

1. Fish and Shellfish,
2. Climate Regulation,
3. Places and Seascapes: with 4 Features
 - a. Degree of naturalness, wildness and vastness,
 - b. Habitat diversity,
 - c. Species diversity
 - d. Number of cultural/historical features

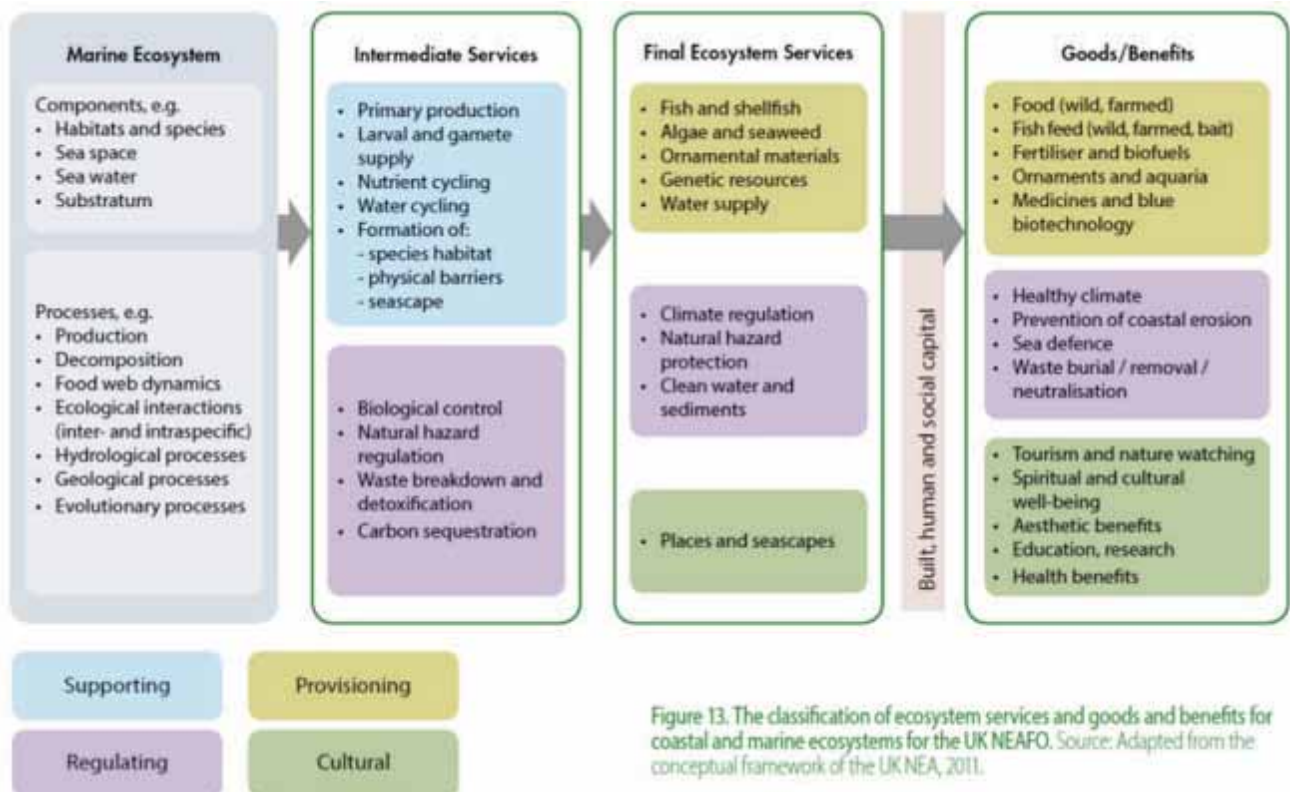


Figure 10. The classification of ES and goods and benefits for coastal and marine ecosystems for the UK NEAFO. (Turner *et al.* 2014).

2.2.4 Background on the linkages between the Laws

We needed to identify the role of the law within the scope of the project in order to provide the background for a Law & Policy interlude in the 2nd Workshop. This was a complex and dynamic process. Firstly, it involved identifying the relevant legal requirements for both the plan making process and the consents/licensing process and some of the laws applicable to various activities carried out in the Firth of Forth. This involved adopting an interdisciplinary approach to the role of law within a wider context and within the role of the project.

The law of the marine environment is vast and extremely intricate. Existing laws are a complex web that spans all levels of governance: local, devolved, national, regional, EU and international. This creates a 'horrendogram' of sectoral legislation and policies. (Boyes and Elliot 2014). A mind map within the framework of the project was created to illustrate the variety of relevant laws (Figure 11).

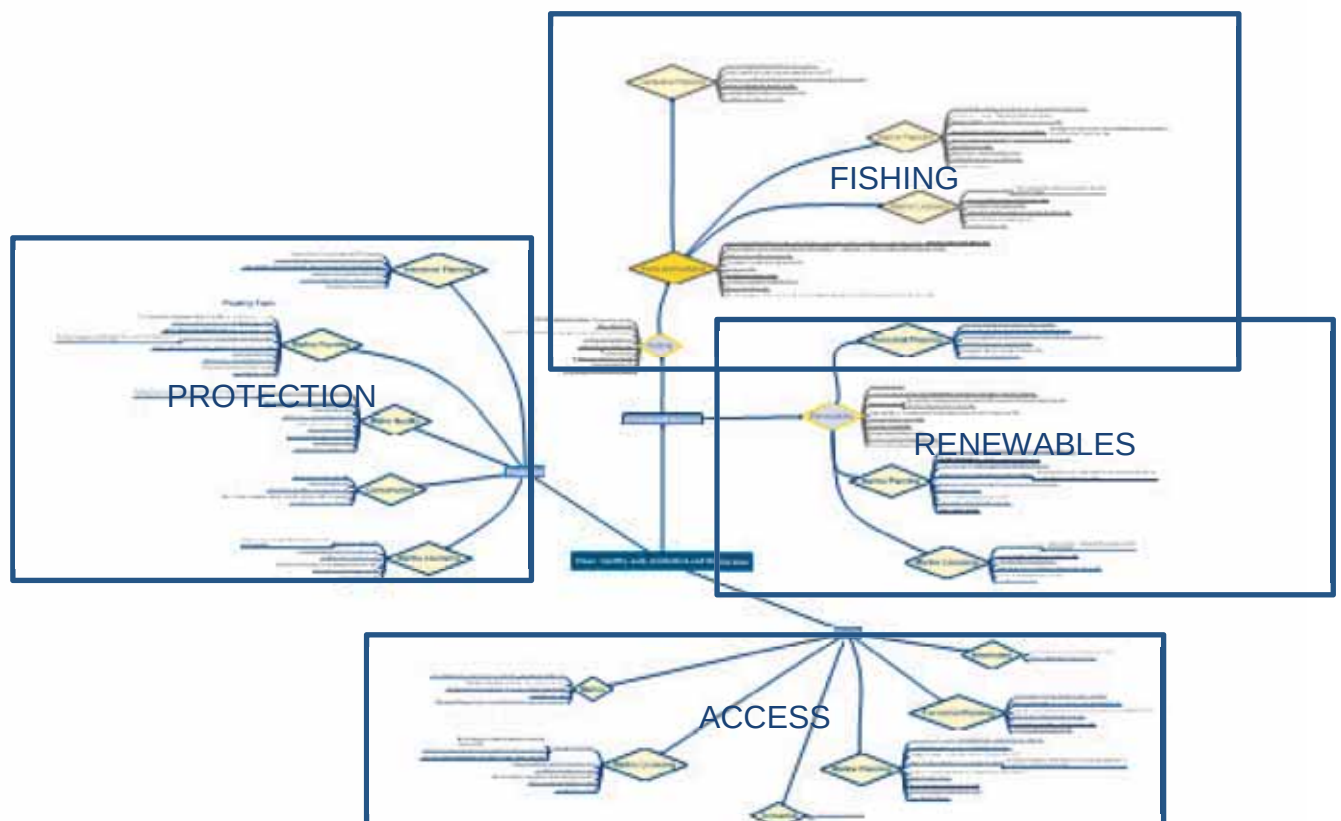


Figure 11. The 'horrendogram' of sectoral law – please see blow ups of each section in Figures 12-15

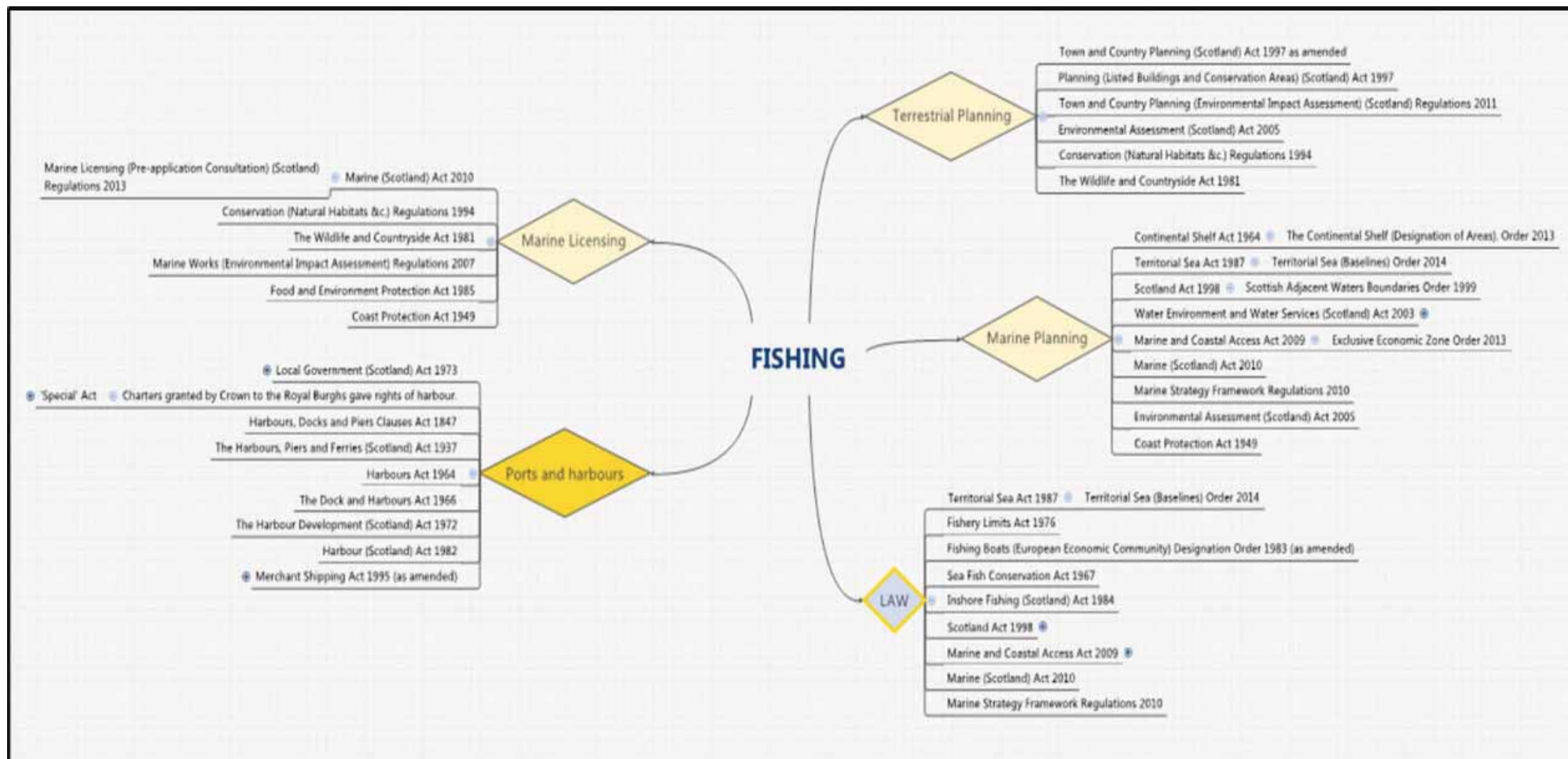


Figure 12. Fishing law

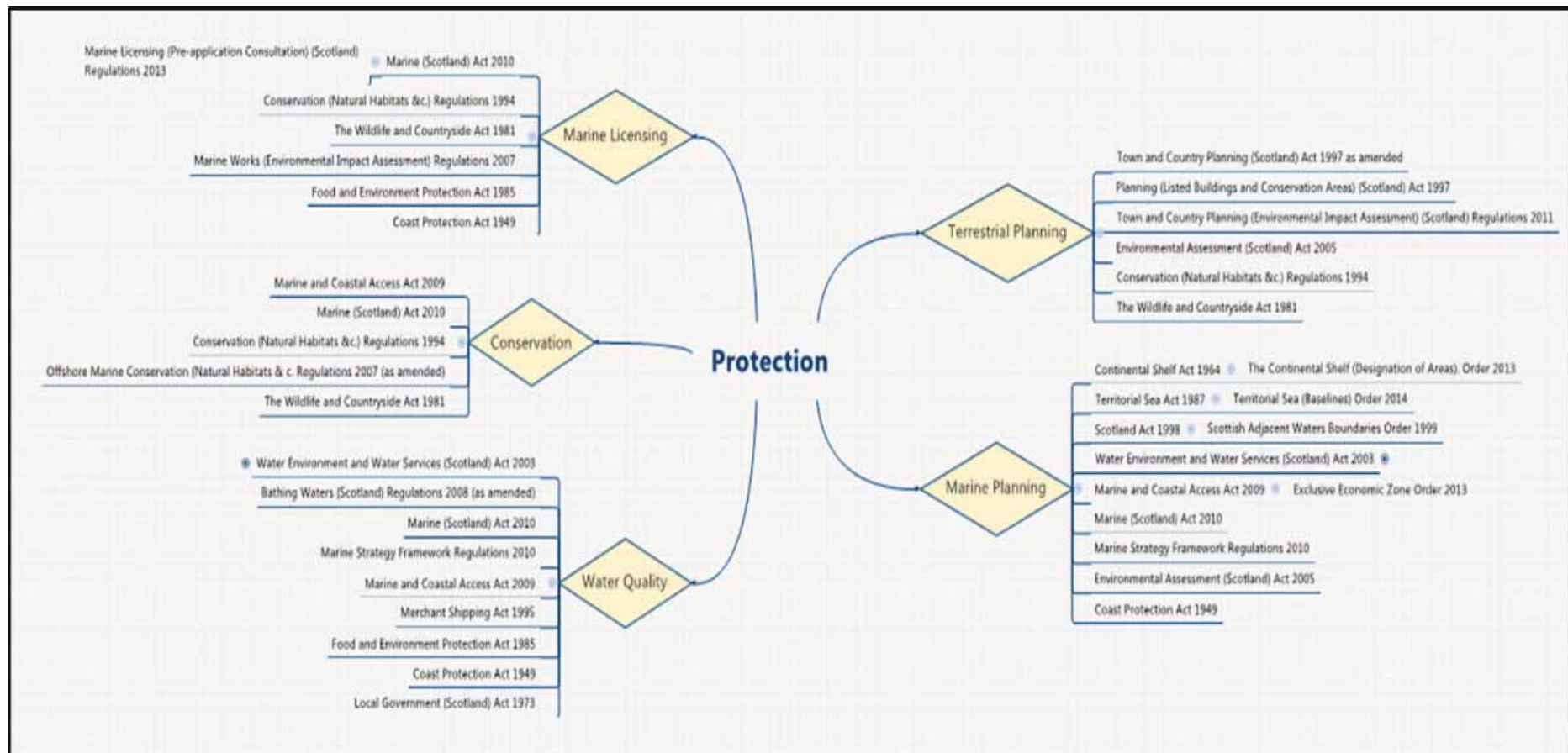


Figure 13. Area protection law

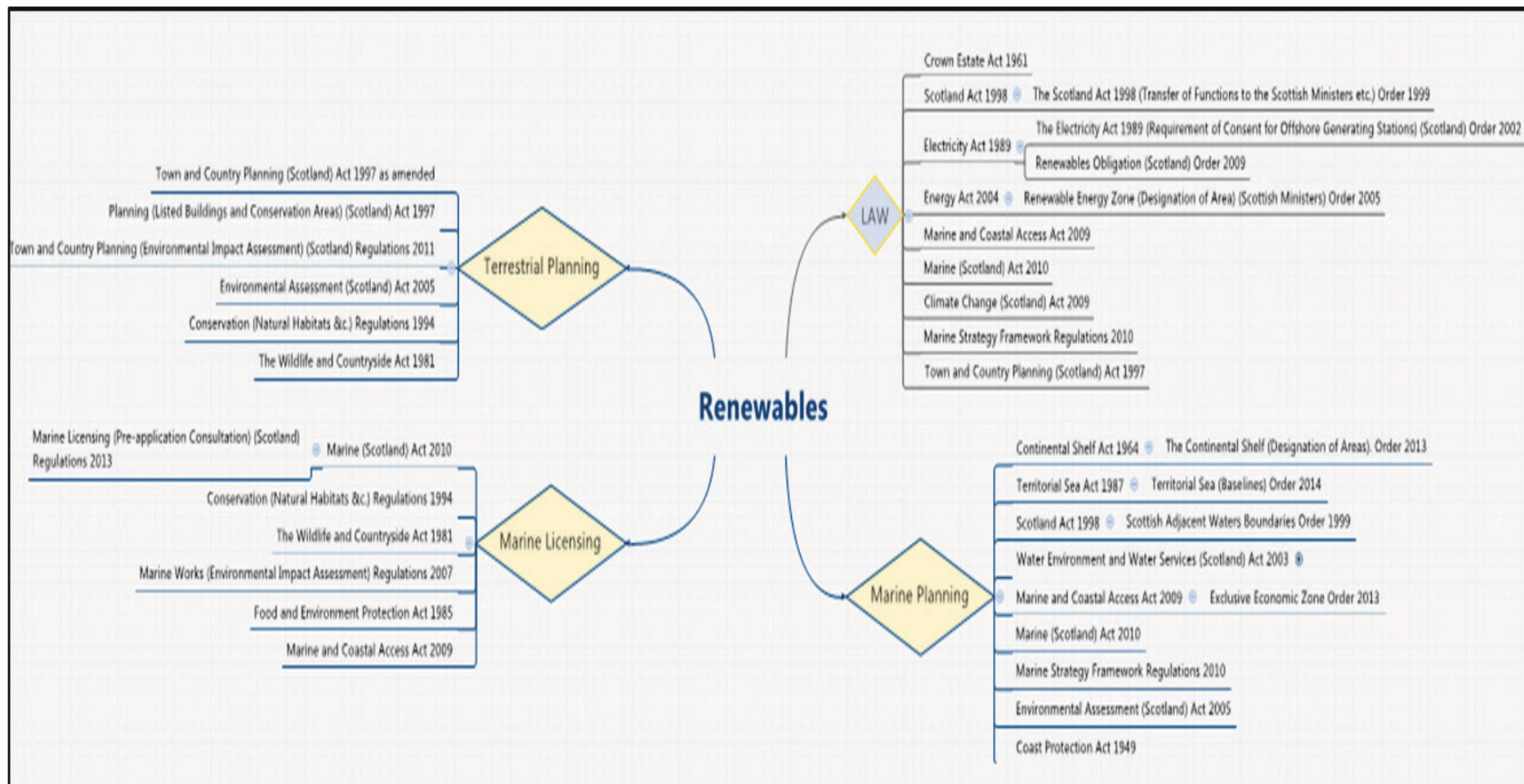


Figure 14. Renewable energy law

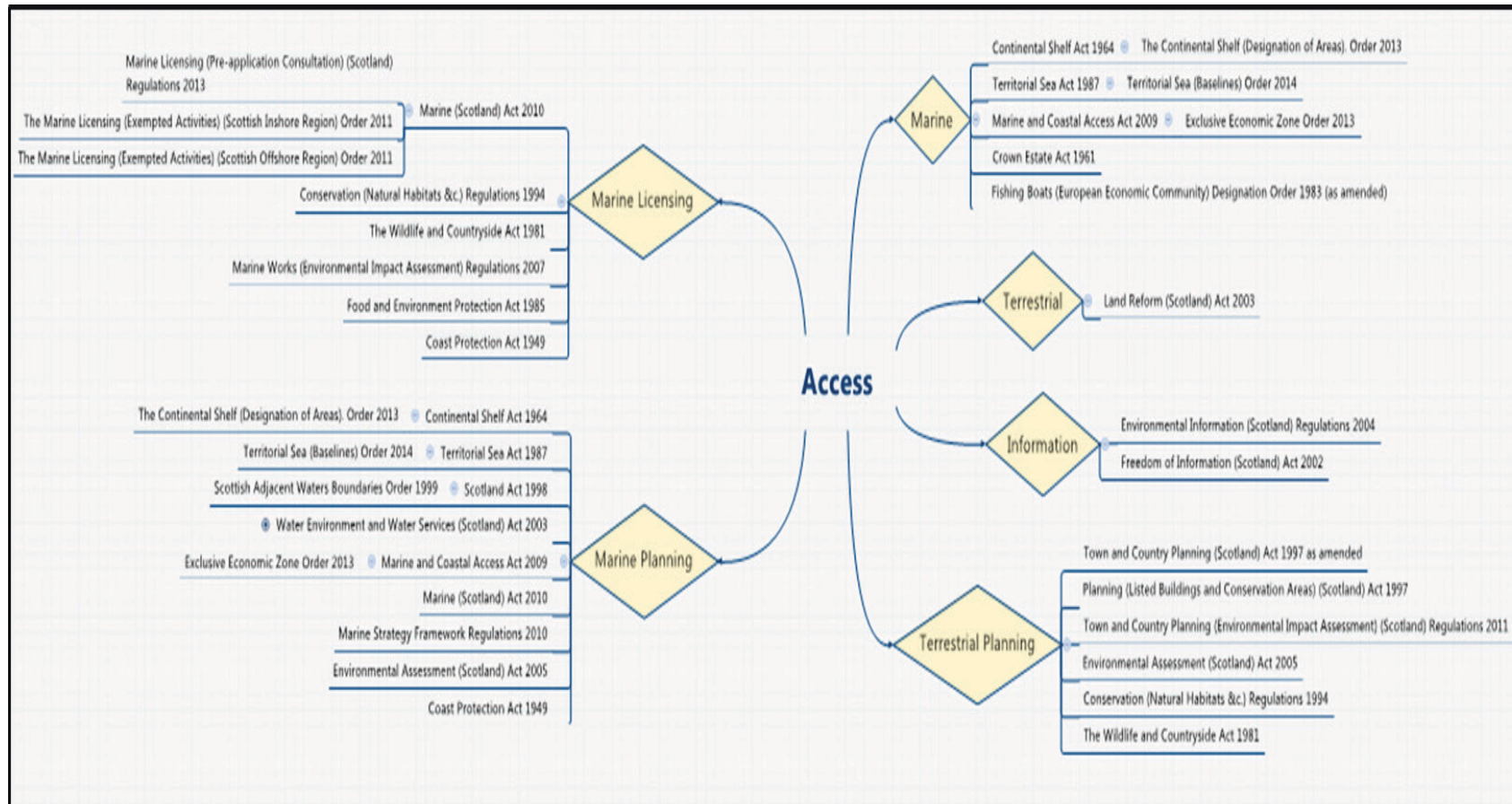


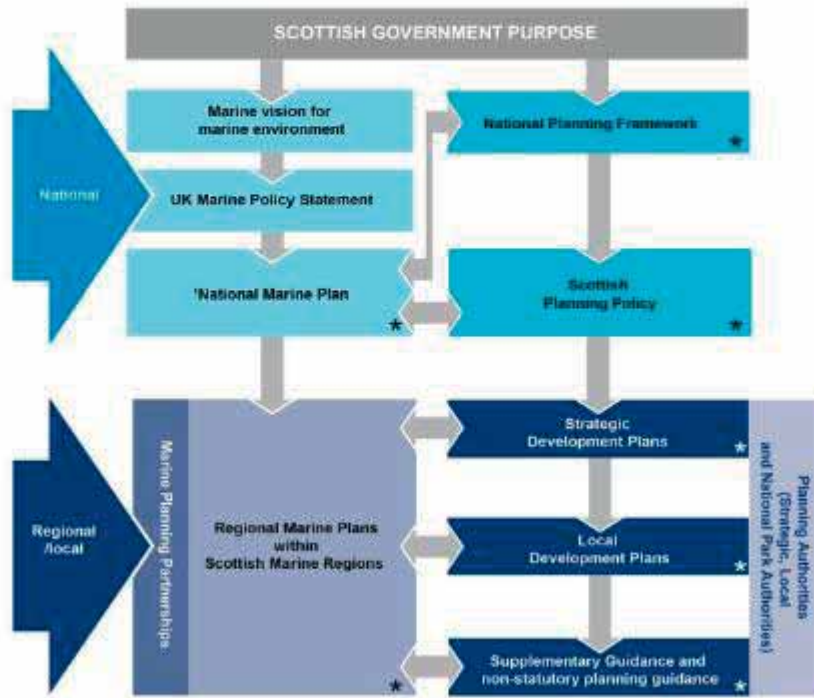
Figure 15. Access law

At the Scottish national level, principal legislation is fleshed out with numerous pieces of secondary legislation. In addition to the main primary legislation governing marine and terrestrial planning, numerous other pieces of primary and secondary legislation also apply. For example, the Local Government etc. (Scotland) Act 1994; the Conservation of (Natural Habitats & c.) Regulations 1994 (as amended); the Environmental Assessment (Scotland) Act 2005; and the Freedom of Information (Scotland) Act 2002 (as amended). In order to facilitate integration between the marine and terrestrial planning systems, the Scottish Government has now produced a planning circular explaining the relationship between marine and terrestrial planning policy to assist planners connecting the two different processes (Circular 1/2015, Figure 16).

Circular 1/2015 The relationship between the statutory land use planning system and marine planning and licensing

Figure 2

Policy relationship between marine and terrestrial planning



¹The National Marine Plan also applies directly to Strategic and Local Development Plans and to Supplementary Guidance and non-statutory planning guidance

²Opportunity for public engagement

Figure 16. Policy relationships between marine and terrestrial planning. (Taken from Circular 1/2015)

It was noted that law is not confined into specific subject compartments, and that there are interactions between and within the numerous pieces of legislation governing different topics. An example of particular relevance to the project is the decision-making process for renewable energy devices. Within the territorial sea, this is governed by the Electricity Act 1989 and the Marine (Scotland) Act 2010, together with other pieces of legislation that have been executively devolved. This process can be dealt with simultaneously.

Within the United Kingdom, the differences between legislation that derive from the UK Parliament and the Scottish Parliament result in different options being made available to a court when challenges are made. Of note, during the project, a challenge to the s.36 licences granted in the Firth of Forth was raised by the RSPB by way of a Judicial Review action through the Court of Session, and at the time of writing this report a decision was still awaited. Figure 17 illustrates the range of law relevant to the decision making process for marine renewables in the Firth of Forth.

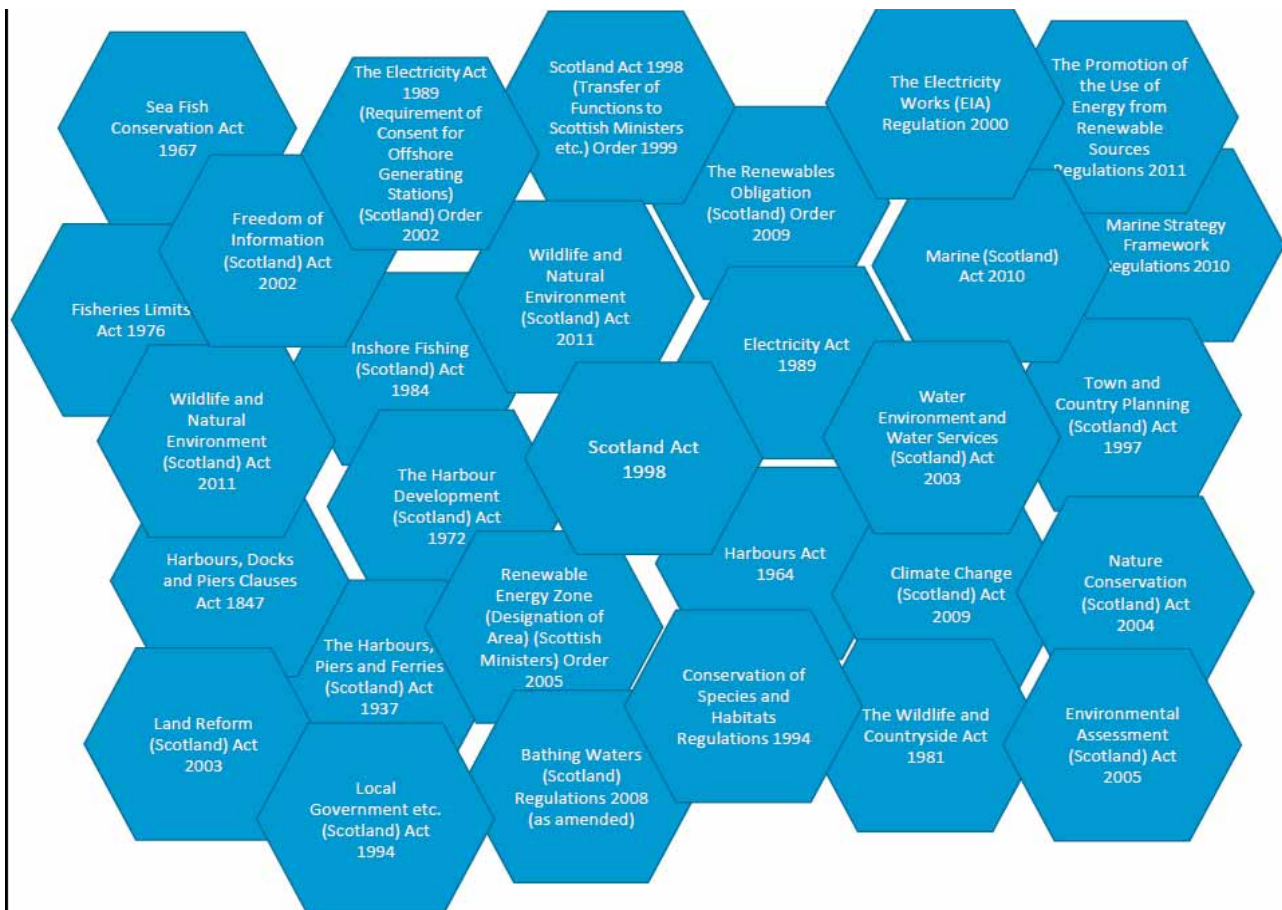


Figure 17. Examples of laws relevant to the decision making process for marine renewables in the Firth of Forth.

It was also noted that relevant marine policies are the 'material considerations' in the decision-making process. On the one hand, the weight to attach to the policies is for the decision maker to determine, on the other hand, the interpretation of these policies is a matter of law. (Millar Homes Ltd v Scottish Ministers [2015] CSIH 20) (John Watchman 'Policy misinterpretation leads to quashing of reporter's decision' (2015) Scottish Planning & Environmental Law 42)

2.3 Workshop 2

The second workshop took place on the 6th of March 2015 at the Scottish Government Buildings, Victoria Quay in Edinburgh, Scotland. The same stakeholders and representatives from the MRE industry and regulatory/advisory partners were invited to attend the second workshop. The overarching objective of the second workshop was to provide a process to exchange knowledge and deepen understanding around the links between benefits and final and intermediate ES. In reference to Figure 9 (The classification of ES and goods and benefits for coastal and marine ecosystems for the UK NEAFO), the workshop proposed to explore the 'black box' of the relationships between ES and benefits. That is, how do identified services link to and create benefits, how they interact, and how can benefits erode if changes happen within the system. The workshop also explored how the policy system could deal with ES thinking and how individual sectors engage with and affect ES.

The workshop consisted of four stages: (1) Linking Local Benefits to ES, (2) Conceptual System Model (CSM) Building, (3) Exploring Trade-Offs and Policy Options and (4) Decision-making Process.

Objectives for Workshop 2:

1. To provide a process to exchange knowledge and enhance understanding around links between benefits and final and intermediate ES, where trade-offs arise, and how they might be affected by different policy drivers; and evaluate the effectiveness of this knowledge exchange
2. To consider in what way those trade-offs should be evaluated, and how the decision-making process could be improved to better incorporate these values

2.3.1 Exercise WS2 - 1: Linking Benefits and ES

The objective of exercise 1 was to promote learning about the links between identified ES and benefits including understanding the terms and how they can be used. The exercise provided a chance for participants to re-engage with the material and prepare for a later formal participatory modelling stage (Exercise 2).

Aim	To link benefit themes to the three final ES (ES) and four features of ES as relevant
Materials	Each group was provided with a pre-printed A1 sheet with 3 ES (in centre) and 12 benefits (around the edges and marker pens.

Activity WS2-1

Each group was provided with a pre-printed A1 sheet with 3 ES (in centre) and 12 benefits (around the edges). The ES were identified from the NEAFO research and deemed most relevant for discussion in the workshop. In addition, we identified a number of 'features' for the ES that would provide additional information on the generic service definitions. This was to contextualise the broad ES definitions into the reality of the Forth region. Benefits were the 12 condensed benefits identified from Workshop 1. The ES and features are listened

below. Sitting in groups, now made up of different sectors, the participants were then asked to draw arrows to indicate how benefits link to different ES and their features

ES:

- Fish and shellfish
- Climate regulation
- Seascape

Features associated with each ES:

- Naturalness, wildness and vastness (a)
- Presence of specific species (b)
- Habitats, geodiversity and topography (c)
- Presence of cultural-historic features (d)



Image 4. Stakeholders drawing arrows to show how benefits link to different ES.

OUTCOMES Exercise WS2-1: Benefit linkages to ES

The 12 Benefit groups and 3 locally important ES and features that were identified from workshop 1 were used in Exercise WS2-1 to assess how stakeholders felt these benefits were linked to the ES. The groups at each table were identified as Green, Blue and Red Tables.



Glossary for the 4 features of ES

Naturalness: Naturalness, wildness and vastness - how natural and wild the environment is perceived to be (without human disturbance / structures at sea i.e. windfarms)

Specific species: Presence of specific species.

Habitats: Habitats, geodiversity and topography – places for animals and plants to live, what it looks like and what materials it is made out of.

Cultural-historic features: Presence of cultural-historic features - wrecks and historic buildings or locations on the coast which are important because of historic or cultural reasons.

Figure 18. Proportion of Benefits identified as important - by all tables and separately – number of links

Figure 18 and Image 4 show the setup of the A1 sheet provided to stakeholders to draw linkages. Numbers of linkages were counted as each line that was drawn between each benefit type and an ES. The benefits were then grouped into the 4 larger categories and pie charts (Figures 19 and 20 were created to show the proportion of linkages between each of the 3 ES and those 4 grouped benefits.

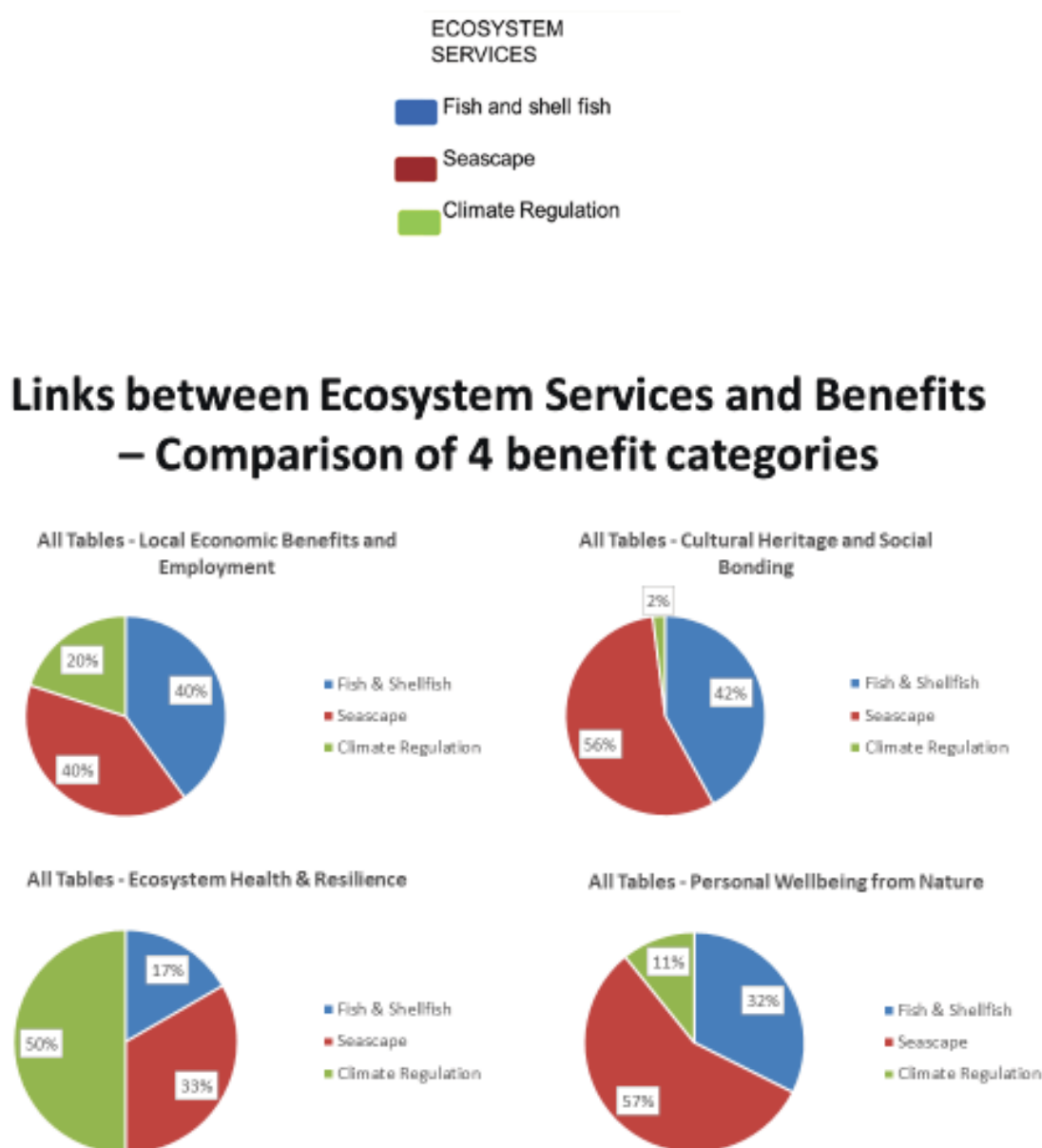


Figure 19. Pie charts showing a comparison of the links between ES and Benefits of the 4 different benefit categories with all 3 tables (green, blue and red) doing the exercise combined.

The overall results of quantifying linkages between Benefits and ES (Figure 19) shows that all 3 ES are represented in all of the large benefit groups. There is nearly equal use of all 3 ES in local economic and employment oriented benefits. Almost all the linkages between cultural heritage and social bonding are nearly equally split between Fish and Shellfish and Seascape. Ecosystem Health is predominantly linked to climate regulation and Personal Wellbeing is predominantly linked to Seascape.

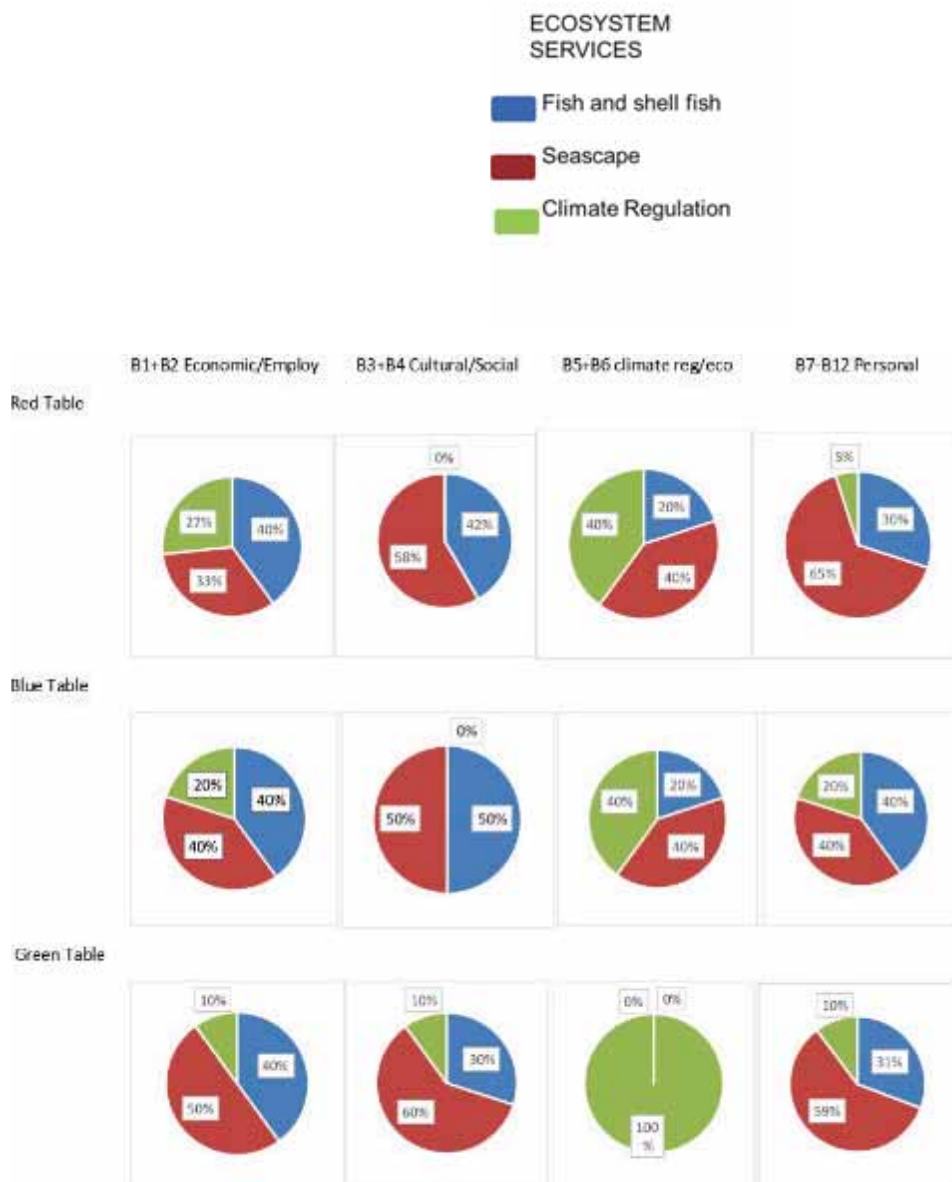


Figure 20. The breakdown by individual tables (Red, Blue and Green) of the proportions of linkages between ES and the 4 Benefit Categories.

The summarised linkages between ESs and Benefit Categories (Figure 20) show differences between the 3 tables of mixed group stakeholders. There is a high degree of similarity between the Red and Blue tables, but the Green table stands out as being different in the proportion of linkages between benefits and ES. In particular, this table put 100% of the linkages between the ES of Climate Regulation and the benefit of Ecosystem Health and Resilience. One major difference at the Green table that could be identified was a lack of a representative from the Fishing Industry (due to the number of representatives at the Workshop)

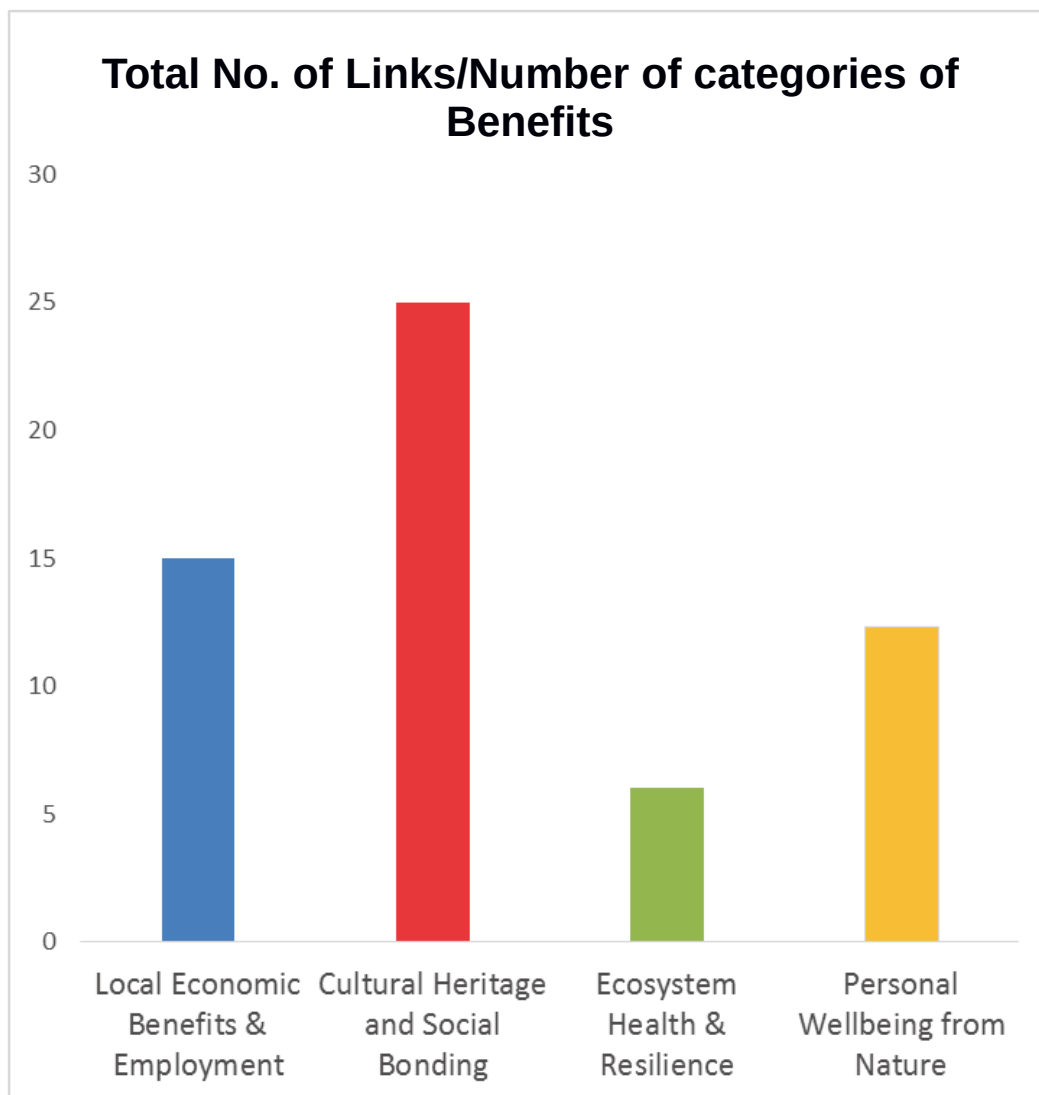


Figure 21. Total sum of numbers of links / number of benefit category to show which ES has the most links to benefits ratio.

Cultural Heritage and Social Bonding ES received the most links per benefit category (Figure 21) as there was a total of 50 links with just 2 categories of benefits. 74 links joined Personal Wellbeing from Nature, but as there were 6 different benefits represented in that one large benefit category, the number of links per benefit was only 12.3. Local Economic Benefits and Employment had a total of 30 links and Ecosystem Health and Resilience had 12.

2.3.2 Ecological Interlude [see slides www.corporatesproject.co.uk]

This interlude was run to help stakeholders become familiar with the difference between 'intermediate' and 'final' services and 'benefits'. It also contributed to understanding of the importance of different ecological processes in influencing delivery of final services and benefits in preparation for Exercise WS2-2.

2.3.3 Exercise WS2- 2: Conceptual Systems Model Building

The objective of Exercise 2 was to consolidate knowledge of the links between ES, benefits and socio-economic drivers and to identify key relationships and feedbacks to help inform discussion about the impacts of different policy drivers. Each table undertook a participatory exercise in conceptual mapping where a range of connections and feedbacks were identified, discussed and mapped. Developing a participatory conceptual model allows for a group understanding of the social ecological system to emerge, to explore system connections and to emphasise process and learning about services as much as outputs. Stakeholders explored how the connections between ES variables, benefits and actions interacted and changed in the context of the Forth and how these complex systems are woven together.

Aim	To develop a conceptual system model around the key ES to look at interactions and feedbacks
Materials	Each group was provided with a sheet of A1 white paper, 17 different ES cards, and marker pens.

Activity WS2-2

Facilitators put down two first cards and asked the participants if the cards were linked to each other ('+' or '-' or '±' or '?'). The definitions of relationships included:

- A **positive relationship** (+) means that if A goes up, B also goes up, whereas if A goes down, B goes down.
- A **negative relationship** (-) means that if A goes up, B goes down, and if A goes down, B goes up.
- An **ambiguous** relationship (±) means that if A goes up, in some cases B may go up, and in others it can go down.
- An **uncertain relationship** (?) means that we don't know what happens to B if A goes up or down.

A sequence of cards was then added to the table, one by one and participants were asked to link the cards either directly or indirectly to the others. At the end of the exercise, participants were asked to focus on the 4 benefits (personal well-being, local economic benefit, cultural heritage & identity, ecosystem health & resilience) and see how these are linked to other parts of the system and what they are dependent on/influenced by.

Table 5: Card Names, colour coding (Ecosystem Services and ES Features, Intermediate Services, Benefits, Actions) and sequence in which to put down cards:

Term	Description of Term (Glossary)	Colour code of circle on card	Present-ation order	Code for Network analysis
Formation of habitats/Habitat Diversity	The formation of places for animals to live/ a variety of places for animals to live	Green/Purple Intermediate Services and Ecosystem Services/Features	1	I5
Species Diversity	A variety of different plants and/or animals	Purple Ecosystem Services/Features	2	F3
Primary Production & Nutrient Cycling	The production of food from sunlight and carbon dioxide via organisms (e.g. plankton)	Green Intermediate Services	3	I1
Larval/gamete supply	The supply of organisms for the next generation	Green Intermediate Services	4	I2
Carbon Sequestration	The removal and storage of carbon dioxide from the atmosphere	Green Intermediate Services	5	I3
Climate Regulation & Stability	The consistency of the timing and expected annual weather conditions within seasons, to lessen the effects of sea level rise and sea temperatures	Red Ecosystem Services	6	E1
Ecosystem Health & Resilience	The condition and hardiness of the ecosystem	Green Intermediate Services	7	I4
Quantity of Fish & Shellfish	The amount of fish and shellfish	Red Ecosystem Services	8	E2
Degree of Naturalness, Wildness & Vastness	How natural and wild the environment is (without human disturbance/structures at sea i.e. windfarms) and the area covered	Purple Ecosystem Services/Features	9	F1
Number of Cultural-historic features	Number of e.g. wrecks & historic buildings or locations on the coast which are important because of historic or cultural reasons	Purple Ecosystem Services/Features	10	F2
Fishing Catch	The amount of fish caught by fishing boats	Blue Actions	11	A1
Cultural Heritage & Identity	Feeling of belonging/social connection to a place and a way of life	Yellow Benefits	12	B3

Marine Tourism/Recreation	For example, wildlife boat trips, kayaking, diving, sailing etc.	Blue Actions	13	A2
Personal Wellbeing from Nature		Yellow Benefits	14	B2
Local Economic Benefits	Income to the local economy in the form of jobs as well as business earnings or the value of e.g. properties	Yellow Benefits	15	B1
Offshore Wind Energy	The effect of having an offshore wind industry: the physical effects of the turbines and the changes to increased human activities, and the changes to local economies	Blue Actions	16	A3
Number/size of Marine Protected Areas	The potential for increases in species abundance and biodiversity and the potential changes to spatial fishing practices	Blue Actions	17	A4



Image 5. Stakeholders using the Conceptual System Model to explore interactions and feedback.

OUTCOMES: Exercise WS2-2 Conceptual Systems Maps - (network mapping/ NodeXL)

The exercise produced both material outputs (i.e maps and data) and outputs that relate to social learning over complex social-ecological relationships between ES, benefits and actions. The conceptual maps produced highlight the complex and detailed interactions in the Firth and increased stakeholder awareness of these interactions. Each of the interactions (ie. the line connecting two variables) was coded into a spreadsheet that formed the basis of a network analysis using the software Node XL. This allowed some of the features of the network to be analysed in terms of key variables, connections and centrality.

Both the participatory conceptual mapping outputs and the network analysis highlight the range of interactions between different services, benefits and actions in the Forth system and the coupled nature of both the social and ecological aspects. The learning from this exercise is covered in the overall review of workshop outputs and helped structure the remaining exercises. However, it should be noted that this exercise was particularly intensive and required considerable focus and energy from the stakeholders, which had ramifications for participation in the remainder of the workshop exercises.

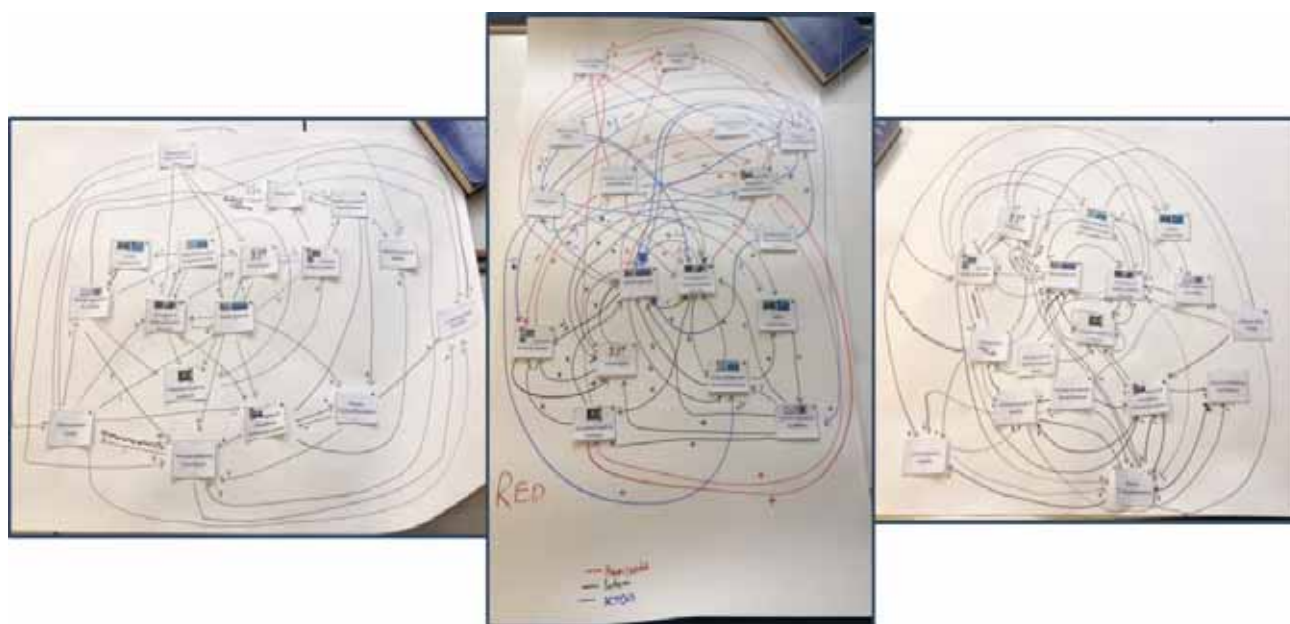


Figure 22. Conceptual System Model trial that the three teams developed in workshop 2.

Networks are a means of thinking about the relationships within and between social and natural systems. Nodes are points within networks and can represent individuals, organisations, actors or other entities and are connected together via ties. In this context our nodes are the ES criteria used in exercise WS2-2 and the ties represent the (+)(-)($\pm$) or (?) relationships between the ES criteria. Networks by their nature are inter-connected and network analysis explores these shared ties between the nodes in the system. Networks are visual representations of the flow of power, resources, information or other currency. In this study, the flows in the network relate to the stakeholder perspectives on

the relationships between ES, classifications, benefits and actions. They are not definitive representations of social-ecological systems but conceptual representations of how ES react according to the perspectives of the expert based working groups. Mapping the shape of a network can assist in identifying the flows or blockages of information; the positions of nodes and the relationships between them.

The following network statistics and diagrams were generated using the freely available NodeXL software.

Table 6 The network graph metrics generated by NodeXL selected for the study

Metric	Description
Total Nodes	The total number of unique Nodes in each network
Edges	The number of Ties (Relationships) in the network
In-Degree	The total of directed references <u>to</u> a Node which may be a 'Sink' for information, resources or in-bound relationships. High In-Degree values may reflect the power or prestige of a Node in a network and reflect importance.
Out-Degree	The total of directed 'out-bound' references made by the Node which may be a 'Source'. High Out-Degree may reflect high levels of influence.
Betweenness Centrality	A measure of centrality. The more (short) linking paths a Node has within the network then the higher its Betweenness Centrality. A Node with a high Betweenness Centrality may act as an important bridge for information or transfer and as such is assumed to have more power and influence.
Eigenvector Centrality	Seeks to determine the most powerful/influential Actors in the network. It combines the relationship between the Degree of a node and the number of subsequent connections by connected Nodes. A high value reflects the influence of the Node as a function of being central within the network.

Network analysis utilises a number of statistical metrics based up the position, ties and relationships between nodes (Table 5). Using this approach, we constructed the top 5 ES classes based on measures of in and out degree, betweenness centrality and eigenvector centrality. The results of Exercise 2 were converted into a spreadsheet of relationships. Using the conceptual maps developed by each table (red, blue and green) each connection identified by the participants was isolated and mapped in an Excel database. Each connection between the nodes (e.g. Card A1 fishing catch to Card F3 species diversity) was categorised according to the (+), (-) or (+/-) relationship. All tables were combined into an overall collective network

All tables						
Label	ES Class	Classification	In-Degree	Out-Degree	Betweenness Centrality	Eigenvector Centrality
F3	Species Diversity	ES / feature	12	11	15.432	0.081
A1	Fishing Catch	Action	7	12	16.822	0.076
F2	Number of cultural-historic features	ES / feature	9	9	9.338	0.073
A2	Marine Tourism/Recreation	Action	10	9	6.105	0.068
B2	Personal Wellbeing from Nature	Benefit	11	5	6.183	0.068
I5	Formation of habitats	Intermediate ES	10	9	6.783	0.068
A3	Offshore Wind Energy	Action	10	10	7.469	0.067
E1	Climate Regulation & Stability	ES / feature	7	11	13.029	0.064
A4	Number/size of MPAs	Action	5	9	4.229	0.058
F1	Degree of naturalness, wildness & vastness	ES / feature	8	8	5.017	0.057

Table 7: Top 10 results ordered by Eigenvector Centrality for the combined tables.

Across the aggregated results of the three tables, 17 nodes were mapped with a total of 343 different connections. Of these connections, 59 were unique and 284 were duplicated or repeated connections. Of the 17 different interactions and feedbacks in the conceptual mapping exercise, the node F3 (Species Diversity: ES / feature) scored the highest in terms of eigenvector centrality and therefore can be considered one of the most central nodes in the network. The node had the highest in-degree suggesting it is considered as an important node for drawing in connections and also the 2nd highest out-degree (although this is shared with E1 – Climate Regulation) suggesting it is influential within the network in terms of connecting to 11 other nodes in the network. A visual representation is below.

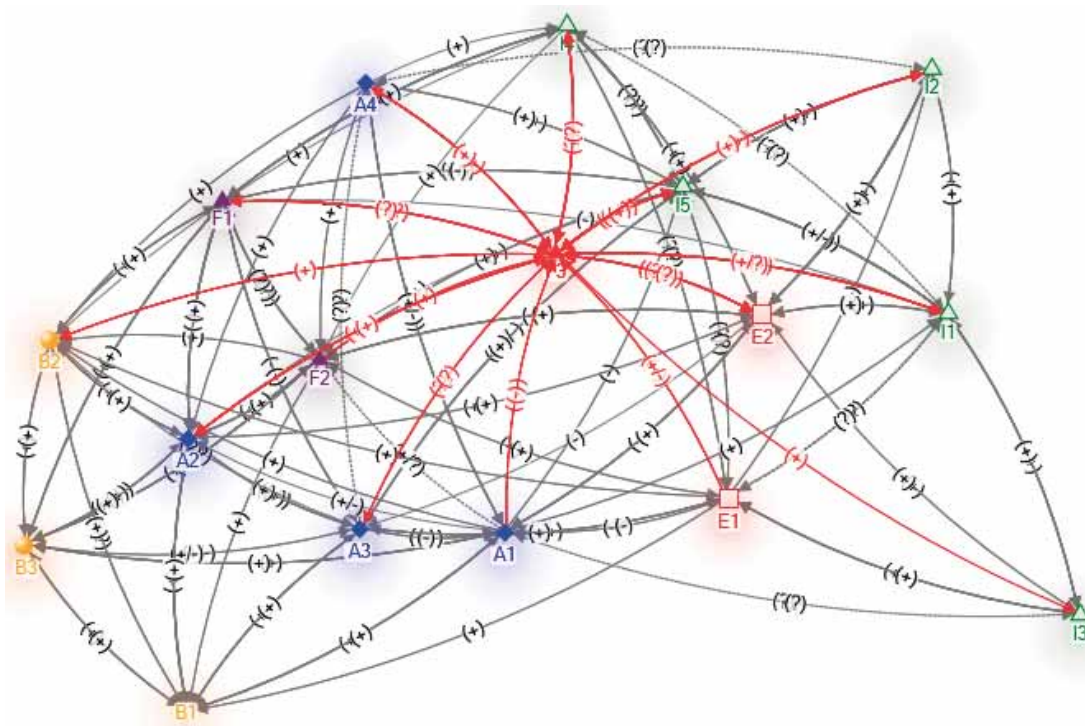


Figure 23. Example from the all tables network highlighting Species Diversity (F3) as a centrally influential node in the network of participant perceptions of interactions amongst select ES.

The perception that species diversity is a key variable in the web of relationships around ES in the region highlights the relative importance of the variable in delivering a range of services and benefits. The high score for eigenvector centrality indicates that it is connected to other nodes that have high connections and the betweenness centrality indicates it as an important bridging node within the network. Most services, benefits and actions will interact with species diversity according to the perceptions of combined stakeholder groups. As an example, F3 species biodiversity (ES / feature) was perceived to have a positive relationship with the variable B2 personal wellbeing from nature (a benefit). This suggests that, according to the range of sectors and stakeholders present, as species diversity increases there is a positive increase in wellbeing effects on individuals and on communities.

Another important variable defined by the participants was A1 Fishing catch (an action variable). This variable was also considered highly central both in terms of links to other connected nodes and to its role as a bridging node in the network. Fishing catch had a high out degree indicating that it was an influential variable connecting to 12 of the 17 nodes and visually represented below.

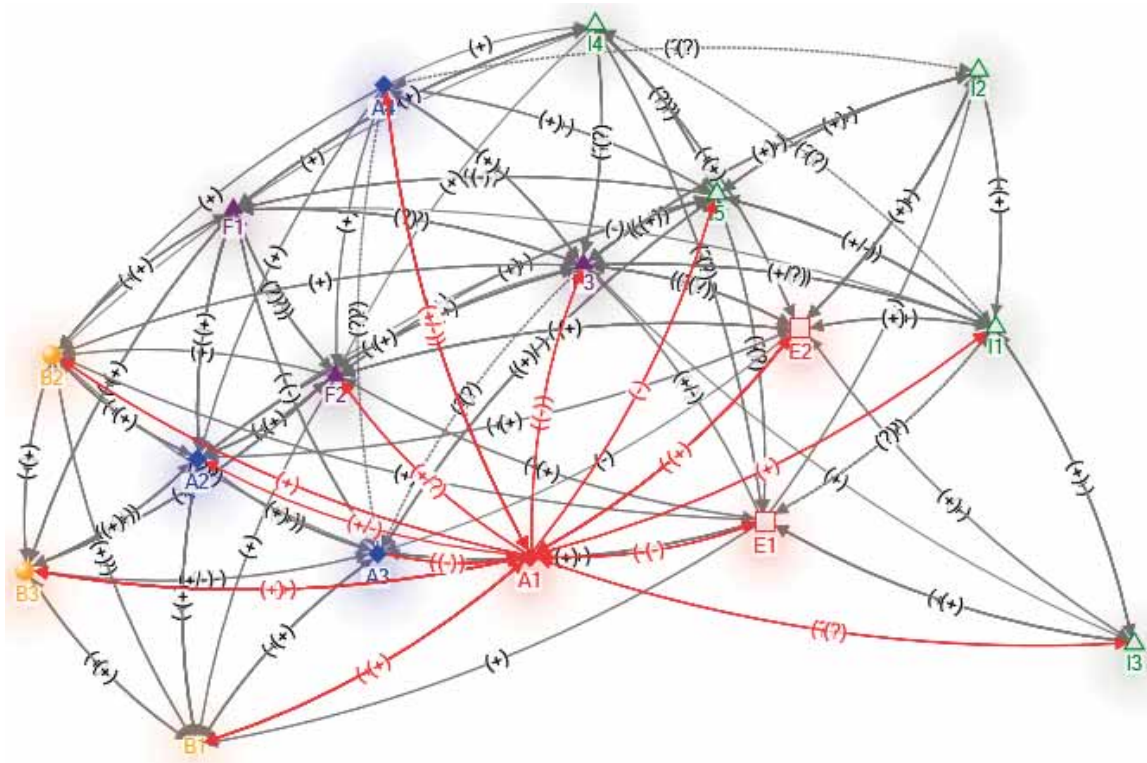


Figure 24. Example from the All tables network highlighting Fishing catch (A1) as an influential node in the network of perceptions of interactions amongst select ES.

The relationships of fishing catch highlight the negative (-) interaction with F3 species diversity and I5 Formation of Habitats and a positive feedback interaction with B3 cultural heritage, B2 personal wellbeing from nature and quantity of fish and shellfish.

The approach demonstrates that social-ecological systems built around ES interactions are highly dynamic and inter-connected. Variables such as species diversity, fishing catch and cultural diversity are important nodes that connect across the system, according to the perspectives of the range of stakeholders present at the workshop. The network analysis approach is useful for exploring these inter-connections of services and benefits and identifying potential hotspots or key variables in the system.

2.3.4 Law and Policy Interlude

Anne-Michelle Slater and Alison MacDonald (lawyers) prepared a presentation on the law and policy relevant to the project with a focus on explaining that, notwithstanding the complexity of the regulatory and policy context, there was a clear relationship between the law and policy. The presentation also highlighted how the decision support system created in the project could be used to inform the development of marine policy and that the process of marine decision-making could be enhanced even within the existing regulatory framework

2.3.5 Exercise WS2- 3: Exploring Trade-Offs and Policy Options

Working in mixed sector groups, the aim of Exercise WS2-3 was to use the outcome of the previous exercise (WS2-2), the conceptual system model that the participants had just created, to explore how activities (MPA, Fishing, Windfarms, Recreation/tourism) will respond to future policy drivers in conservation, fisheries and climate (e.g. MSFD, Habitats Directive, CFP, IFGs, Renewables Directive, 2030 Climate Framework). The changing actions will have ramifications for different services and benefits and these trade-offs can be explored based on the linkages in the CSM model.

Aim	To enable mixed groups to consider how sectors and activities (including industry & conservation) will change in response to key policy and legal drivers and how these changes will impact intermediate ES and benefits. The discussion promotes the connections within the system, the trade-offs that will need to be made, and the potential opportunities and impacts for sectors.
Materials	Each group were issued with a flip-chart with a ready-drawn chart on it and a selected policy driver to discuss.

Activity WS2-3a

Each group was asked to consider a number of policy and legal drivers and present a set of storylines that represent effects on the actions (wind energy, fishing, MPAs, tourism/recreation) and suggest how these may affect intermediate ES. This helped the groups to advance their understanding of what trade-offs are involved through increasing/decreasing an action in response to policy drivers. The group was also asked to consider the criteria used in decision-making processes. A chart cross referencing drivers with actions / trade-offs was drawn by each facilitator on a flip chart.

Each group was allocated 1 driver to start, and then moved on to discuss another driver. Groups discussed the influence of the following policy drivers:

- Group 1: Conservation (MSFD; Habitats Directive)
- Group 2: Fisheries (CFP; IFGs)
- Group 3: Climate (Renewables Directive; 2030 Climate Framework)
- Group 4: Stakeholder suggested drivers

Across the following activities:

- Marine tourism and recreation
- Offshore energy
- Number and size of MPAs
- Fishing catch

Using the conceptual model as guide (i.e. following the links and +/-), various trade-offs were noted between different activities. As trade-offs were discussed, scribes made notes of any decision-making criteria / principles that emerged.

OUTCOMES: Activity WS2-3a: Trade-offs and policy

For this exercise, each group was asked to consider the impact of a specific policy area (e.g. fisheries, recreation) on the different elements in the social-ecological system which they had previously mapped out (Exercise WS2-2). With each group focused on a different policy driver, discussions between groups diverged. All groups did however recognise and discuss impacts not only on the sector at which the policy was aimed but also how sector-specific policies might affect other sectors. An example was the potential negative effects of the landing obligation within commercial fisheries on bird species such as gannets which currently benefit from fish discarded from vessels. One of the groups discussed how short and long term impacts of policies could potentially go in opposite directions. An example here was the erection of off-shore wind turbines which was seen as having negative effects on fisheries and tourism in the short term but potentially positive effects in the long term.

A recurring issue was the uncertainty that accompanies the introduction of new policies. New policies can create problems in relation to investments and efforts to comply with existing policies, and uncertainty regarding the exact details and the implementation can in itself be problematic. For example, uncertainty regarding proposed changes in the EU's Common Fisheries Policy was seen to have negative impacts on fishermen already with some people already choosing to leave the fishery sector.

As with an earlier activity that sought to explore potential impacts on the socio-ecological system (Exercise WS1-3), this venture also engendered a degree of confusion and difficulty, although to a lesser degree or extent. The challenge may have been in the design of the activity itself (potentially too many layers) or timing (close to the end of the workshop) although following a second explanation some successful further prompting by facilitators occurred. For one of the groups, the conceptual systems diagram (Exercise WS2-2) appeared to form the basis for discussion whereby individual items within the system (e.g. fishing catch, tourism) were identified as likely to be impacted by the policy being considered. Their subsequent debate focused on unpacking how this might occur. As a whole, the discussions and insight generated through this activity appeared relatively rich and detailed, which may reflect the emphasis on exploration of linkages and relationships

that was central to all activities in Workshop 2. More details of the discussion are given in Appendix 3.

Activity WS2-3B: Individual Narratives of Future Changes

This exercise was created to contextualise the systems model into reality for individuals and their interests. This was done by encouraging the development of ‘narratives’ for individuals in different sectors. Asking them to reflect on how they respond to the trade-offs discussed in WS2-3A. Do the potential changes from drivers affect their own activity, livelihood, perspective? It was hoped that this exercise would uncover ideas, stories, causes and consequences that could impact decision making, but are missed by the conceptual process.

Aim	To develop narratives in order to understand how the conceptual and broad scale issues impact upon individuals. This can reveal new information that supports decision-making and may identify unintended consequences of a policy action. A ‘first hand’ perspective can improve engagement by making people feel ‘listened to’ and grounds the conceptual model into the reality of life for the users.
Materials	Each participant was given a sheet of paper and a pen to record their 1 page narrative of future changes.

Activity WSS2-3B

Within the mixed groups, each individual was given 15 minutes to write up to 1 page a story about how an individual from a sector might respond to the drivers and trade-offs identified in the previous exercise. The following was used as guidance:

- Your story should be about an individual – yourself or imaginary – who is working in a sector in the context of the changing driver.
- What is happening in the broader sector (i.e. from the drivers) and how does this impact you as an individual? What are your prospects?
- How does your story unfold both in the short term (2020) and the long term (2050)
- How do the changes identified in the system model affect you? Your business? Your values?
- How do you engage in decision-making?

After 15 minutes, the mixed groups discussed their narratives. Facilitators and scribes captured key issues that emerged with a focus on phenomena that can influence the decision-making process.

OUTCOME: Exercise WS2-3B: Individual Narratives of Future Changes

Narratives were, unsurprisingly, varied in structure (e.g. bullet point list, observational story), content and focus. One commonality voiced in many of the narratives was a recognition of, and concern over the effect of the numerous, varied and seemingly disjointed character of the policy and law contexts. Several such observations are noted in Table 5 as well as the following comment, the content of which provides insight into how a more joined-up policy context might facilitate a different scenario:

Existing dysfunctional regulation currently leading to marine spatial conflict – more integrated regulation would promote MSP - better use of the total resource (for everyone!) [fishing industry participant 1]

Policy/regulatory drivers in Scotland are very disjointed... Regulatory processes are reactive, largely change coming too late – failure to understand a need to learn from terrestrial planning process [MRE INDUSTRY sector]

No coherent management of several policies may lead to “consultation fatigue” and confusion as to how all of the various policies will fit together [Additional Relevant Stakeholders]

Progress on both environmental and conservation issues and on (sustainable) development are hampered by bureaucracy and at the moment it feels like bureaucracy is going off the roof [conservation sector]

Policy should seek to drive these by being coherent

...we are being snowed under by consultations after consultations [fishery sector]

Finance cuts mean consultations being reduced to minimum [community sector]

Table 8: Comments from participant narratives reflective of the concern over a plurality of policies, laws and budgetary frameworks

Present in the narratives is also a sense of passion and commitment. Two examples of this include:

Personally, I am long past retirement age but feel I can contribute to the future of the industry I have been part of for almost 60 years... [fishery sector participant]

We are at an historic juncture in the development of sustainable marine conservation and planning systems for Scotland's seas. A fundamental question from the perspective of myself (both individually and professionally) is the degree of ambition of the various processes: MPAs and marine planning. [conservation NGO sector participant]

An additional dimension present was that of trade-offs, both in terms of what contributes to the decisions (i.e. *'outcome of trade-off discussions depends on the scale, particularly temporal scales at which benefits are evaluated'*, [conservation sector] and the potential for win-win solutions. This latter notion is illustrated by the following two comments:

For me, this is a mixed/complex picture - but we need to see the big picture (spatial plans) to see where (maybe) different activities can exist [community sector]

Opportunities to co-exist are being missed [MRE INDUSTRY sector]

See Compilation of Narratives in Appendix 4.



Image 6. Stakeholders exploring the trade-offs and policy options.

2.3.6 Exercise WS2- 4: Decision-making Process Input

This was a wrap up exercise to allow reflection on both workshops and consider and openly discuss as a whole group.

Aim	To reflect on the process (Workshop 1 and 2) and to provide feedback to inform the parameters of a decision-support tool/mechanism
Materials	Each scribe was issued with a notebook and pen to record the discussions.

Activity WS2-4

In small groups, participants were asked to discuss the following:

- What elements of the discussions in WS1 and WS2 should be included in the decision-making process?
- How should they be included?
- When? / At what points in the process?
- Who should be involved?

OUTCOME: Exercise WS2- 4: Decision-making Process Input

We have reproduced statements (in italics below) from the discussions and linked them to the exercises that participants have highlighted that they felt should be used in future MSP.

What elements of the discussions in Workshop 1 and Workshop 2 should be included in the decision-making process?

- *Gathering of spatial evidence of Benefits* (Mapping exercises WS1-1 and Benefits WS1-2)
- *Uniqueness of CORPORATES was the introduction of the ES: framework: it is potentially the way forward.* (Linking Benefits to ES, WS2-1 and CSM WS2-2)
- *A benefit of the workshops highlighted the uncertainty and complexity of the situation* (Ecological and Law/Policy interludes and CSM WS2-2)
- *It was good qualitative exercise. However, in order for it to be useful and allow decision makers to use, it has to be quantitative and interactions between nodes (represented as arrows) should be modelled.* (CSM WS2-2)

How should they be included?

- *Good order of activities:* In particular, the gathering of spatial evidence as the first thing (Mapping exercises WS1-1)
- *There is always the trade-off on balancing between the benefits to society and benefits to individuals with recognition that benefits to a community are not evenly distributed.* (Benefits WS1-2 and CSM WS2-2)
- *Uncertainty needs to be included as uncertainty in one sector increases so too does uncertainty in other sectors* (Ecological and Law/Policy interludes and CSM WS2-2)

When? / At what points in the process?

- *Start now as MSP is very sectoral and socio-cultural aspects are missing.*
- *Good to use in regional marine planning. Need to have Ecosystem-based regional plans and Cumulative impacts i.e. Pentland Firth & Orkney Waters marine spatial plan*
- *As other policy drivers conflicting /affecting marine development – need overall view i.e. drivers/policies for MPAs and Climate change have many link to other sectors.*
- *Too much consultation and not enough actual engagement (listening): listening to stakeholders and trying to find solutions was a two way process.*

Who should be involved

- *Very beneficial to work with stakeholders from other sectors*
- *Smaller companies – but individuals do not have time or resources to participate effectively and therefore need a way to be represented*
- *Government departments – as they were not listening /talking to each other*

2.3.7 Workshop 2 – Evaluation Summary

The second workshop had fewer participants (n=14) than initially planned. The breadth of sectors represented however was similar to Workshop 1, although none of the independent tourism operators (recreational sector) were present. This could be a reflection of the time of year (early spring may coincide with preparation for tourist season); it is also reflective of the wider literature in terms of the challenges associated with recruitment of stakeholders to workshops, absence of a financial incentive to participate, and the fact that the process was not aimed at influencing the decision-making procedure in this case.

Assessment of the usefulness of the workshop as well as the workshop materials and delivery were largely positive (Figure 25). From a content perspective, it was noted that the maps generated through the participatory mapping exercise in workshop 1 were missing, with one participant stating, 'there was a disconnection between this and the first workshop.' Across all provided comments there appeared to be an appreciation for the value of such workshops and activities that addressed the complexity and brought together a range of voices. This diversity of sectors and the opportunity to interact with other organisations were both highlighted as contributions to the value of the workshop. These sentiments were coupled with a pragmatic sense of 'now what' which is perhaps exemplified by the following two comments: 'a useful exercise; the challenge remains in translating the complexity into planning' and '[I am] interested to see how you can interpret the outputs from the groups!'

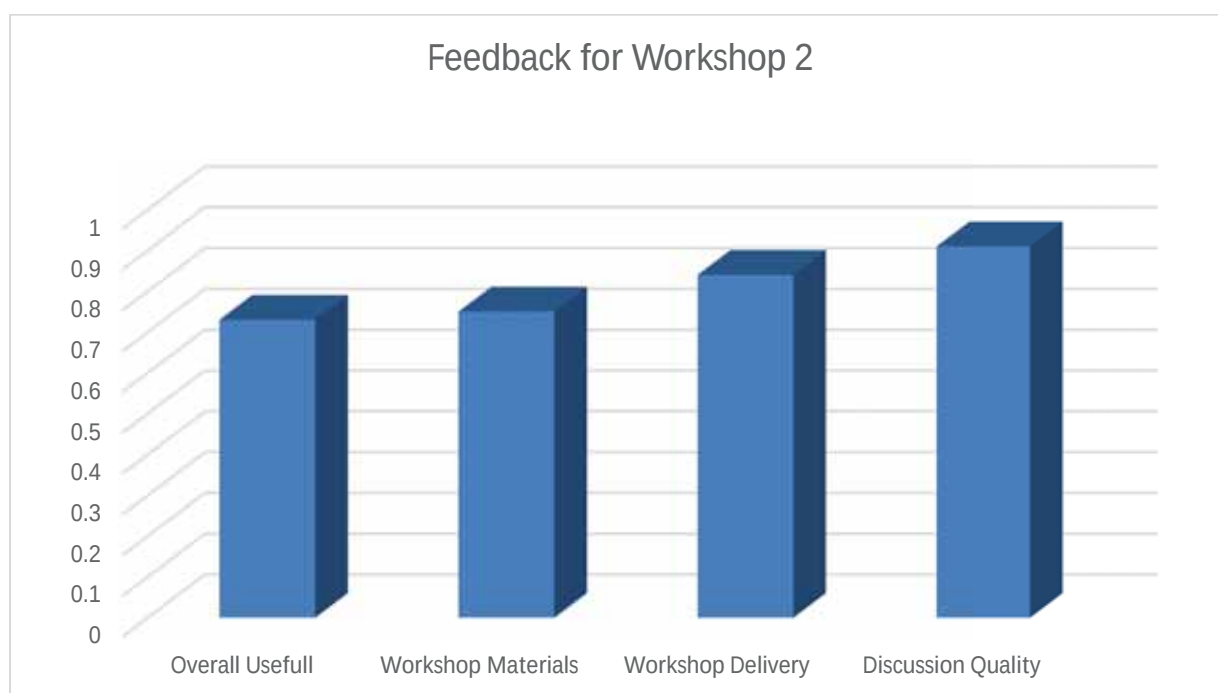


Figure 25. Quality of the workshop 2/out of 1.0

As regards learning about the concepts of ES and trade-offs between different activities, evaluations were mixed with some participants indicating they had learned something new and others stating they had not. This probably reflects substantial differences in prior experience and exposure to ES knowledge. Two participants' comments emphasized the need to fully acknowledge the inherent complexity that is present in these ideas. In considering their responses in relation to learning about these two ideas, one participant wrote: 'but realisation that many relationships are complex – don't feel we bottomed them

out fully'. Another noted 'the need for cross-sectoral integration during deliberative processes and to recognize complexities'. Overall responses with regard to knowledge gained about these two concepts is illustrated in Figure 26.

Figure 26 summarises assessment of the extent to which new knowledge was gained from the workshop's specific activities. Evaluations suggested that participants felt they had learned more from the activities that examined linkages and relationships than those focused on trade-offs and impact. Comments from two of the participants suggest that for exercises focused on these latter two areas; there may have been too little time available.

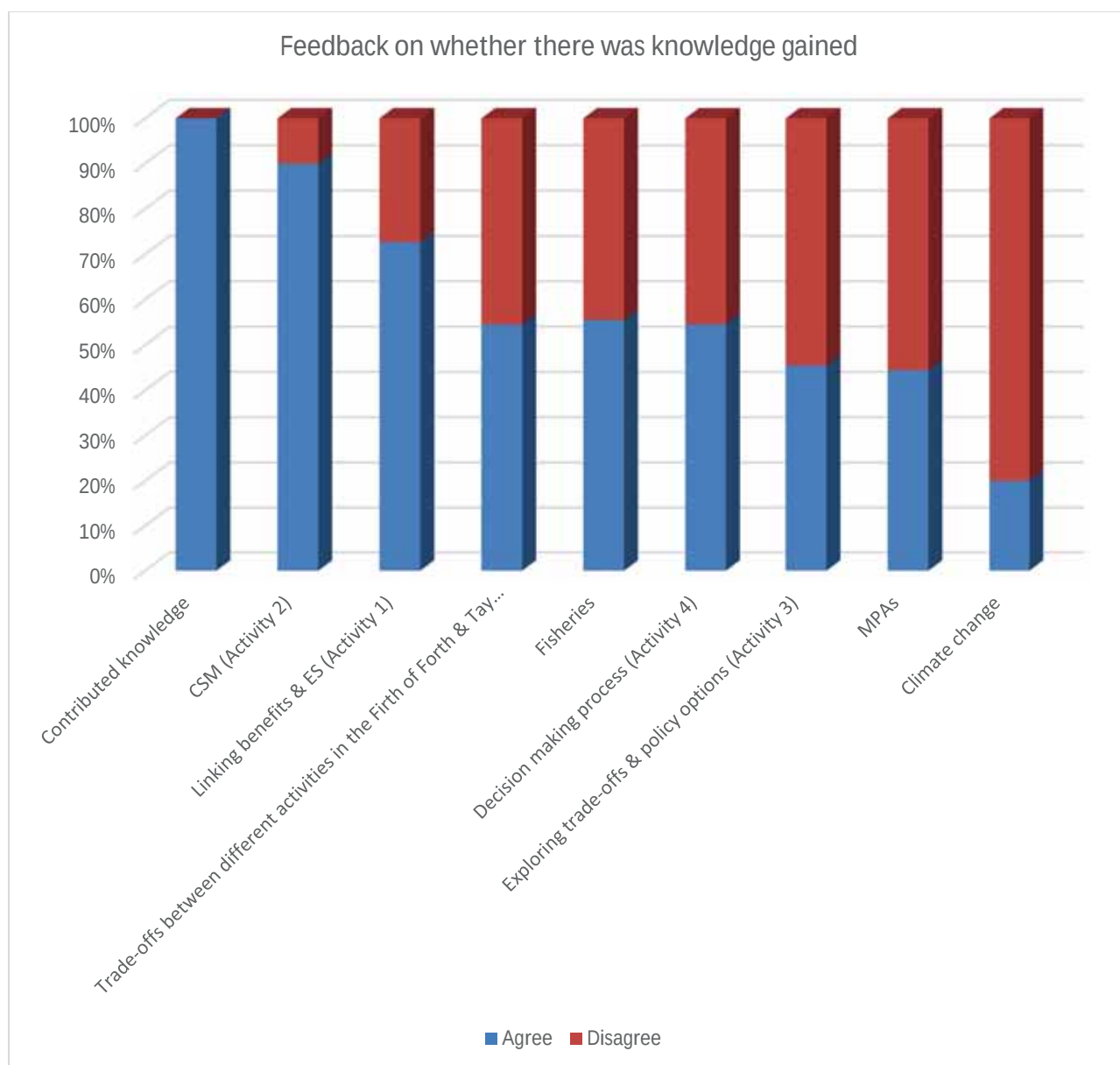


Figure 26. The Percentage of participants that that either agreed or disagreed with the statement that they gained knowledge from the stated activity

The quality of discussion and opportunity to contribute knowledge or views to discussion were again both rated highly in the evaluation assessment. Participants indicated they liked the opportunity to work in cross-sector groups, valued listening to and interacting with the others and appreciated the personal and social learning opportunity. One individual's

comment exemplifies the general sense at the end of the workshop that ‘we need to keep the dialogue going’. Importantly, the comment from one of the participants suggests that there was also an appreciation that ‘certain aspects did make some participants uncomfortable’. Figure 27 provides examples of summative comments provided by participants for Workshop 2.

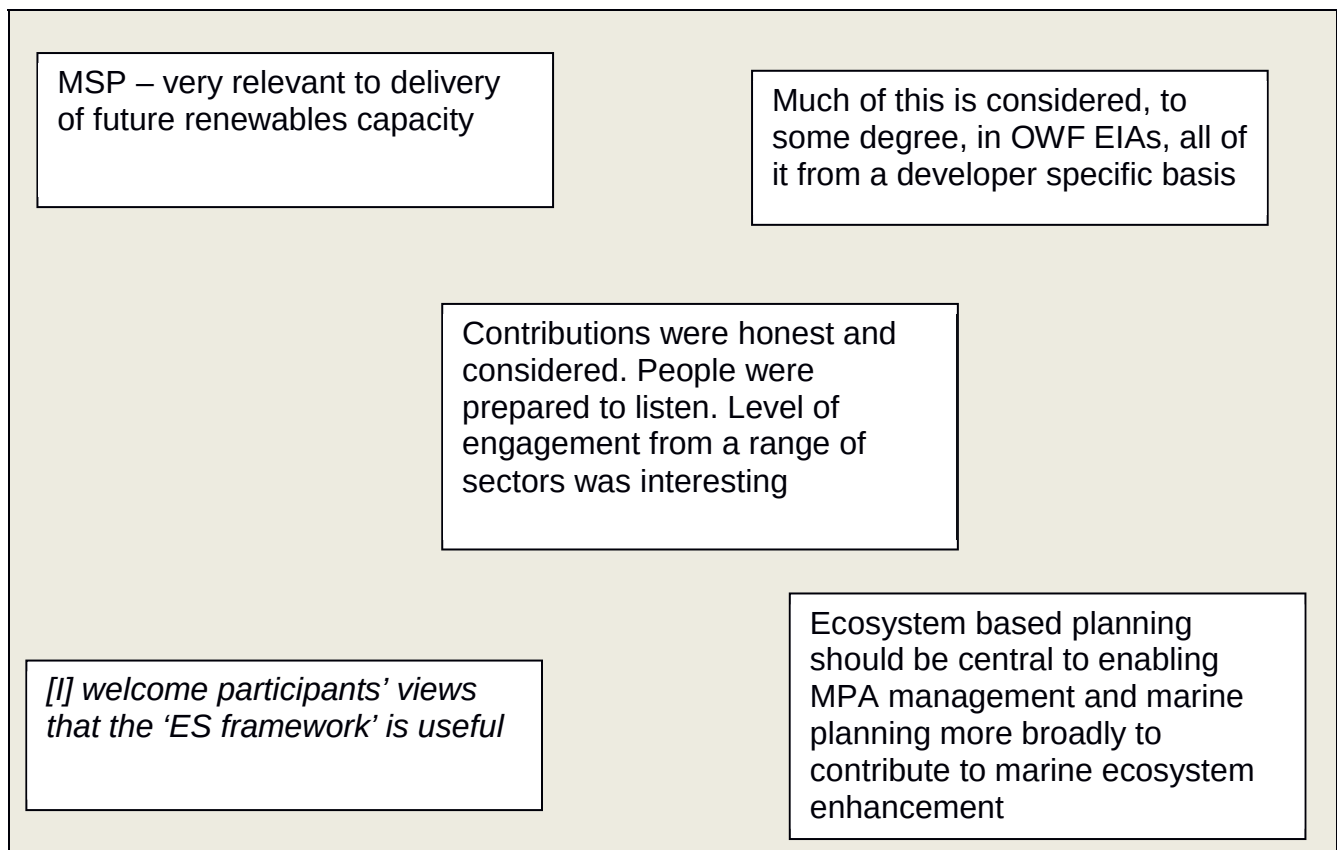


Figure 27. Selected stakeholder comments about workshop 2 overall

3 Overall Outcomes

The CORPORATES study is a pilot study exploring the use of the concept of Ecosystem Services (ES) to build dialogue between marine sectors and stakeholders, and allow discussions on the evaluation of trade-offs between ecological, economic and cultural values from within the existing regulatory framework in Scotland.

CORPORATES was built around 2 cross-sectoral Workshops, which included structured introductions (interludes) of underlying ecological processes, together with an overview of relevant marine and terrestrial laws and policy applicable to the project, enhanced development of cross sector and inter-disciplinary understanding. This enabled appreciation of the possible interactions of ES with the range of stakeholder activities, and the resulting trade-offs required. The initial mapping activities, in sectoral groups (Fishing/Maritime, Recreation & Tourism, Conservation & Ecological, Renewables), had two uses: identifying spatial usages in the region which were then shared across sectors, and allowing participants to be immediately actively involved in the process.

Overall, in preparing for the Workshops, the research team developed a shared appreciation of each other's areas of expertise. Explaining science, law and methodologies to each other resulted in a careful use of language and a wider appreciation of the issues associated with the project.

In Workshop 1, interactive 'conversations' between stakeholders within cross-sectoral groups on benefits and ES exposed similarities in benefits experienced by each sector (Figures 19 and 20), building rapport between sectors. Following on from this, linking benefits to the most important regional ES in Workshop 2 allowed stakeholders to appreciate common reliance on different ES

The CSM network mapping (Figure 23 and 24) in Workshop 2 consolidated concepts introduced during the interludes, and built upon the benefits & ES conversations, further improving knowledge of the mechanisms of ES. It was the base upon which the impacts of activities, climate change and policy options were explored by mixed sector groups, further reinforcing the concept of ES and their reliance on a healthy, functioning ecosystem. Finally, written narratives allowed individual stakeholders to express views and concerns about future changes to ES, and to benefits and activities relying on ES. This allowed for anonymous expression of points a stakeholder may have felt had not been adequately dealt with within the workshop.

Attendees found the format and content of the Workshops' useful to sharing knowledge (>90% agreed), and although some were familiar with the concept of ES before Workshop 1, the majority felt the activities contributed to their knowledge (75%). Many stakeholders commented that the mixing of sectors was a new experience. The biggest difference of the Workshops to stakeholders, as compared to other consultations, was the usefulness, as well as the possible way forward within MSP, of utilising ES concepts in mixed sector groups. These exercises created synergy, producing new insights for stakeholders into possible trade-offs between activities and ES, and highlighting cross-sector concerns.

The useful outcomes of these Workshops have led to the conclusion that these methods provide an ES-based decision-support model for exchanging societal-ecological knowledge and providing stakeholder interaction in marine planning. This is considered to be an appropriate method of achieving an ecosystem approach to marine planning decisions as required by law. It was also noted that the approach could be immediately relevant in Scotland as it could be utilised in the development of the marine regional planning regime, which are now required to be implemented in the 11 Scottish marine planning regions.

4 Conclusions and Recommendations

4.1 What worked, what didn't and why

What worked well and should be used in a MSP (MSP) decision-support system to better incorporate ES (ES) knowledge and values into MSP decisions are the following:

The mapping and collation of Benefits in Workshop 1 (Exercise WS1-1 and WS2-2)

The linking of Benefits and ES (Exercise WS2-1)

The Conceptual Systems Models (Exercise WS2-2).

All formal and informal feedback showed that these exercises and the fact that we worked a lot in mixed sector groups were the most useful of exercises across the 2 workshops.

However, stakeholders found it difficult to switch from conceptual issues of ES, benefits and ecological trade-offs to discussing local specifics. There is a clear lack of knowledge and quantifiable information about what specific actions/policies will mean to local ES /benefits in terms of economics, ecology and cultural & social changes. The use of and creation of maps in the 1st workshop was appreciated by stakeholders. However it was decided not to bring those maps into use in the 2nd workshop because of difficulties anticipated to arise from the lack of specific knowledge and quantifiable evidence in the marine regions of what ecological changes will occur with the introduction of large scale windfarms, MPAs and climate change.

One has to ask the question 'Does this process allow all stakeholders to have a voice?' Could workshops such as these be helpful in getting stakeholders to discuss what really needs knowing (economically, ecologically and socially) and provide the background to inform where strategic research could then be launched by governments? The main point being that these interactions are real information exchanges and that involve a lot of knowledge transfer and active listening from both sides. A better understanding of the most important issues, as agreed by a range of stakeholders, can then be turned into action by government, filling in the needed knowledge gaps. This action needs to include some level of attempting to study and quantify the ecological trade-offs that will occur in any particular change in marine spatial usage.

There is clearly a need to explain the legal requirement of the decision making process, now part of the marine planning regulatory framework. There was much benefit derived by the participants in learning and understanding the role of law and policy. The methods used were also clearly a way of fulfilling existing legal requirements.

The participatory processes, where shared values around cultural ES can be elicited, can form an important avenue for bringing both ecological and legal understanding into the decision-making and marine planning process. Specific mechanisms need to be provided to allow values that are often subtle and implicit to become explicit; mapping and deliberation is a starting point but can be complemented by interpretive and artistic approaches to achieve this more profoundly. The CORPORATES process demonstrated clearly that the range of stakeholders present all shared and agreed on many of the same benefits and ES that were important. There were more similarities between groups than differences. Therefore there needs to be better methods to allow people to realise they share/or at least recognise what others are concerned about losing.

Also, while the CORPORATES process provides a suitable methodological template for exchange of social-ecological knowledge and values, and provides a basis for trade-off analyses through mapping of uses and conceptual modelling, a limitation of the tool thus far is that it omitted a more formal evaluation step, where, e.g. through multi-criteria analysis, different policy options could be appraised across different ES, uses, and types of values elicited. In other words – there needs to be information on the direction and quality (and quantity) of the links between ES, activities and benefits.

4.2 Timing and number of workshops

Due to the need to classify the long list of benefits defined by stakeholders and the need to identify ES of importance that are linked to those benefits, it would be difficult to run a pair of workshops using these methods on consecutive days. However, they could be run a few

days or weeks apart now that the necessary methods have been identified and implemented. Preparation time, and the large amount of time we needed to digest the information generated in the 1st workshop and to re-design the 2nd workshop would be greatly reduced. Also, we suspect that some amount of time for reflection is good for stakeholders, as we were very pleased to see some stakeholders coming back for the 2nd workshop talking with terminology, such as terms like '*ecological trade-offs*', introduced in the 1st workshop from our Ecological and Law/Policy Interludes.

4.3 When in the MSP process to have this sort of exercise

Ideally, these workshops should be performed very early in the process of spatial planning. This could include workshops site development considerations, with a wide range of stakeholders at the start of the process for site development considerations. The sooner the full range of stakeholders can engage in this process the better, as it helps to build common understanding not only of the ecological system, but also an understanding of the importance of which aspects others find valuable. The workshops need to be run in a context where this process can actually support a spatial management decision, and where there is enough time that a component which is deemed essential to know more about could be added or even go so far as fully quantify the effects a decision could have, in order to be able to more explicitly weigh ecological trade-offs.

4.4 The team facilitating the workshops and the experience level of stakeholders

From our experience as a team, from a wide array of disciplines and several of us also very experienced in multi-disciplinary work, we found working together very stimulating. The mix of natural scientists, lawyers, social scientists, government researchers and policy makers allowed a sharing of knowledge and advice that we think made a potentially good project into an excellent project. Having highly experienced stakeholders, with a range of areas of vast knowledge, also made a difference in the depth of discussions. Both of these factors are important, and need to be thought about for the success of future workshops.

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Appendices

Appendix 1: Full list of Benefits from Workshop 1 Exercise 2

Benefit Code FINAL	Benefit - Participant Identified	Sector
B1 Local Economic Benefit	Contribute to local economy	Fishing/Maritime
B1 Local Economic Benefit	Food exports	Fishing/Maritime
B1 Local Economic Benefit	Tourist industry & employment	Fishing/Maritime
B1 Local Economic Benefit	Infrastructure associated to renewables (e.g. Fife Energy Park)	Renewables
B1 Local Economic Benefit	Economy	Recreation & Tourism
B1 Local Economic Benefit	Tourism & economic	Recreation & Tourism
B1 Local Economic Benefit	Wealth – via property prices	Recreation & Tourism
B1 Local Economic Benefit	Wildlife tourism (Isle of May/Bass Rock)	Conservation & Ecological (Human)
B1 Local Economic Benefit	(Marine) Tourism	Conservation & Ecological (Human)
B1 Local Economic Benefit	Coastal communities (and impacts on all marine incomes e.g. fisheries tourism)	Conservation & Ecological (Human)
B1 Local Economic Benefit	Recreational (enjoyment/revenue)	Conservation & Ecological (Human)
B1 Local Economic Benefit	Commercial fisheries	Conservation & Ecological (Human)
B1 Local Economic Benefit	Develop an offshore wind industry and infrastructure in Scotland	Conservation & Ecological (Human)
B1 Local Economic Benefit	MPAs increase commercial fish stocks (potentially)	Conservation & Ecological (Human)
B1 Local Economic Benefit	Jobs and investment	Conservation & Ecological (Human)
B1 Local Economic Benefit	Develop an offshore wind industry and infrastructure in Scotland	Conservation & Ecological (Human)
B1 Local Economic Benefit	Coastal communities (and impacts on all marine incomes e.g. fisheries tourism)	Conservation & Ecological (Human)
B2 Employment	Employment opportunities	Fishing/Maritime
B2 Employment	Provision of employment	Fishing/Maritime
B2 Employment	Use of natural resources to make a living	Fishing/Maritime
B2 Employment	Employment in infrastructure	Fishing/Maritime
B2 Employment	Job creation (operation, manufacturing, maintenance)	Renewables
B2 Employment	Employment/ Job creation	Recreation & Tourism
B2 Employment	Jobs and investment	Conservation & Ecological (Human)

B2 Employment	Tourist industry & employment	Fishing/Maritime
B3 Cultural Heritage	Family continuity	Fishing/Maritime
B3 Cultural Heritage	Daily life in peripheral communities	Fishing/Maritime
B3 Cultural Heritage	Historical markets: Spectacle in modern times – Tourist attraction	Fishing/Maritime
B3 Cultural Heritage	Cultural heritage	Fishing/Maritime
B3 Cultural Heritage	Fishing catch as local delicacy	Fishing/Maritime
B3 Cultural Heritage	Salmon & Sea trout as cultural heritage	Fishing/Maritime
B3 Cultural Heritage	Scotland's history	Fishing/Maritime
B3 Cultural Heritage	Community preservation/sense of community	Fishing/Maritime
B3 Cultural Heritage	Understanding heritage	Recreation & Tourism
B3 Cultural Heritage	History (uncovering history)/ Natural history awareness	Recreation & Tourism
B4 Social Bonding	Friendships (working with groups on projects)	Recreation & Tourism
B4 Social Bonding	Shared experience	Recreation & Tourism
B4 Social Bonding	Long term friends	Recreation & Tourism
B4 Social Bonding	Social interactions/development	Recreation & Tourism
B4 Social Bonding	Youth activities	Recreation & Tourism
B5 Healthy Climate	Reduction of carbon emissions	Renewables
B5 Healthy Climate	Contribution towards mitigation of climate change	Renewables
B5 Healthy Climate	Weather event	Recreation & Tourism
B5 Healthy Climate	Seasonal	Recreation & Tourism
B5 Healthy Climate	Renewable electricity	Recreation & Tourism
B5 Healthy Climate	Low carbon energy	Conservation & Ecological (Human)
B5 Healthy Climate	Carbon cycling and sequestration	Conservation & Ecological (Human)
B5 Healthy Climate	Carbon cycling and sequestration	Conservation & Ecological (Animal)
B5 Healthy Climate	Renewable energy generation	Renewables
B6 Ecosystem Health and Resilience	Renewable energy generation	Renewables
B6 Ecosystem Health and Resilience	Resilience	Conservation & Ecological (Animal)
B6 Ecosystem Health and Resilience	Ecosystem resilience	Conservation & Ecological (Animal)
B6 Ecosystem Health and Resilience	Healthy food webs for food production/Trophic functioning	Conservation & Ecological (Animal)
B6 Ecosystem Health and Resilience	Food production for fish and shellfish	Conservation & Ecological (Animal)

B6 Ecosystem Health and Resilience	Sense of place (importance of habitats to local populations)	Conservation & Ecological (Animal)
B6 Ecosystem Health and Resilience	Fishing ban (sand eels benefit)	Conservation & Ecological (Animal)
B6 Ecosystem Health and Resilience	Designated area protection provides protection	Conservation & Ecological (Animal)
B6 Ecosystem Health and Resilience	Sand eels feeding seabirds	Conservation & Ecological (Animal)
B6 Ecosystem Health and Resilience	Food availability	Conservation & Ecological (Animal)
B6 Ecosystem Health and Resilience	Suitable nesting habitat	Conservation & Ecological (Animal)
B6 Ecosystem Health and Resilience	Estuarine habitat and food shelter	Conservation & Ecological (Animal)
B6 Ecosystem Health and Resilience	Current patterns of food availability and diversity in area	Conservation & Ecological (Animal)
B6 Ecosystem Health and Resilience	MPAs increase commercial fish stocks (potentially)	Conservation & Ecological (Human)
B6 Ecosystem Health and Resilience	Current patterns of food availability and diversity in area	Conservation & Ecological (Animal)
B6 Ecosystem Health and Resilience	Sand eels good habitat availability	Conservation & Ecological (Animal)
B6 Ecosystem Health and Resilience	Resilience	Conservation & Ecological (Animal)
B6 Ecosystem Health and Resilience	Ecosystem resilience	Conservation & Ecological (Animal)
B7 Escape	Freedom/Escape	Recreation & Tourism
B7 Escape	Get away from man made things	Recreation & Tourism
B7 Escape	Relaxation/Calm/Enjoyment/Leave problems behind	Recreation & Tourism
B8 Health	Feel good factor/satisfaction – My hobby is my work	Fishing/Maritime
B8 Health	Food provision	Fishing/Maritime
B8 Health	Food as a nutrition	Fishing/Maritime
B8 Health	Salmon & Sea trout food	Fishing/Maritime
B8 Health	Relaxation/Calm/Enjoyment/Leave problems behind	Recreation & Tourism
B8 Health	Fitness/physical fitness	Recreation & Tourism
B8 Health	Well-being/ Spiritual wellbeing	Recreation & Tourism
B8 Health	Health/fresh air	Recreation & Tourism
B8 Health	Mental challenge/Good for your soul	Recreation & Tourism
B8 Health	Food	Recreation & Tourism
B8 Health	Enjoyment of the natural world	Conservation & Ecological (Human)
B8 Health	Feel good factor/satisfaction – My hobby is my work	Fishing/Maritime
B9 Adventure and challenge	Salmon & Sea trout recreation	Fishing/Maritime

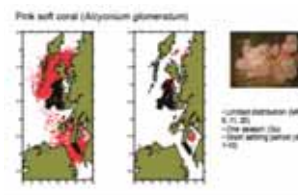
B9 Adventure and challenge	Testing your limits	Recreation & Tourism
B9 Adventure and challenge	Adventure	Recreation & Tourism
B9 Adventure and challenge	Sporting success	Recreation & Tourism
B9 Adventure and challenge	Recreational fishing	Conservation & Ecological (Human)
B10 Knowledge and skills	Learning about immediate environment	Fishing/Maritime
B10 Knowledge and skills	Environmental data generated through the EIA process	Renewables
B10 Knowledge and skills	Education/Knowledge	Recreation & Tourism
B10 Knowledge and skills	Contributing to Science/research/academic study into ecological receptors	Recreation & Tourism
B10 Knowledge and skills	Personal development	Recreation & Tourism
B10 Knowledge and skills	Introduces people to new activities and environments	Recreation & Tourism
B10 Knowledge and skills	History (uncovering history)/ Natural history awareness	Recreation & Tourism
B10 Knowledge and skills	Play with boys toys (underwater photography)	Recreation & Tourism
B10 Knowledge and skills	Human geological study through protection	Conservation & Ecological (Human)
B10 Knowledge and skills	Study benefits of MPA protection	Conservation & Ecological (Human)
B10 Knowledge and skills	Understanding heritage	Recreation & Tourism
B10 Knowledge and skills	Learning about immediate environment	Fishing/Maritime
B10 Knowledge and skills	Environmental data generated through the EIA process	Renewables
B11 Connection to Nature	Environmental appreciation	Recreation & Tourism
B11 Connection to Nature	Nature/Closeness to nature	Recreation & Tourism
B11 Connection to Nature	Experience natural environment	Recreation & Tourism
B11 Connection to Nature	Closeness to nature	Recreation & Tourism
B12 Aesthetics and Scenery	Enjoying the scenery	Recreation & Tourism
B12 Aesthetics and Scenery	Aesthetics	Conservation & Ecological (Human)

1



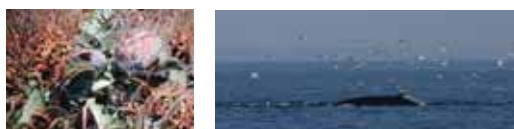
Formation of Habitats/Habitat Diversity

4



Larval supply

2



Species Diversity

5



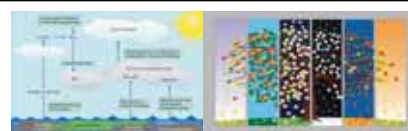
Carbon sequestration

3



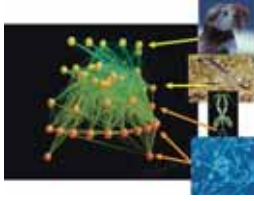
Primary Production & Nutrient Cycling

6



Climate regulation & stability

7



Ecosystem health & resilience

8



Quantity of fish & shellfish

9



Degree of naturalness, wildness & vastness

10



**Number of
cultural-historic
features**

13



**Marine Tourism/
Recreation**

11



Fishing Catch

14



**Personal
Wellbeing from
Nature**

12



**Cultural heritage
& identity**

15



**Local Economic
Benefits**

16



Offshore Wind Energy

17



Number/size of Marine Protected Areas

Appendix 3: Detail of Discussion in Workshop 2 Exercise 3a

I. Conservation Driver (Summary)

Recreation & Tourism

- Increase aspects of tourism/recreation
- May be managed more (but limited – difference per type of activity – not always clear cut)
- MSFD acts at large scale – what is local impact?

Offshore wind

- Additional assessments resulting from new designations decrease
- Individual species impacts (collision, displacement)

Fisheries

- How to achieve more productive inshore fisheries?

Example of detailed discussion from Conservation Driver group:

Participants were initially confused on what they were asked to do so we examined conservation policy drivers. Clarifications were needed by participants whether this only includes governmental policies or sector-driven policies.

Discussion around recreation & tourism

Overall, it is expected to bring indirect positive relations by increasing the health of the seas, subsequently increase the naturalness and as a result increase the benefits to the recreational sector.

Participants decided to focus on the Forth MPA complex and the proposed offshore SPA.

An opinion was presented that there will be no direct impact on the sector. There are possibilities for positive relations e.g. through recreational angling. Activities are believed to be compatible with the conservation objectives of the MPAs in the area.

All benefits to the recreational sector will be indirect and will in fact prevent other future activities from happening which could potentially impact the sector. There is no clear impact on the sector.

Forth MPA is way offshore so it is not affecting that much.

Many times, governmental policy drivers are following actions that are already happening through local actions/ initiatives e.g. SFF sustainable fishing objectives.

Another benefit of conservation policies can be that things could become worse if action is not taken. It is not expected that conservation policies will make such a big difference to the recreational sector.

It is assumed that existing recreational activities are compatible and essentially protects from future activities.

Assuming that existing conservation policies do not have a direct benefit to the sector but only indirect, what conservation measures would you take to increase on tourism and recreation? Good examples would be to allow for a more productive inshore fishing industry from smaller vessels which in return will provide local delicacies to restaurants.

MSFD legislation applies to larger areas. Debate followed whether it is appropriate to be considered as relevant.

New Scottish MPAs' management measures are currently unknown. Only after they will be published it can be assumed that existing activities are compatible.

Discussion around offshore wind

It is likely that any new conservation policy can change the type of assessments against all new conservation objectives. This will be fed into the consenting process.

Proposed offshore windfarms require assessments both on the area but also against the conservation objectives of applicable MPAs (Habitat Appraisal)

Strong debate around the ecological impacts of offshore wind. Agreed that there will be definitely some impacts but left the discussion on the level of the impact out. There will also be a trade-off between offshore wind and wilderness of an area (visual impacts).

II. Climate Change Driver (Summary)

Offshore wind

- Increase in renewables (short term)
- Decrease in naturalness (short term & long term)
- Recreation decrease short term (during construction) but increase long term (trips to windfarm)
- Decreased fishing catch short term (displacement of fish), but increase long term (windfarm acts as protected area for fish)
➔ Joined up policy/regulation needed

III. Common Fisheries Policy Driver (Summary)

The group felt this impacted upon cards:

11 (fishing catch),

13 (tourism).

16 (offshore wind) and

17 (number and size of MPAs.)

Example of detailed discussion from Common Fisheries Policy Driver group:

The landing obligation was identified by the fishing participant as a good example of how it impacts:

No one knows what is going to happen, how this is going to work in practise. It was felt that it threw out all the previous work that had been undertaken under the previous regulation. The landing obligation was identified as having a huge impact upon the previous work for

example on fishing gear and methods that had been developed. It was felt this was going to be a negative impact. Ultimately it would increase uncertainty.

Conservation methods which had already been adopted could become redundant. People were already selling up and leaving the industry. Another participant asked if there were exemptions. The fishing participant explained that initially under the landing obligation non quota species were exempt from the landing obligation but by 2019 all species would be included.

As fishing catch (card 11) was going down it was felt that tourism (card 13) could/would be increasing through diversification. People were leaving the fishing industry and going into other industries. This meant that crews were changing. However it was not always possible for vessels to diversify into becoming guard vessels. The process for converting fishing boats to guard vessels was believed to be prohibitive albeit not entirely restrictive.

The landing obligation could also impact upon species diversity for example sea gannets did well out of discarded fish. This landing obligation could have a negative impact on the species although on the other hand others may see this more as returning to a natural state.

The landing obligation was believed to impact upon local economies and could also impact upon the quality of MPAs. For example the landing obligation could put pressure upon other areas outside MPAs, which in turn could impact upon the quality of the MPA through changes in larval supply. Furthermore it was felt that MPAs still have total uncertainty surrounding the management measures that will be introduced. One participant stated that management plans for SPAs would be coming out this year.

It was believed that linking fishing catch (11) to card 5 (carbon sequestration) and fishing catch to habitat formation (card 1) could also lead to further MPAs being designated in the future and by linking fishing catch (11) to primary production (3) and to 5 (carbon sequestration). This could impact upon local economic benefits (15) as communities dependent upon fishing are more vulnerable to change; this also linked to personal wellbeing (14). It could also impact upon the cultural heritage and identity as either communities move away and or change through diversification.

Fishing catch was also linked to fish quantity – adding in discards to TACS. The impact of this is uncertain, it is still not known how this will work in practise or what impact it will have. Fish stocks have benefitted from the measures that were previously adopted, this has increased diversity – the impact of the landing obligation is totally unknown.

Example of Flip Chart notes from Common Fisheries Policy Driver group

Recreation/Tourism	• May increase if less fisheries • Discard benefit may influence birds such as gannets negatively, but this could also be seen as going back to a more natural balance/state (populations not kept artificially high by feeding them with discard) • People might move from fisheries into recreation/tourism related work because of uncertainty about CFP
MPAs	• If more pressure on fish stocks outside the MPAs maybe there will also more pressure on the overflow

	fish & larva coming out of the MPAs? • Maybe new future MPAs if less fishing leads to new/enhanced habitats
Off-shore energy	• People might move from fisheries into energy related work because of the uncertainty about the CFP
Fisheries	• The big impact is the landing obligations and the uncertainty created by not knowing how the policy will be • Uncertainty means that many fisher people are selling up/may sell up • Previous investment in gear may be lost if new regulation has different requirements • Uncertain how the CFP will influence fish quantity • The landing obligation may mean that fishers will be less selective regarding species
Cultural heritage & identity	• Communities may move away from fishing to other things which will change them
Communities	• More vulnerable to change due to impacts of increased uncertainty on local economic benefits and personal well-being

Appendix 4: Compilation of Individual Narratives in Workshop 2 Exercise 3b

Sector: Additional Relevant Stakeholders Need to work with all sectors so all policies are significant

- Work by needing to inform sectors who are not directly affected
- Gives opportunity to bring sectors together
- Role is to facilitate the decision making rather than directly contribute
- Introduction of marine planning partnerships will change role of partnerships far more than any one policy
- Problem that lot of sectors I need to discuss with are external individuals e.g. dog walkers, canoeists etc.
- Problem that finance cuts means consultations being reduced to minimum

Sector: Conservation

Climate change drivers –

- Increased offshore wind energy = decreased habitats/species/wildness = decreased ecosystem health/resilience
- Increased offshore wind energy = increased climate change regulation = increased ecosystem health/resilience

Marine protected areas –

- Increased Ecosystem health/resilience = increased habitats/species/wildness = increased quantity of fish/shellfish (=increase fish catch), and increased marine tourism/recreation (= increased local economic benefits)
- Decreased offshore wind energy (?) = decreased climate change & stability = decreased ecosystem health/resilience =

For me, this is a mixed/complex picture! → But, we need to see the big picture (spatial plans) to see where (maybe) different activities can exist.

Sector: Conservation

Issues/changes in the marine environment

- Human exploitation of fish stocks
- Climate change → impacts on primary production etc.
- Pollution – oil spills,
- Impacts of renewables (wind, wave, tidal)
- Shipping traffic/other similar disturbance
- Only new factor is renewables → uncertain what the impacts are – hard to know what short term/long term effects – lack of evidence

Decision making

Lobbying through charities (e.g. RSPB, NT, NTS)

Voting for political party who best reflect views (but none really do – lack of environment in manifestos)

Sector: Conservation

- Marine law & policy has created an incredible amount of new jobs for marine scientists/ecologists. I would say we are the winners in industry or in government or in academia. Is it sustainable?
- Outcome of trade of discussions depends on the scale, particularly temporal scales at which benefits are evaluated.
- Progress on both environmental/conservation issues and on (sustainable) development are hampered by bureaucracy and at the moment it feels like bureaucracy is going off the roof.
- This exercise seems largely to be based on 'generalisation' and yet the outcome in reality is specific – is there a risk of missing the point at times?

Sector: Conservation

We are at an historic juncture in the development of sustainable marine conservation and planning systems for Scotland's seas. The fundamental question from the perspective of myself (both individually and professionally) is the degree of ambition of the various processes: MPAs and marine planning. As a representative of an NGO we have an opportunity to engage at the heart of many of the processes and with that comes a responsibility to best reflect the concerns of the ecosystem itself (and the component species & habitats) which don't have a 'voice' (and therefore we are not a 'sector'). Even despite this opportunity, it is an ongoing challenge to counter the current paradigm which tends to find conservation as a constraint and tends to proceed in a non-precautionary basis.

A principal concern is the degree to which MPAs will be "well-managed". There is a concern that the non-precautionary approach risks losing this historic opportunity to enhance the health of our seas. The burden of proof should be on those whom wish to carry out an activity to prove as far as possible it won't have a deleterious affect on sites... conservation objectives. Currently, most particularly relating to fishing, the burden of proof is on having to prove damage rather than as it should be, to prove that an activity won't do damage. This adaptive management approach risks being non-precautionary. We also need to have cross-sectorial acknowledgements of the current depleted baseline (as evidence with expert judgement set out in Scotland's Marine Atlas).

Sector: Fishing

Pre-supposing policy/regulation fishing activities

Existing dysfunctional regulation currently leading to marine spatial conflict – more integrated regulation would promote MSP → better use of the total resource (for everyone!)

Sector: Fishing

Fisheries Policy

Personally, I am long past retirement age but feel I can contribute (cannot read the writing) to the future of the industry I have been part of for almost 60 years.

The worry thing about the future is the way we are being railroaded into operating a policy that no one has a clue to what the side effects of such a policy.

People like myself who try to make representation to government on behalf of active fishermen are being snowed under by consultations after consultation,

Ever more restrictions are being introduced before the results of all previous restrictions have been assessed.

Huge areas of sea are being closed to fishers (MPAs, Windfarms, Gravel extraction).

Sector: Renewables (MRE)

Local benefit (economics) requires supply chain that will be dependent upon wind projects being built. This requires government to facilitate CFP process with more money

- Uncertainty around existing and predicted impacts from offshore has meant really conservative assessments. Current consents therefore take up existing 'head room' for ecological impact – Need targeted monitoring campaigners to establish actual impact, reduce conservation & allow reliable estimation of 'head room' will limit benefit.
- Management projections for MPA need to reflect conservation objectives to ensure effectiveness.

Sector: Renewables (MRE)Key issues from CFP for offshore wind:

I expect few effects from the CFP. The following are possible:

- More former fishermen looking for work due to restrictions imposed by CFP. Therefore more specialised/knowledgable workforce i.e with greater knowledge of the local marine environment and conditions.
- Drop in seabird population for some species caused by CFP eg Gannets and a large gull populations will fall due to a lack of discards, which will coincide with the construction of the new offshore windfarms – which will get the blame!

Other policy impacts on offshore wind

- UK government funding. Without this, the delivery of Scottish government consents is redundant.
- Carbon and renewable targets
- Designations – new MPAs and SPAs – depending on the detail of management measures these could restrict offshore renewable developments
- MSP – if these are indeed 'spatial' this will have implications for locating renewable energy devices.

Sector: Renewables (MRE)

Policy/regulatory change – EU/UK/Scotland

- Uncertainty = political climate is very different now than 5 years ago. Future direction is currently uncertain (but the drivers remain)
- Policy/regulatory drivers in Scotland are very disjointed (within single body – e.g. Marine Scotland)

- = conservation v's offshore wind
- = regulatory processes are reactive, largely change coming too late – failure to understand a need to learn from terrestrial planning process
- = Future planning for offshore renewables scenarios has failed to acknowledge outcomes from decision making to date
- Opportunities to co-exist are being missed.
- Policy should seek to drive these by being coherent
- E.g. fishing exclusion = MPA = safe place for windfarm = wider, longer-term benefit for fishing
- Securing any benefit locally/nationally should be an important consideration.

Sector: Additional Relevant Stakeholders

Crown Estate Renewables Planning and Policy

- Potential benefits for those in the fishing sector to move into other industries.
- Changes to local communities and then change in local identity.
- Any increase in uncertainty in one sector is guaranteed to have knock on effects on other sectors. This may lead to more difficulty engagement with that sector.
- Climate change/low carbon drivers may have preference for specific sectors increasing effects on others.
- Increases in the total of MPAs may sterilise the marine area for others and make the opportunities for sectors such as fishery and renewables dependent on management measures.
- No coherent management of several policies may lead to consultative fatigue and confusion as to how all of the various policies will fit together.

Sector: Additional Relevant Stakeholders Fisheries management conservation

- Uncertainties about future stocks and it is unclear if the CFP will support or hinder sustainable fishery stocks.
- Will offshore developments impact fishery stock numbers, Can MPAs mitigate and provide a buffer of the developments. Trade –offs.
- Scotland has a strong fishing heritage and culture, it should be supported. Funding.
- Lack of stakeholder engagement in the decision making process. Any decision could impact upon a community, which could have a negative/positive impact on not only local economic benefits and personal wellbeing.
- Could restrict opportunities for future generations.

Sector: Additional Relevant Stakeholders

Comments on the process:

The links were classified as positive or negative. The scales of changes are essential information if trade-offs are to be... What scale of action would be needed to alter primary production to have significant effect on fisheries?

There is no mechanism to balance societal benefits against individual benefits

There are no mechanisms to handle factors... cultural identities, perceived wildness etc. These need to be quantified, and interactive, modelled in some way analogous to individual based models in biology (behaviour etc) and monte-carlo simulations. Some applies to impacts on fisheries, to benefits of increased tourism etc.

Appendix 5: Post Workshop Questionnaires

Insight from Post-workshop Questionnaire

We received responses to our questionnaire from three groups. All three had indicated previously (on workshop evaluation forms) that they had a good familiarity with the ecosystem services idea and with various aspects of the marine planning process. Our aim with the follow-up questionnaire was to explore three aspects: specific workshop components; the CORPORATES process as a whole; and workshop design. Given the limited number of responses, the insights drawn can only be characterised as ‘things to consider’ in the design of future such processes.

Specific components: Both workshops incorporated a ‘knowledge exchange interlude’ which focused on ecology/oceanography or law/policy. These were provided prior to an exercise that had been designed to draw on the information. In this respect, the interlude’s fulfilled their purpose, i.e. responses on the questionnaires indicate that they had been useful for setting up the exercise. One participant wrote: ‘although I was familiar with a lot of the information provided, it was useful to provide context for the discussions that followed’. The law/policy interlude was noted in particular as very informative; ‘I found this very informative as it was not something that I knew a lot about’.

Both workshops also had a mapping component, the first focused on mapping benefits and activities, the second on mapping the linkages within the system. For the former, we asked participants to provide ideas for how the workshops could make better use of the maps. Comments confirmed the need for clear goals for the maps, the importance of integrating into both workshops and the possible use to illustrate and explore the ‘*potential for differences in the spatial and temporal differences between [benefits and ecosystem services]*’, for example, ‘*benefits may be experienced in one place but the ecosystem services behind them may rely on features or processes that occur over a different/wider area*’. For the conceptual systems models, we invited participants to share what they had gained from the exercise. The comments received note the value of the activity for bringing out complexity, linkages, places where trade-offs are likely to occur and an opportunity to learn from other stakeholders:

‘The linkage diagrams were incredibly complex and difficult to interpret and highlighted the uncertainties associated with the magnitude and significance of the interactions.’

‘It increased knowledge of what other stakeholders value and the complexity of the interconnections. To recognize the interconnected nature of services, activities and benefits, leading to the recognition that trade-offs are a likely component in decision-making.’

‘Building a conceptual model is a powerful tool provided all participants have the same understanding of exactly what is meant by the components, flows and impacts.’

The process: These questions explored what might be unique or different about CORPORATES, what had been helpful, the knowledge exchange element and how involvement had or might shape involvement in decision-making and marine spatial planning. Interaction with other stakeholders and extending one's knowledge were highlighted as either unique, useful or both. One participant noted that *'getting all the stakeholders from different organisations with different concerns was almost unique'* particularly as *'this project managed to get everyone in a room and talking without much conflict and lots of co-operation'*. The co-operation and lack of general acrimony may, in one individual's opinion, be because *'the Forth was not the best location for this study as so much work had already been done and negative impacts much reduced by choice of location and other mitigations.'*

Perhaps unsurprisingly, in terms of opportunities to share knowledge and clarifying understanding, given the level of existing familiarity amongst these three individuals, the emphasis in responses to these questions was on their contribution to the discussion. Round table discussions were noted as a useful platform for knowledge exchange as were the sessions in Workshop 1 and the opportunity to support development of other stakeholders' understanding.

The question which asked about involvement in decision making and marine planning processes was included to explore the extent to which involvement in the process developed through CORPORATES might facilitate subsequent engagement. Responses largely reflected the fact that the three individuals who provided responses to this question were already heavily involved in marine spatial planning and decision-making, e.g. it is their job. Two of the individuals indicated that they were incorporating insight gained from CORPORATES into their work; one of these also indicated that they were clearer now about where in the marine planning process they could effectively engage, while the other noted that their involvement in the decision-making process might need to be at a different stage.

Future Workshops: The general consensus was that the 3 month break between the two workshops was too long, with suggestions of an appropriate length ranging from 1 week to 6 weeks. The final question asked for thoughts on *what* elements from the workshops (1 and 2) should be included in future efforts to facilitate decision-making and *how* these might be incorporated into the decision-making process. Comments included the need to: (i) quantify ecosystem interactions if they are to be used in decision-making; and (ii) be specific about which and whose decision-making. With respect to the latter, it was emphasized that such techniques would most likely be valuable at early stages e.g. *'when there is still an opportunity to make changes to or even withdraw proposals'* and that their usefulness for gathering stakeholder perceptions and spatio-temporal information on benefits from ecosystem services *'could have a strong role in decisions made over planning policies and supporting regional locational guidance'*.

Comments also emphasised the vital role for stakeholder involvement, the importance of building and maintaining trust, the magnitude of time, effort and intellectual input made by stakeholders, and the need for clearly defined aims for any ecosystem services mapping and/or valuation if it is to have influence on planning policies.

An additional questionnaire was circulated only to attendees from the recreational group to explore ways in which this sector could be more involved in such decision-making efforts. For this, we received response from only one individual, an attendee who had been at both workshops. Their comments emphasised the key issue of time, noting that for many in the recreational sector, the opportunity costs to attend are high and the need to be clear as to how output or decisions might affect the sector.



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