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Investigating options on how to address cumulative impacts in marine spatial planning

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ABSTRACT

Marine spatial planning (MSP) is an important aspect of the current European, UK and Scottish environmental agenda. The European Commission's recently published draft directive to create a common framework for MSP and integrated coastal management in EU waters and coastal areas is an indication that the sustainable management of marine and coastal waters is a pressing issue. The development of the Shetland Islands' Marine Spatial Plan (SMSP) was initiated by the Scottish Government in 2006 and is an example of a progressive regional marine spatial plan. The SMSP has successfully provided a policy framework and baseline spatial data to guide the placement of marine developments. Through policy, it provides suggestions, proposes directions and highlights opportunity for development. A model which maps cumulative pressures around the Shetland Islands, based on an ecosystem-based risk assessment and extensive knowledge of existing marine activities and uses, is the next step in identifying areas for action and marine policy formulation. This model may be used in comparable marine plan regions with access to comprehensive mapped activity data and local expertise to develop their own methodologies in addressing cumulative impacts. This research also aligns with the Marine Strategy Framework Directive which requires an analysis of the predominant pressures and impacts, including human activity, on the environmental status of marine waters which *inter alia* covers the main cumulative and synergetic effects.

1. Introduction

Marine spatial planning (MSP) is recognised as an important tool in the sustainable management of marine ecosystems (Douvere and Ehler, 2007; Ehler, 2008; Ehler and Douvere, 2009; CEC, 2008; Schaefer and Barale, 2011; Collie et al., 2013). Until recently governments applied a mainly sectoral approach towards marine issues, but now realise that a more integrated approach is required to manage increasing pressures on the marine environment (Olsen et al., 2011). Within the EU MSP is currently being steered by a number of policy drivers including the EU Integrated Maritime Policy, Blue Growth, Water Framework Directive, Marine Strategy Framework Directive, Habitats Directive, Common Fisheries Policy, Renewable Energy Directive and the recently proposed directive to establish a framework for maritime spatial planning and integrated coastal management (Kelly et al., 2014).

New emerging demands on marine space and resources, such as renewable energy developments, highlight the potential for user–user conflicts i.e. with fishing activities as well as user-environment conflicts. Traditionally, marine space has been predominantly regulated within individual economic sectors (Douvere, 2008) such as shipping channels and aquaculture sites, and there has been little consideration of the effects of multiple developments on other human activities or the marine environment (Ehler and Douvere, 2009). Conflicts between users and the marine environment jeopardises the ability of the ocean to provide the necessary ecosystem goods and services upon which many depend (Ehler and Douvere, 2009).

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The impact of human activity on the environment, as well as society, has been a recurring concern over the past century. The term 'sustainability' first originated in ecological science where it was developed to express the conditions that must be present for the ecosystem to sustain itself over the long term (Holden et al., 2014).

The term was then formally recognised in the 1987 Brundtland Report 'Our Common Future' where sustainable development was defined as 'development which meets the needs of the present without compromising the ability of future generations to meet their own needs' (World Commission on Environment and Development, 1987). In the face of global environmental degradation sustainable development was considered an approach that aims to balance different, and often competing, needs against an awareness of the environmental, social and economic limitations that society faces. Today, the concept of sustainable development is recognised by world leaders and is included in corporate reports, the media, schools and in conversation with the general public (Farley and Smith, 2013).

In 2012 the report 'Back to Our Common Future' looked at developments in the previous twenty years and stated that at the global level, the impacts of human activities on the environment have been increasing. Moreover, it noted that many resources on which humanity depends for survival are 'witnessing trends that, if continued, would lead to depletion or collapse' (United Nations Department of Economic and Social Affairs, 2012). Notably this included the marine environment where resources were identified as being under threat from overexploitation, pollution, and land-based development.

Both the economy and society are wholly reliant on the environment including our oceans to survive. The marine environment produces the ecosystem services on which humans depend upon including provisioning, regulation, culture and habitat provision. The primacy of environmental stability and quality is therefore central to sustainable decision-making. However as Farley and Smith explain, it is not about simply considering the environment but about understanding the role of the environment in the functioning of social and economic systems, then working to align the sound stewardship of the environment with the desired social and economic outcomes (Farley and Smith, 2013).

In October 2007 the European Commission (EC) adopted the Communication on Integrated Maritime Policy (IMP) for the European Union (EU), also referred to as the 'Blue Book' (Commission of the European Communities, 2007). This acknowledged the need to act in a coordinated manner to respond to pressures from multiple users on the marine environment. The Communication sets out the basic structure for a governance framework and cross-sectoral tools necessary for an EU Integrated Maritime Policy. Included are a set of main actions that the Commission will pursue and are guided by the principles of subsidiarity and competitiveness, the ecosystem approach, and stakeholder participation. One action includes the development of a roadmap towards MSP by Member States (MS). As a consequence, the Communication titled 'Roadmap for Maritime Spatial Planning: Achieving Common Principles in the EU' was adopted by the EC on 25 November 2008 and aims to facilitate the development of MSP by MS, and to stimulate its implementation at a national and EU level (Commission of the European Communities, 2008). The Roadmap sets out key principles for MSP and encourages the development of a common approach among MS including ecosystem based management and the consideration of cumulative effects on the marine environment.

In 2008 the EU also adopted the Marine Strategy Framework Directive (MSFD) which aims to achieve or maintain good environmental status (GES) of the marine environment by 2020 (European Commission, 2012). The MSFD requires MS to apply an ecosystem approach and to ensure that pressure from human activities is compatible with GES. The MSFD has been described as the environmental pillar of the Integrated Maritime Policy (The European Parliament and the Council of the European Union, 2008). The MSFD will complement the EU's Water Framework Directive (2000/60/EC; WFD) which requires MS of the EU to achieve 'good water status' in freshwater and coastal waters by 2015. The WFD aims to reduce pollution from land based sources entering the sea; improving marine conditions while also protecting coastal waters as well as transitional waters including estuaries and coastal lagoons. These are important spawning grounds for marine fish species and an integral link between freshwater and marine ecosystems. The two directives therefore strive to incorporate the principles of 'systems ecology' and those of the 'ecosystem approach' (De Jonge, 2007). In both situations common environmental conditions are assessed to determine the response to total natural variation and human induced pressures and impacts (De Jonge et al., 2012).

There are a number of definitions for 'ecosystem based approach' and 'ecosystem based management', both terms appear to be interchangeable, however for this paper the definition from the Convention on Biological Diversity is used to explain the process as follows:

> *'The ecosystem approach is a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way. Thus, the application of the ecosystem approach will help to reach a balance of the three objectives of the Convention: conservation; sustainable use; and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources'* (Secretariat of the Convention on Biological Diversity, 2004).

An ecosystem based approach to MSP must therefore consider the entire ecosystem including human beings. The objective of ecosystem-based management is to maintain an ecosystem in a healthy, productive and resilient condition, providing the goods and services humans want and need (Ehler and Douvere, 2009). In this respect, ecosystem-based management differs from traditional approaches which focus on a single species, sector, activity or concern. The ecosystem approach should therefore consider the cumulative impacts of different sectors on the marine environment.

The recently published EC's draft directive to create a common framework for MSP and integrated coastal management (ICM), if adopted, will formalise the marine plan preparation process throughout Europe (EC, 2013). This will include the assessment of environmental effects of maritime spatial plans and integrated coastal management strategies in accordance with the provisions of the Strategic Environmental Assessment (SEA) Directive 2001/42/EC. In accordance with the EC, the application of SEA is expected to ensure a holistic consideration of the impacts, including cumulative ones, from the various human activities at an early stage and therefore facilitate the implementation of future projects (European Commission, 2013). To adequately implement the SEA Directive in MSP, an appropriate understanding of the potential impacts and pressures associated with marine activities is a basic requirement. The spatial identification of where these cumulative impacts may occur and the features they may affect is intrinsic to any environmental assessment and one which seems to have been overlooked or inadequately addressed to date. Nevertheless, this research into mapping cumulative impacts around the Shetland Islands is a 'learning by doing' approach which can be reviewed and adapted to inform management policy and practice. Monitoring and evaluation can help to promote understanding and improve