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A quality management review of Scotland's sectoral marine plan for tidal energy

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ABSTRACT

As coastal communities continue to increase in size and population, associated marine economies will have to expand in unison. This relationship gives rise to an increase in user – user and user – environment conflicts. Such conflicts demand the implementation of marine spatial planning (MSP) in order to effectively manage users and uses within the marine environment. Furthermore, climate change increasingly threatens the integrity of marine ecosystems, thereby affecting the economies of coastal communities. Political support for the adoption of offshore renewable energy has increased in order to assist a transition away from carbon-based economies. These drivers have triggered Scotland to construct and implement the world's first sectoral marine plan for tidal energy (SMPTE). As this SMPTE is the first of its kind, it is important to include a quality assurance element in the plan framework. The authors have undertaken a quality management review of Scotland's SMPTE against guidelines set out in the International Council for Exploration of the Sea's *Marine Spatial Planning Quality Management System* (ICES MSP QMS). Conformity of the SMPTE to criteria set out in the ICES MSP QMS are ranked, gaps in quality management are analyzed, and recommendations are made for further improvement.

1. Introduction

Historically, the seas adjoining coastal nations have acted as a resource conduit to assist in the proliferation of the development and expansion of city states and nations. The value of the seas remains a theme in modern societies, with 44% of the global population living within 150 km of the coast (UN Atlas of the Oceans, 2010). Increasing emphasis on sustainable development of the sea reflects the potential of the seas to accommodate new activities (European Union, 2012) and the need to create compatible relations between new and established uses of the sea. Traditional coastal activities such as fishing, shipping, dredging, mineral extraction, and tourism have proved to be an economic stronghold for coastal communities (Douvere and Ehler, 2009). The growth of coastal populations, in conjunction with the estimated 382 existing and emerging uses of the marine environment (Lester et al., 2013), can act to compromise the ecosystem integrity of marine environments at a pace greater than any other in human history (World Resources Institute, 2005). This dilemma is further exacerbated by the rapid warming of the Earth's climate due to the excessive combustion of fossil fuels. The combination of such regional user conflicts and global ecosystem stressors have led to scientific analysis suggesting that no portion of the Earth's oceans have escaped the influence of anthropogenic activities (Halpern et al., 2008).

User – user conflicts (interactions amongst various users of the marine environment) and user – environment conflicts (interactions of various users of the marine environment with natural ecosystem properties) (Douvere, 2008) arising from the proliferation of marine activities in size, number, and intensity demand the application of marine spatial planning (MSP) as a means to effectively manage the environmental, economic, and social implications associated with their usage across time and space (Foley et al., 2010). The negative implications of global climate change have prompted a shift in all levels of government policy and legislation towards the reduction of greenhouse gases (GHG) and implementation of renewable energy sources. These two prerogatives become ever the more intertwined when examining the notion of tidal current energy development and implementation, as such renewable energy technology essentially becomes another player in the usage of finite and already stressed marine space.

Anticipating such conflicts in marine spatial usage, Scotland has become the first and only nation to draft a sectoral marine plan for tidal energy (SMPTE) with the intent of promoting the sustainable deployment of tidal current turbines (TCTs). The SMPTE takes into consideration areas characterized by strong tidal energy resources and the potential environmental, economic, and social constraints associated with developing such areas, ultimately resulting in the identification of ten potential commercial-scale tidal energy sites. However, TCT

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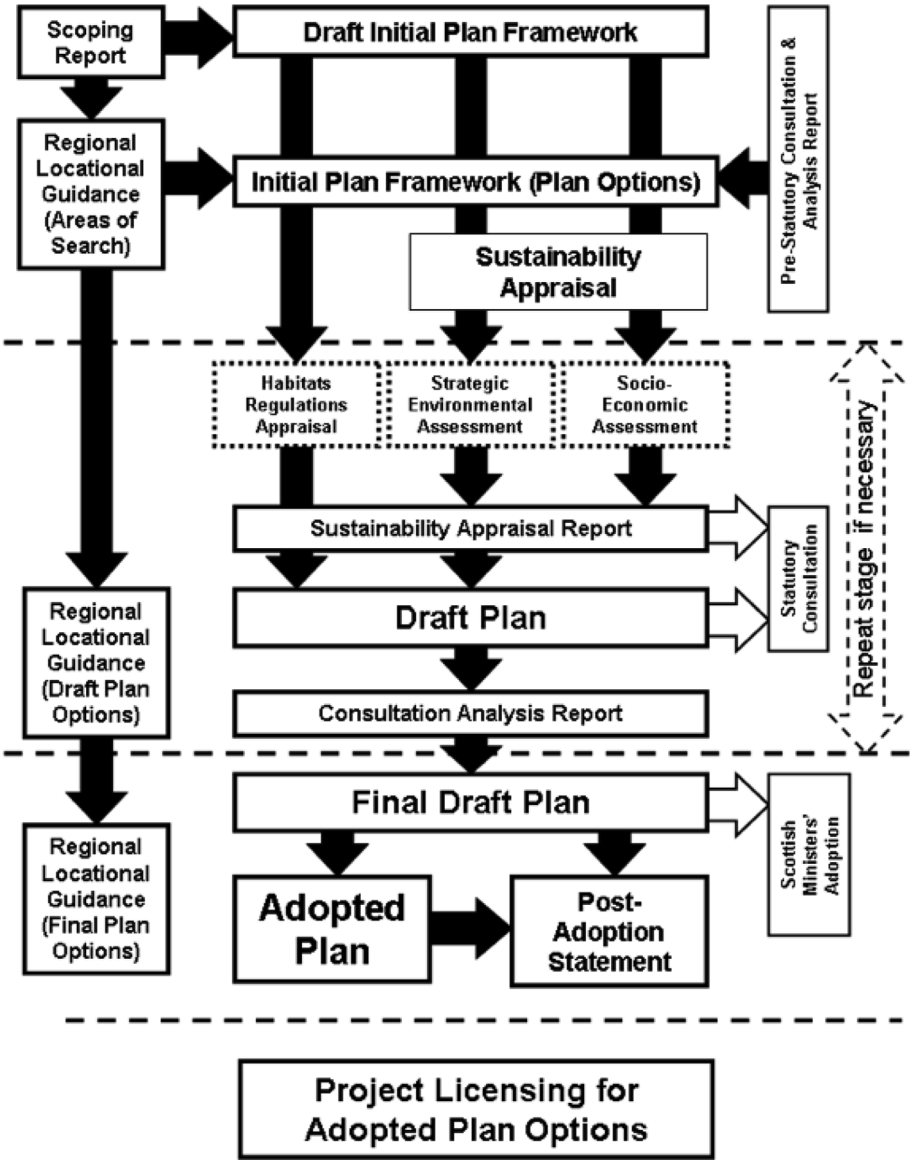

Fig. 1. Scotland's SMPTE process (Davies and Pratt, 2014).

deployment continues to develop into a mature commercial proposition (Myers et al., 2011), and, therefore, while many scholars have advocated the deployment of TCTs based on their suggested environmentally benign operational nature (Pelc and Fujita, 2002), favorable long term economics (Fraenkel, 2006), and ideal location of implementation on the seabed reducing public resistance generated from visual and/or audio pollution (Fraenkel, 2002), such effects cannot yet be confirmed. In order to address this issue, it is suggested within the SMPTE that a sectoral plans review group be established in order to oversee the implementation of the SMPTE and stimulate strategic monitoring and research to fill information gaps identified in the sustainability appraisal report. In partial response to the above, Marine Scotland Science undertook a review of quality management protocols of the SMPTE.

The International Council for Exploration of the Sea's (ICES) *Marine Spatial Planning Quality Management System* (MSP QMS) (Cormier et al., 2015) is the most recently published MSP quality assurance scheme. The ICES MSP QMS was preceded by UNESCO's *Marine spatial planning: a step-by-step approach toward ecosystem-based-management* (Ehler and Douvere, 2009) and the European Commission's *Establishing a Framework for Maritime Spatial Planning and Integrated Coastal Management* (EC, 2013). All three documents propose a similar framework to structure the development of a MSP, loosely beginning with the establishment of a governance structure under existing legislation through to the review and monitoring of an implemented plan. The UNESCO document places some emphasis on development outcomes stimulated by the plan, and the European Commission document also emphasizes organizational and jurisdictional aspects. As the Scottish SMPTE is a relatively new document, there has been little time for its conclusions to work through into project development. The ICES document was therefore selected as the basis for the current review due to the process-oriented emphasis of the guideline, its more comprehensive granulated structure, and the fact that it provides a quality management checklist (QMC) of questions specifically developed to review the inputs, processes, and outputs of a MSP in relation to legal, political, technological, environmental, ecological, social, cultural, financial, and economic contexts (Cormier et al., 2015).

This paper presents a quality management review (QMR) of Scotland's SMPTE against criteria set out in the ICES MSP QMS. Consistencies between the SMPTE and the ICES criteria are identified and gaps in quality management are analyzed in order to provide recommendations for further improvement.