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FROM NATIONAL TO REGIONAL LOCATIONAL GUIDANCE FOR RENEWABLES

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ABSTRACT

The recently published Regional Locational Guidance for Wave and Tidal Devices in the Shetland Islands (RLG) arose as a first step in identifying opportunities for future renewable developments. Although marine renewables offer potential economic and environmental benefits, there is a need to ensure that the growth of this emergent industry considers existing features and users of the marine environment, and there is a clear role for marine spatial planning to guide its spatial development. In response to this, the Scottish government has produced Sectoral Marine Plans for offshore wind, wave and tidal energy. However, although these provide strategic direction for the marine renewables industry at a national, societal level, they do not represent the local cultural values of those potentially impacted by siting decisions. The Shetland RLG is a complementary, sensitivity led approach to identifying the suitability of areas around the Shetland Islands for renewable energy development. It has been successfully translated into policy within the Shetland Islands Marine Spatial Plan, which will form supplementary guidance to the Shetland Islands Council's forthcoming Local Development Plan. Working closely with local stakeholders was key to this process, which incorporates economic, environmental, social and cultural constraints into one constraint model; constraint levels are set by local and societal values, rather than monetary equivalences. Here we present a comparison of this local plan to the national Sectoral Marine Plans, and provide insights on the process of developing local scale Guidance.

INTRODUCTION

The Shetland Islands have been identified as having potential for both tidal and wave powered developments [1; 2; 3; 4]. However, there is a need to ensure that the growth of this emergent industry considers existing users and important environmental features, and there is a clear role for Marine Spatial Planning (MSP) to guide its spatial development. One way of ensuring a more equitable situation both across and within different priorities of the marine area is by defining and analysing future conditions for ocean space. The Scottish Government has created Sectoral Marine Plans for renewable energy [3; 4; 5], producing 'zones' recommended for development. Shetland's marine stakeholders expressed a reluctance to define strict zones for different activities [6], but acknowledged that, without any clear spatial guidance on the types of activities that may be able to co-exist in which areas, MSP is unable to provide direction or help in 'streamlining the development application process' [6]. As a result, the industry felt that a more flexible and cumulative approach, that allows for re-analysis of the localisation of renewable energy to preferred areas without excluding any but the most restricted or sensitive sites, was the favoured option [7].

In response to these demands, a sensitivity led approach to identifying suitable areas for renewable energy development was deemed suitable for inclusion in the Shetland Islands' Marine Spatial Plan (SMSP) [8], resulting in the recently published Regional Locational Guidance for Wave and Tidal Devices in the Shetland Islands (RLG) [9; 10]. The SMSP provides a policy framework and baseline spatial data to guide the placement of all marine developments within the 12 nautical mile limit (Figure 1). The policies and spatial data encompass economic, environmental, social and cultural uses and features, providing information to public bodies with responsibilities for marine and coastal planning functions, and to developers; informing decision-making, guiding priorities, and seeking to achieve a balance between national and local interests [8].

METHODOLOGY

The spatial model underlying the RLG reflects a process of consultation on constraints with local stakeholders (including advisors, planners, regulators, community representatives, NGOs and developers), and incorporates environmental, social, cultural and economic considerations into the site selection process for marine renewable energy developments. The RLG uses SMSP data to model spatially varying 'total constraint levels' on tidal and wave renewable energy developments. The SMSP has identified and mapped marine biophysical features and maritime activities within Shetland's marine and coastal environment; consultation resulting in both local datasets and locally amended national datasets [11]. It was decided by stakeholders that constraints relating to technology were outside the scope of this model, as constraints are heavily device dependant and are subject to

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change in a quickly evolving industry. This is in contrast to the national level Sectoral Marine Plans, which include data on renewable energy resources (tidal current velocities and wave power densities), and data such as bathymetry and sediment type, relevant to technical considerations. The RLG model was developed in ArcMap® 10.0, using the spatial analysis toolbox, and focuses on constraints to developments at sea, and on constraints to cable landing sites at the coast.

Consultation with local stakeholders and marine renewables companies provided details of features potentially adversely affected by developments. Identified features underwent further consultation to establish the level and spatial extent of the constraint they represent. A difference between the local RLG and national Sectoral Marine Plans lies in the constraint scoring of the features, with scoring within the RLG reflecting local community values, societal interests and planning precedents, as established through consultation with stakeholders. In general, constraint values ranged from 1 to 0, so the maximum possible constraint was valued at 1 and no constraint at 0. The exceptions to this were areas of 'exclusion' constraints (assigned a value of 4, due to legal requirements or planning precedent), and some areas designated for nature conservation, which were valued higher (at 2) due to their legally protected status. The individual feature constraints were then overlain and summed, with equal weighting to each feature, to create the full model output. Details of the model, the features selected and the constraint values assigned are described elsewhere [9; 12].

Stakeholder engagement has been key to the development of this guidance, and has enabled the RLG output to be directly linked to policy (within the SMSP), whereas the national Sectoral Plans are not. The RLG linked policy within the SMSP is designed to guide developments away from areas of higher constraint, towards areas of lower constraint, through requiring mitigation measures in areas of higher constraint levels. In order to assist in ease of interpretation of the model results by developers and decision makers, constraint levels were assigned into 4 'levels' (LOW, MEDIUM, HIGH, and VERY HIGH). Stakeholders felt a continuous spectrum of constraints were difficult to interpret, and distinct 'levels' were visually clearer, particularly with values close to the boundary between LOW and MEDIUM (at which the necessity for mitigation measures, as per the SMSP policy, is triggered). The boundaries between constraint levels were carefully considered and subject to consultation.

MODEL RESULTS

Model outputs were mapped (Figure 1), and the precentage of area assigned to each constraint level calculated (Table 1).

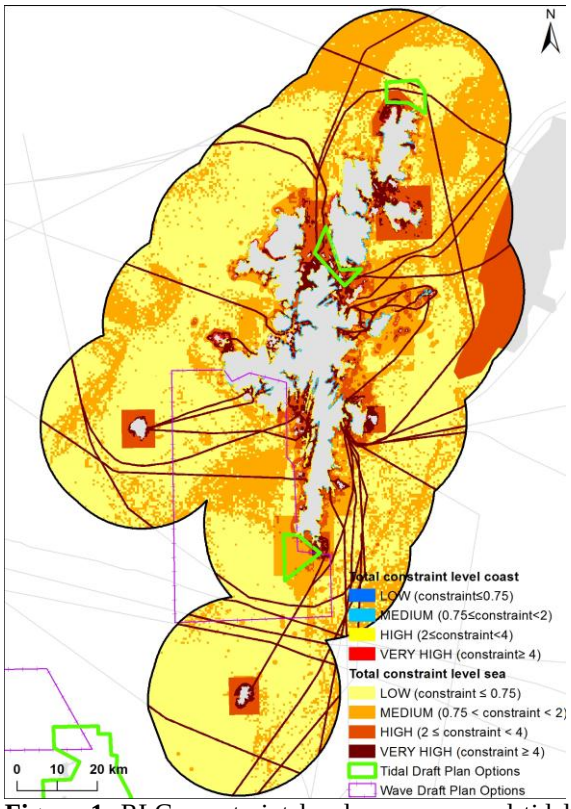

Figure 1. RLG constraint levels on wave and tidal marine renewable energy developments at sea, and for cable landings at the coast. National Sectoral Plan zones are also plotted. Higher resolution maps are available from http://www.nafc.ac.uk/smsp.aspx. Maps not to be used for navigation. Contains Ordnance Survey data © Crown copyright and database right (2011). Contains UKHO data © Crown copyright and database rights.

Table 1. Percentage of total area (and area in km^2) assigned to each constraint level, both at sea and at the coast.

	LOW	MEDIUM	HIGH	VERY HIGH
Sea	52% (6431)	30% (3662)	9% (1068)	9% (1140)
Coast	2% (5.2)	26% (66.3)	60% (153.5)	11% (28.9)

CONCLUSIONS

High levels of stakeholder engagement and local representation have underpinned this RLG, allowing the capture of as large a spectrum of potential constraints to renewable developments as is currently possible. One of the challenges in ecosystems based management and MSP is finding a way to incorporate and compare physical, economic, environmental, social and cultural activities and features. The mechanism of the model allows incorporation of data from all stakeholders in an equivalent and transparent way, to produce a single constraint model based on societal and cultural values. This unique method of valuing activities and features for consideration is a far cry from the traditional approach of weighting monetary values and equivalences against one another. It provides a measure of social justice, where local cultural and

socio-economic features are considered alongside nationally valued features. However, within this framework, the scoring of individual features was influenced by a requirement to reflect realistic levels of protection, and the consideration given to features during the planning application process.

The Scottish Government's Sectoral Marine Plans [3; 4; 5] for wave, tidal and offshore wind marine renewables are designed to guide strategic decisions by the Scottish Government on identifying areas suitable for development by the renewables industry, just as the RLG is designed to guide at a local level. The important differences between the models used in the Sectoral Plans and the RLG lie in the data used and the weightings applied. This RLG incorporates both local and locally verified national datasets, and therefore contains a more exhaustive list of features in the region which are of local importance, some of which are either not available or are not valued nationally.

The differences in model methodology, in combination with the 'zoning' output used in the national Sectoral Plans, have resulted in some divergence between regional and national recommendations. The output of the Sectoral Plans is heavily influenced by resource availability, and the final 'zones' recommended as suitable for development highlight where resources are suitable and few features of national or international importance are present. The zone recommended for wave based developments in Shetland (Figure 1, in purple) is classified by the RLG as MEDIUM or higher constraint in half of its area, thus requiring mitigation measures of any development in half the area. 10% of the national zone is classed as VERY HIGH constraint by the RLG, requiring significant planning and mitigation due to current features requiring 'exclusion' buffers. Of the Sectoral Plan's three zones for tidal energy in Shetland (Figure 1, in green), an average of 12% of the zoned area is classified in the RLG as LOW constraint, with 0% LOW constraint in one particular zone. Thus, mitigation measures are likely to be required for any development. The zones also have high proportions of area classed as 'VERY HIGH' ('exclusion') constraint (11 – 50%), further constraining the area suitable for development.

The differences between national and regional Plans are, however, reconcilable. Both represent spatial potential for developments. The Sectoral Plans guide developers towards regions with resources suitable for potential for development (large zones within the Shetland Islands in this case), and the RLG provides higher resolution spatial guidance on site suitability. Both the RLG and the national Sectoral Plans require further site-specific surveying of areas proposed for development.

The structure of the RLG policy in the SMSP allows integration of GIS data into the policy without the need to fix spatial boundaries or create 'zones'. The policy is worded such that an area's constraint level is defined by the mapped model output, and not by explicitly stated spatial boundaries within the policy. This allows for updating of the GIS based constraint maps without changing the policy or redefining zones; for example, if new data becomes available, regulations change, or if social or cultural values shift. MSP is a continuous activity [13], and guidance such as this RLG is an example of adaptive management which responds to changing conditions.

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