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Bargaining a net gain compensation agreement between a marine renewable energy developer and a marine protected area manager

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ABSTRACT

When the development of marine renewable energy (MRE) is only possible inside already established marine protected areas (MPAs), and there is a risk of ecosystem loss, environmental or monetary compensation -being the last step in a hierarchy of mitigation measures- might be an option for working out a trade-off between energy production and nature protection. In this article, it is argued that for this type of siting situation, instead of the well-established strategy of no net loss, a net gain should be provided from the MRE developer to the MPA manager, which acts as an incentive for the manager to cooperate and covers future potentially lost conservation benefits due to MRE potential damages. Based on this argument, a hypothetical example is used to demonstrate that a net gain is ensured only when there is a societal surplus from a combined MRE-MPA arrangement that can be divided between the players through bargaining. However, when asymmetric information is involved, it is shown that cooperative solution concepts are more sufficient for leaving both players better off after coexistence than before.

1. Introduction

1.1. The MRE-MPA coexistence dilemma

When deciding where to site marine renewable energy (MRE) installations such as wind turbines, and wave and tidal energy devices, economic, social and environmental criteria need to be considered. These considerations include economic viability, location suitability, public acceptance, minimization of conflicts with other marine uses and compliance with environmental regulations [1]. The practice so far has been to prohibit non-conservation related activities within marine protected areas (MPAs) [2] due to the possibility that the MRE developments might have adverse effects on the protected species and/or habitats inside MPAs. Locating the MRE installations away from MPAs, through the designation of exclusive use zones for each one of them is the ideal solution in order to avoid environmental conflicts caused by spatial overlap. By zoning in this article, we mean an arrangement wherein only one type of sea use is allowed in a reserved area designated by a marine spatial plan (MSP).

However, when one or more MPAs encompass all possible sites for other uses, a dilemma arises whether to put MRE inside MPAs or not, i.e. whether MRE can coexist with MPAs a decision that should be an MSP task as well. In this decision problem, at least two stakeholders are involved: (a) the MRE developer (the developer) who represents society's needs for climate change mitigation and (b) the MPA manager (the manager) who represents society's needs for nature conservation (NC). Two scenarios exist in the coexistence dilemma:

(a) Coexistence between MRE and MPA cannot happen (a non-cooperative solution) either because it is prohibited by national law (as stated in [3] "EUs strict biodiversity protection regime could necessitate the rejection of many large renewable energy projects. That is, it may not be possible as a matter of EU law for national authorities to grant permission for such projects"), the developer avoids the site and gives up the investment or the manager does not approve the project by applying management and exclusion rights. Exclusion rights, as the name suggests, confer the authority to exclude individuals from entering a defined space or exploit a specific resource (i.e. restricted access rights) [4]. In this scenario, the society only benefits from the protection of the area but the conservation objectives are not threatened by the

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MRE development. In this case fall some European countries such as Belgium, Italy, Greece, Poland and Spain [2], where applications inside MPAs are prohibited (Belgium) or have been avoided.

(b) Coexistence between MRE and MPA might happen (a cooperative solution) because it is not prohibited by national law, the developer applies for a license in the MPA and the manager is willing to accept the project. In that case, the society benefits from both MRE and the MPA, but achieving the conservation objectives might be at risk by possible negative effects of the MRE development. This might reduce the performance of the MPA having as a consequence the non-approval of the project by the manager. In this case fall some European countries such as Sweden, UK and Malta [2], where applications inside MPAs exist and have been either approved or waiting for approval.

This article focuses on the second scenario. In order to avoid the situation where the MPA manager risks the loss of conservation value of all or part of the MPA, a cooperative solution with compensation should be considered. The manager (the "pollutee"), by holding management rights for the marine area on behalf of the public through the legal establishment and management of an MPA, should be entitled to compensation by the developer (the "polluter") in case of (potential) damage [5]. Management rights are the rights to regulate resource withdrawal and/or improvement of the surrounding ecosystem [4]. Thus, management rights confer the authority to determine what MPA resources may be exploited and when, where, and how such exploitation may occur [5,6]. The compensation or transfer payment, in turn, can be used by the MPA manager to finance offsets elsewhere and achieve no net loss. The goal is to use compensation to ensure that the utility provided by the MPA total utility is at least as much as before the cooperative arrangement.

1.2. Coexistence as a social planner's goal

From a social welfare perspective, a planner's goal is to maximize the present value of social welfare by achieving Pareto Efficiency (PE), which is a state in which no one can be made better off without making someone else worse off [7]. In this context, when an action or a change takes place that is required to achieve efficiency (i.e. in our case study: coexistence of two uses), compensation is required from those who gain from the action to those who lose from it (i.e. an equity criterion). Cooperative solutions are enabled by the existence of a Potential Pareto Improvement (PPI) that occurs when the sum of the benefits to the gainers (here, the developer) are greater than the sum of the losses of those who are harmed (here, the manager). This allows a positive transfer where the "loser" is as well off as he would have been without a policy-induced change ensuring no change in their initial welfare [8–12]. These transfers are often referred to as side payments which can take any form: monetary or resource based. Side payments are also used in cooperative game theory reflecting the transferable utility (TU) assumption. TU is a fundamental prerequisite in cooperative games and equates to the existence of mechanisms for transfer payments (compensation) payable by the winner of the cooperation to the loser since full cooperation does not mean each player is individually better off.

But what is the appropriate amount of compensation that gives an incentive to both players to cooperate and achieve win–win results [13] and what is the most appropriate process for defining the MRE-MPA coexistence game? It should be a compensation leading to a fair coexistence, in which win–win results are maximized at least to the level that the damage is covered and the conservation benefit resulting from the MPA establishment is secured. In short, to make both the manager and the developer at least as well off or better off than before.

The objective of this paper is to contribute to a fair arrangement for MRE-MPA coexistence by:

a. Departing from methods based on the no net loss approach, that are already used to define the amount of compensation for environmental damage, and adjusting them to achieve net gain and;
b. Applying cooperative solution concepts for reaching compensation agreements, in order to overcome obstacles that might arise during negotiations between the developer and the manager.

2. Tools and methods

2.1. Choosing the net gain as a policy objective to drive MRE-MPA coexistence

Currently, the most popular mitigation mechanisms are those using the "no net loss" approach. No Net Loss (NNL) is a target for a development project in which the impacts on biodiversity caused by the project are balanced or outweighed by measures taken to avoid and minimize the project's impacts. It is an approach to undertake restoration and finally to offset the residual impacts of a project, so that there is no loss (no change in welfare) of species composition, habitat structure, ecosystem functioning and people's uses, as well as cultural values associated with biodiversity [14]. Where the gain exceeds the loss, the term 'net gain' (NG) may be used. NNL and NG of biodiversity are policy goals in several countries, and are also the ambition of voluntary biodiversity offsets [15,16]. Some countries have specific provisions for NNL/NG as a policy goal. For example, the United States and Australia [17] have national and state policies on NNL and offsetting and also the EU is exploring options for the development of an EU-wide policy to implement its 2020 Biodiversity Strategy goal of NNL of biodiversity and ecosystem services (Action 7).

There is a serious debate on the best way to offset damages to natural resources and ecosystem services. Generally, two types of compensation are distinguished: environmental compensation and monetary compensation [18]. The first consists of environmental restoration or implementing other actions that provide restoration benefits [19]. The second consists of awarding money to the injured parties. The latter applies in case no adequate functional restoration can be executed, while most systems that have compensation rules in place allow for monetary compensation [20].

The most common environmental compensatory approach for attaining NNL is the so-called biodiversity offset scheme that has already been implemented by governments in several countries and regions, such as Australia, Canada, the European Union, Brazil, and the United States [21–23], and by private interests in countries such as South Africa, Madagascar and New Zealand [14]. Biodiversity offsetting includes conservation actions intended to compensate for the residual, unavoidable harm to biodiversity caused by development projects, so as to ensure NNL of biodiversity [23,24]. The where, what, how and how much will be conserved in order to outweigh environmental loss, is defined by equivalency analysis (EA) methods [25].

There are four main approaches to determine the equivalency between the lost and the compensative resources: service-to-service, resource-to-resource, value-to-value and value-to-cost for more details on their commonalities and differences the reader can refer to Tucker et al. [26]. The European Commission guidance on the Habitats Directive compensation follows a resource equivalency approach. Offsets can be traded through habitat banking or tradable permits. Habitat banking provides a route through which