Marine Policy 56 (2015) 1–8

Contents lists available at ScienceDirect

Marine Policy

journal homepage: www.elsevier.com/locate/marpol

Assessing the impact of a new approach to ocean management: Evidence to date from five ocean plans ☆

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ARTICLE INFO

Article history:
Received 24 December 2014
Received in revised form
5 February 2015
Accepted 5 February 2015
Available online 27 February 2015

Keywords:
Ocean planning
Marine spatial planning
Economic value
Conservation
Social impact

ABSTRACT

Previous studies have helped define what good ocean planning (also known as maritime or marine spatial planning) looks like, effective stakeholder engagement, possible conservation and community benefits, and how ocean plans could theoretically cut costs and create economic value. But little evidence has yet been compiled showing the actual results of ocean plans, and whether or not they have delivered on their promise to balance competing interests through a collaborative process that considers environmental concerns. This paper presents an empirical study of five government-approved ocean plans, all of which resulted in broadly shared net benefits. Economically, these five ocean plans delivered on average $60 million per year in value from new industries and retained value in existing industries, although some stakeholders bore losses and government spending did not decrease. Environmentally, planning increased marine protection, ensured industrial uses avoided sensitive habitat, cut carbon emissions, and reduced the risk of oil spills. Socially, marine planning increased broad stakeholder engagement (thus improving design and administration of plans), while building trust that will likely improve sustainable future use of ocean space.

1. Introduction

Ocean planning, also called marine or maritime spatial planning, is a public process of analyzing and allocating ocean uses over space and time to achieve economic, ecological, and social objectives [1].[1]

A rich body of literature has, to date, focused on defining the essential elements of ocean planning, elucidating its potential benefits, and documenting the early progress of planning efforts. For example, the seminal work of Ehler and Douvere provides a step-by-step guide and framework for ocean planning [2]. Later work by the Monitoring and Evaluation of Spatially Managed Areas (MESMA) project in Europe created a generic framework for monitoring and evaluating ocean planning efforts and evaluated planning efforts (though not plan results) against the framework [3,4]. Ehler's latest UNESCO guide on evaluating marine spatial plans addresses the evaluation of plan results [5]. Administrators and academics have expanded this body of literature to include other planning guides and tools, as well as process lessons and suggestions gleaned from past planning efforts [6–10].

Building on the planning literature, other studies have suggested the kinds of benefits ocean planning could theoretically provide. At its broadest level, ocean planning resolves the governance mismatches that stymie efforts to manage ocean ecosystems and uses holistically [11]. Economic overviews have described the theory by which ocean planning can lower government regulatory costs, speed approval of projects, and increase the total economic value of the ocean [12,13]. Ecological overviews have helped define what good conservation would look like in ocean planning, including codifying desirable environmental conditions in the European Union [14], describing ways ocean planning could go further than simply protecting defined areas [15,16], and integrating ecosystem resilience into broad-based plans [17]. Social overviews have shown how ocean planning can create management actions that are accepted and sustained over time by engaging a complex set of stakeholders, their interests, and expectations [18].

Recent literature has advanced the theory on ocean planning's economic impact by grounding it in real-world data. Ecologists have modeled the tradeoffs ocean planning considers and shown how planning can increase total economic value and expand conservation efforts, potentially at the same time. A model of the Massachusetts Bay suggests ocean planning could unlock over $10 billion in wind

☆Funding: The authors gratefully acknowledge the Gordon and Betty Moore Foundation for their financial support. The funders had no role in the collection, analysis, or interpretation of data, nor in the writing of the report.

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[1] Many academics and practitioners use the term marine spatial planning or MSP. This paper uses the term ocean planning to describe the same idea.

http://dx.doi.org/10.1016/j.marpol.2015.02.004

energy development while still conserving commercial fisheries [19]. Similar models have projected the impact of planning on fisheries off the California coast and wave energy production in Oregon [20].

As countries around the world have turned to ocean planning, the evidence base for its benefits has grown as well. Initial planning efforts in England sped up the wind energy approval process, providing greater certainty to developers and saving government $210,000 in staff costs in just six months [21]. In Massachusetts Bay in 2007, stakeholders worked with the International Maritime Organization to shift shipping lanes in and out of Boston Harbor to avoid high concentrations of endangered whales. The shift cut the risk of colliding with endangered right whales by an estimated 58 percent, provided a safer environment for ships, and increased travel times by only 10–22 min [22].

To date though, analysis of economic, environmental, and social outcomes from the implementation of ocean plans has been lacking. These outcomes largely remain hypotheses to be tested. This paper uses a case study approach to test these hypotheses, drawing on qualitative and quantitative data from plans around the world, with a focus on cases relevant to North America.

2. Methodology

This study undertook five case studies of ocean plans in Massachusetts, Rhode Island, the Great Barrier Reef Marine Park, Norway, and Belgium. The study gathered information from and analyzed over 50 semi-structured confidential interviews with experts and stakeholders on the case studies. Interviewees included agency personnel, conservation groups, the wind industry, fishermen, other ocean users, and academics. The interviews were supplemented with additional research and original analysis, and information from other plans was collected to supplement the case studies where possible. Case studies and expert interviews were used since most ocean plans are relatively new, the lack of existing empirical studies, and the difficulty of assessing new public policy.

The study considered the 59 different ocean plans, broadly defined, completed or in process by the summer of 2014 [5]. Of these 59 plans around the world, only 26 have been completed and are in force. The others are still being developed, have yet to secure political approval, or lack any binding regulations. Of those 26, 15 are in North America, Europe, or Australia. The remaining 11 are all in China and therefore less applicable to the North American context.

To choose five geographically diverse plans for in-depth study, experts were asked in structured interviews about the recognition of the plans as exemplars of ocean planning and data availability (Table 1). Ultimately, Massachusetts and Rhode Island from North America, the Belgian North Sea and Norwegian Barents Sea from Europe, and the Great Barrier Reef from Australia were selected.

Of the North America plans, the Massachusetts and Rhode Island plans are recognized within the ocean planning community for balancing multiple uses effectively, and both have been in place for at least three years. The Oregon plan pre-dates the others, but was developed piece-meal so there are few cross-sector tradeoffs to analyze. The Florida Keys National Marine Sanctuary includes ocean planning, but is a less balanced multi-use plan since environmental protection trumps all other uses. While perfect balance is not a strict requirement to using it as a model, the Massachusetts and Rhode Island plans provide superior options given their multi-use character.

Of the ten European plans, the Belgian North Sea and Norwegian Barents Sea plans are the longest established and have collected the most impact data. The Netherlands completed its North Sea Plan in 2005, but there is less data available on the plan's impacts. Germany completed plans for the North Sea, the Baltic Sea, and the three states on its northern coast in 2009, but less impact data are available than for the Belgian and Norwegian plans.

In Australia, the modern Great Barrier Reef plan dates to 2004 (building off of legislation in 1975 and original plans completed in 1988 and is the only Australian plan with full regulatory force. While it has been criticized for relying more on zoning than on strategic management [23], and preferences conservation over other uses, it demonstrates most of the qualities associated with ocean planning (e.g., considered multiple uses, was derived through an extensive planning process with considerable stakeholder input, and includes monitoring and enforcement).

3. Results

3.1. Economic results

3.1.1. New economic value created

The five plans studied in-depth likely created approximately $310 million in new economic value, mainly through offshore wind developments in Rhode Island and Belgium (Fig. 1).

Belgium's new offshore wind farms provide approximately $230 million in annual gross revenues [24]. Before the plan, offshore wind was opposed by local communities and a proposed project was supposedly derailed because it blocked coastal views. This not only created additional carbon emissions but also cost developers: up to $13 million for environmental assessments, site surveys, piloting, and more each time a permitting process failed [25]. In 2004, by contrast, Belgium's Master Plan successfully declared a wind energy development zone far from the coast, away from sensitive seafloors. When fully developed, the zone is expected to support 2400–3800 MW of installed wind capacity. Three of the zone's seven granted leases have already been developed [26].

Rhode Island's experience was similar. The 2010 Rhode Island plan pre-approved renewable energy zones, enabling two wind projects with expected annual gross revenues of $5–10 million and $50–100 million respectively [27]. Deepwater Wind, the developer of both projects, has now secured all the approvals for a five-turbine wind farm in state waters off Block Island. It plans to install up to 100 turbines (a project called Deepwater One) in federal waters covered by the Rhode Island plan. Rhode Island approved this project in under one year, cutting its permitting process down from nearly five years. According to multiple interviewees, it is quite likely these projects would not have happened without the plan, which simplified the regulatory process and included stakeholder outreach to all major parties likely to be affected. A very different scenario played out in federal waters near Cape Cod, where Cape Wind has attempted for fifteen years to build 130 turbines. While there are no public figures available, Cape Wind estimates it has spent more than $65 million so far working through the regulatory and legal challenges [28].

Although their economic impact on wind development is not yet clear, European plans have made permitting easier. In the Netherlands, the North Sea ocean plan cut the cost of offshore wind permits by two-thirds [29]. In Germany, the North Sea plan helped resolve conflicts between wind developers and other users, and wind farms are reported to now have an easier time during permitting [30].

Industries other than wind, such as seafloor cable developers, also saw value from ocean plans. For example, Comcast and NSTAR credit the Massachusetts ocean plan with helping their project to lay a new cable from Falmouth to Martha's Vineyard getting approved 12–24 months faster than expected [31]. Comcast received approval to file a single Environmental Impact Report in July, 2011, saving at least six months assuming it would have crossed the impact threshold regardless, according to experts with detailed knowledge