Ocean & Coastal Management 114 (2015) 116–128

Contents lists available at ScienceDirect

Ocean & Coastal Management

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

Marine conservation finance: The need for and scope of an emerging field

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ARTICLE INFO

Article history:
Received 17 November 2014
Received in revised form
15 June 2015
Accepted 22 June 2015
Available online 30 June 2015

Keywords:
Marine conservation
Conservation finance
Sustainable funding
Marine resource management
Conservation planning
Impact investing
Environmental externalities
Marine ecosystem services

ABSTRACT

The global oceans contribute to human wellbeing by providing marine ecosystem services, but the ability of the oceans to continue providing these services is jeopardised by anthropogenic impacts. There is a limit to marine conservation that has not been adequately addressed: finance. This paper reviews the state of marine conservation funding, identifies associated challenges, and recommends possible ways forward. We identify five challenges: 1) funding for marine conservation is inadequate in terms of the size, duration, and diversity of revenue, 2) finance mechanisms are under-developed and under-utilised, 3) finance is often disconnected from conservation planning, 4) the environmental side-effects of economic activity increase the gap in global conservation funding, and 5) few individuals and programmes specialise in marine conservation finance and integrate its disparate lines of thinking. We then propose five solutions: 1) financial strategies for marine conservation, 2) increased research on and development of finance mechanisms, 3) integration of financial planning into conservation planning, 4) engagement of businesses in reducing the gap in conservation funding for marine ecosystems, and 5) definition, focus, and specialists for the emerging field of marine conservation finance. Multi-sector and interdisciplinary collaboration is essential to reduce the marine conservation-funding gap and sustain marine ecosystem services.

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1. Introduction

The global oceans contribute to human wellbeing by providing marine ecosystem services including food, income, cultural services, recreation, carbon storage, and storm protection (Rashid et al., 2005; Baskett and Halpern, 2009; Palumbi et al., 2009; Lau, 2013; Börger et al., 2014; Werner et al., 2014). The ability of the oceans to continue providing these essential ecosystem services is in jeopardy due to anthropogenic impacts that include climate change, fishing pressures, coastal development, land-based pollution, and recreation (Worm et al., 2006; Halpern et al., 2008, 2012; Doney et al., 2012; Halpern et al., 2012). There are numerous approaches and tools being used to address these challenges, including but not limited to marine protected areas (MPAs), marine and climate policy, sustainable or green development, and fisheries management (Pikitch et al., 2004; Norse et al., 2005; Roff et al., 2011; Halpern, 2014; Ray and McCormick-Ray, 2014). Herein we use the inclusive term 'marine conservation initiatives' to refer to all initiatives for management, restoration, and sustainable use of marine resources.

Marine conservation initiatives are widespread globally, involving almost every country on earth (e.g., IUCN and UNEP-WCMC, 2013; CI, 2014; TNC, 2014; WCS, 2014; WWF, 2014). There are notable success stories about conservation objectives having been achieved and/or threats averted (Knowlton and Jackson, 2011). More often, however, there are stories of declines in marine resources, and consequential impacts on human wellbeing, despite monumental efforts (e.g., GBRMPA, 2014). The scientific literature abounds with factors that constrain the success of marine conservation initiatives. Examples include disjointed and inadequate ocean governance (Marian, 2012; Yen-Chiang, 2012; Aswani and Ruddle, 2013), conflicts between stakeholders (Pomeroy and Douvere, 2008; Kuei-Chao et al., 2013), and limited enforcement capacity (Monteiro et al., 2010). Yet there is an overarching limit to

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http://dx.doi.org/10.1016/j.ocecoaman.2015.06.021
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Table 1
Challenges and recommendations for marine conservation finance.

Section	Challenge	Section	Recommendation
2.1	Funding for marine conservation is inadequate in terms of the size, duration, and diversity of revenue streams.	3.1	Marine conservation initiatives need financial strategies.
2.2	Finance mechanisms for marine conservation are under-developed and under-utilised.	3.2	Increased research on and development of finance mechanisms for marine conservation are needed.
2.3	Finance is often disconnected from conservation planning.	3.3	Financial planning should be integrated into conservation planning, and involve key stakeholders.
2.4	The environmental side effects of economic activity increase the gap in global conservation funding.	3.4	Businesses need to be engaged to reduce the gap in conservation funding for marine ecosystems, with different approaches taken for different types of businesses.
2.5	While there are numerous interdisciplinary fields of practice and research that can contribute to marine conservation finance, few individuals and programmes specialise in this area.	3.5	The emerging field of marine conservation finance needs definition, focus, and specialists.

marine conservation that has not been adequately addressed in the literature or in practice: finance.

The aims of this paper are to review the state of marine conservation finance, investigate the challenges associated with funding marine conservation, understand the potential consequences of the marine conservation funding gap, and propose recommendations to address those problems. We begin by reviewing both the grey and scientific literature to identify five key challenges related to marine conservation finance (Table 1; Section 2). Next, we discuss strategies that have the potential to mitigate these challenges (Table 1; Section 3). We conclude in Section 4 by summarising the extent of the problem, the consequences for marine ecosystems and human wellbeing, and possible ways forward.

Among our intended audience are marine conservation scientists and practitioners. We draw from, but do not comprehensively review, diverse bodies of literature, including those in sustainable development, ecological economics, conservation planning, and marine ecology. Because of the interdisciplinary nature of this paper, many terms will hold different meanings to people in different disciplines. Accordingly, we try to use terms with the widest currency, and define them as they arise.

2. Challenges

2.1. Inadequacies in marine conservation finance

Funding for marine conservation finance is inadequate in three ways: the size, duration, and diversity of revenue streams.

2.1.1. Size

Fundamentally, at the macro scale, the need for conservation funding is a result of people consuming and damaging biodiversity and ecosystem services and not paying enough to restore, maintain, and manage those services (Buchanan, 1962; Braat and de Groot, 2012; Managi, 2012; Thampapillai and Sinden, 2013). The remaining financial burden is either taken on by others, notably philanthropists and governments (Evans et al., 2012; van Beukering et al., 2013), or ignored. The resultant gap between the economic costs of environmental degradation – estimated globally at $7.3 trillion USD per year and increasing (TEEB, 2013) – and the available global funding for biodiversity and ecosystem services – estimated between $36–38 billion USD per year (Parker and Cranford, 2010) and $51 billion USD per year (GCP 2012) – is the approximately $7 trillion annual gap in global conservation funding. This novel estimate is significantly greater than a recent estimate by Credit Suisse, World Wildlife Fund, and McKinsey and Company (2014) of $300 billion USD total global conservation funding gap.

While we could find no comprehensive estimate of the portion of this gap relevant to marine conservation, there is consensus among experts that chronic underfunding of marine conservation is a problem (Lennox, 2012). Conservation is underfunded everywhere (Parker and Cranford, 2010), but the gap is worse in the tropics (Balmford and Whitten, 2003) where many marine conservation activities are undertaken. The only global estimates of gaps in marine conservation funding that we could find are related to objectives for coverage of MPAs and 'rebuilding' marine fisheries, that is, restoring fish populations and achieving maximum sustainable yield from wild fisheries (Pitcher, 2001; Worm et al., 2009). To achieve the United Nations Convention on Biological Diversity target of 20% of the ocean in MPAs, management costs were estimated at between $4 and $8 billion USD per year (converted to 2014 USD; Balmford and Whitten, 2003), although this is likely to be an underestimate (Ban and Klein, 2009). Subsequently, estimated that achieving and effectively managing a 10% coverage of MPAs would likely cost between $3 and $8 billion USD per year. A large group of international experts wrote a letter to the New York Times in June 2015 which urges business and community leaders to create new funding mechanisms – including trust funds – for MPAs around the world in order to "secure this blue life support system."[1]

The cost to 'rebuild' fisheries includes, but is not limited to, fisheries buyouts (purchasing fishing quotas and/or fishing vessels), research and development for less harmful fishing gear and the purchase of that gear, more efficient infrastructure for seafood distribution, capacity building, and certification or marketing of sustainable seafood (Watson et al., 2002; Clark and Munro, 2005; Hilborn et al., 2005; Cunningham et al., 2009; Rangeley and Davies, 2012; EDF et al., 2014). In 2012, the cost to 'rebuild' global marine fisheries was estimated at $203 billion USD (Sumaila et al., 2012). (Ye et al., 2013) later estimated that one component of the cost to 'rebuild' fisheries – fisheries buyouts – would cost between $96 and $358 billion USD.

We could find no global estimates of the costs of other types of marine conservation initiatives, but estimates for local and regional initiatives are large. For example, an initiative to manage agricultural pollution for the Great Barrier Reef, Australia, has been allocated $200 million AUD over five years ($171 million USD; Brodie et al., 2012). As another example, the United States National Oceanic and Atmospheric Administration grants approximately $11 million USD annually, matched by nearly $5 million USD from other sources, for coral-reef conservation.[2] These programs should ideally be extended globally, at an unknown cost, and

[1] http://www.thetimes.co.uk/tto/opinion/letters/article4463022.ece, accessed 16 June 2015.
[2] http://coralreef.noaa.gov/.

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