



Are outcomes matching policy commitments in Australian marine conservation planning?



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ABSTRACT

Marine protected areas (MPAs) are believed to be an effective means of preserving marine biodiversity. Hence, MPAs have become the cornerstone of many national and international strategies for decelerating the loss of marine biodiversity. Australia has made strong international commitments to increase its coverage of MPAs through the principles of systematic conservation planning and, in the last 10 years, has rapidly expanded its MPA coverage using these principles. This paper assesses Australia's progress in achieving a key principle of systematic conservation planning—representation—which states that MPAs will include the full range of marine ecosystems. Australia's progress in achieving representation is measured nationally and within seven extensive commonwealth marine regions: the Great Barrier Reef Marine Park (rezoned in 2004), the South East Marine Regional Plan (2007), and the South West, North West, North, Temperate East and Coral Sea proposed plans (2011). State marine waters (within 3 nautical miles of the coast) are not considered. Results illustrate that, if the proposed marine plans are followed verbatim, Australia will protect just over 36% of its marine jurisdiction in MPAs and over 13% in “no-take” marine reserves. However, except for MPAs in the Great Barrier Reef, and the proposal for the Coral Sea marine park, the existing and proposed MPAs are far from representative. Importantly, only a small portion of the highest protection occurs on the continental shelf where activities potentially harmful to marine biodiversity are concentrated. Despite having a strong and long-standing commitment to the principles of systematic conservation planning, Australia is not achieving the fundamental requirement of representation across most of its marine jurisdiction. We conclude that a failure to set quantitative targets is restricting the achievement of representative marine protection in Australia. Consequently, the 2004 rezoning of the Great Barrier Reef remains a model to emulate, not only in other countries, but in other parts of Australia's marine waters.

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1. Introduction

Marine protected areas (MPAs) are recognised as important management tools for preserving marine biodiversity [1,2]. However, the small extent and biased distribution of the world's MPAs [3,4] have led to an increased interest in protecting a representative and adequate sample of the world's marine biodiversity [4]. Historically many MPAs were placed in an *ad hoc* manner [5–7]. Consequently, many regions have MPAs that are small, isolated and unrepresentative of the full suite of biodiversity [4,6]. Hence the move towards more systematic objectives that focus attention on representing biodiversity was a significant step towards protecting the oceans of the world. The protection of all biodiversity features is now a key objective in MPA designation

[3,8,9] and increasingly incorporated into international strategies for reducing biodiversity loss.

Increasing the representation of MPAs is an important goal of several international conventions. In 2002 the World Summit on Sustainable Development called for a representative global network of MPAs [10], while the Convention on Biodiversity established a target that ‘at least 10% of each of the world's marine and coastal ecological regions be effectively conserved by 2012 (now 2020)’ [11]. Many countries have become signatories to these agreements [12] and are thus committed to establishing MPA networks that protect all of their major marine ecosystems.

Like many countries, Australia has made strong international and national commitments to increase its MPA coverage using the principles of systematic conservation planning. Internationally, Australia is party to agreements under the Convention of Biological Diversity (1992), the Jakarta Mandate on Marine and Coastal Biological Diversity (1995), and the World Summit on Sustainable Development (2002). Nationally, Australia is also committed to

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creating a network of MPAs by 2012 under the Intergovernmental Agreement on the Environment [13]. Australia's policy framework, the National Representative System of Marine Protected Areas (NRSMPA), is the primary mechanism for meeting these international and national commitments.

The NRSMPA is an agreement between the commonwealth and all state and territory governments, containing guidelines that all governments must follow to achieve a national system of MPAs that is comprehensive, adequate and representative [14]. Comprehensive and representativeness (hereafter together referred to as representation) requires that the NRSMPA will include the full range of ecosystems and their diversity [14] across each of the bioregions delineated by the Integrated Marine and Coastal Regionalisation of Australia [15]. While adequacy as defined by the NRSMPA guidelines seeks to achieve enough protection to ensure the ecological viability and integrity of populations, species and communities [14].

The systematic planning principles of representation and adequacy are well established in the scientific literature e.g. [8,16,17], and involve a transparent process of setting clear goals and objectives and an explicit and transparent decision-making framework [16,18]. Although these systematic principles have been the basis for developing Australian conservation strategies for almost 20 years [19,20], no quantitative conservation objectives have been defined for Australian marine bioregions or other broadly defined marine features [21], despite such objectives being a core component of systematic conservation planning [16].

Recently Australia's Minister for Environment announced that the Commonwealth Government had met its commitment for the NRSMPA in commonwealth waters and aided in creating the "world's largest representative network of MPAs", "covering more than 1/3 of Australia's marine jurisdiction". However given that specific quantitative objectives were not used in the process (e.g. conserve $x\%$ of every bioregion), it is prudent to assess how representative this system of MPAs really is.

To measure representation of Australia's MPAs the national coverage of current and proposed MPAs across bioregions and bathymetric classes in Australian waters is first assessed. With more finely defined marine ecosystems, the progress in achieving representation in commonwealth waters without quantitative principles is compared. This paper focuses on commonwealth waters only as all commonwealth MPAs have either been designated or proposed. Using the Great Barrier Reef Marine Park, which used quantitative guiding principles [22], progress is compared in achieving representation to the other commonwealth marine regions that were not zoned with quantitative guiding principles (the South East, South West, North West, North, Temperate East and Coral Sea marine regional plans). As no performance measures for representation have been consistently defined within Australia, protection equality [23] was used to measure representation. This paper finishes with a discussion of the challenges for policy and science that will have to be faced for Australia, and indeed the rest of the world, in establishing networks of MPAs that meet systematic design principles.

2. Methods

2.1. Marine jurisdictions

Australian marine waters are split into two kinds of management jurisdictions: state/territory or commonwealth. The six states and the Northern Territory are responsible for waters out to three nautical miles from the coast, including coasts of inshore islands and two offshore islands: Lord Howe and Macquarie. The Commonwealth Government is responsible for waters between

three nautical miles from the coastline and the outer limits of Australia's Exclusive Economic Zone (EEZ), up to 200 nautical miles from the coast of the mainland and islands, depending on the proximity of neighbouring countries. Australia's marine jurisdiction (state and commonwealth) was obtained from Geosciences Australia [24].

The Commonwealth Government has divided its waters into six large marine regions (South East, South West, North West, North, Temperate East and the Coral Sea; Fig. 1) for planning purposes. New MPAs are selected within each region through a regional marine planning process under the Environmental Protection Biodiversity Conservation (EPBC) Act (1999). The Great Barrier Reef Marine Park is within state and commonwealth waters and is managed jointly by the federal agency known as the Great Barrier Reef Marine Park Authority (GBRMPA) and the Queensland Government. The rezoning of the Great Barrier Reef Marine Park in 2004 was determined by the Commonwealth Government and therefore the Great Barrier Reef is referred to as a commonwealth region for the purpose of this study.

Spatial data for the commonwealth marine regions (including the Great Barrier Reef Marine Park) was obtained from Discover Information Geographically (DIG) [25].

2.2. Marine protected areas

Australian MPAs have been assigned, wholly or partly, to one or more of the IUCN management criteria (I–VI) [26]. Generally, Australian MPAs in categories I and II have no extractive activities such as fishing or mining. MPAs in categories III–VI allow some forms of extractive use, with III allowing the least and VI allowing the most. Protection of marine biodiversity therefore decreases from categories I and II to category VI. The term "MPAs" is used to refer to areas in categories I–VI and "marine reserves" to refer to internal zones or whole MPAs in categories I and II. Marine reserves (IUCN I–II) are examined separately because they have been shown to be the most critical for safeguarding marine populations and increasing the sizes and biomass of commercially caught species [1,27]. They are thus an important component for assessing the representation of marine protection in Australian waters, especially when the value of other IUCN categories in protecting marine biodiversity is still not completely understood [28]. Spatial data for all designated MPAs in Australia were obtained from the Collaborative Australian Protected Area Database [29]. Data on proposed MPAs were obtained from Discover Information Geographically [30].

2.3. Data for national representation

State and commonwealth waters were used together to measure national representation of current and future MPAs. Marine bioregions identified through the Integrated Marine and Coastal Regionalisation of Australia (version 4) [15] were used to assess the representation of MPAs and marine reserves. Although marine bioregions are large, they are used to guide the implementation of the NRSMPA and are the only consistent marine classification across all jurisdictions in Australian waters. Marine bioregions have been delineated to be relatively homogeneous in terms of physical and biological characteristics, at least compared to the national marine jurisdiction as a whole. Thus areas within bioregions will tend to be more similar to one another than to areas in different bioregions.

Two types of marine bioregions have been identified in Australian waters: provincial and mesoscale. The 41 provincial bioregions cover Australia's marine jurisdiction from the coast to the boundary of the EEZ, including the offshore territories of Norfolk, Cocos (Keeling), Christmas, and Macquarie Islands

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