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Establishing a marine conservation baseline for the insular Caribbean

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ABSTRACT

Marine protected areas are a primary strategy for the conservation of marine habitats and species across the globe. In small island developing states, they often exceed their terrestrial counterparts in both number and area. To assess their effectiveness as a conservation measure over time, the accurate and up-to-date representation of marine protected areas through spatial and tabular data is imperative in order to establish baselines. Various regional and global agreements have set specific protection targets and these require spatial reporting on protected areas as an indicator of progress. For the insular Caribbean region, this study considers progress towards global Aichi Target 11 of the Convention on Biological Diversity which is to conserve at least 10% of coastal and marine areas, and progress towards the regional target of the Caribbean Challenge Initiative (CCI) to protect "at least 20% of nearshore marine and coastal habitats", both aiming for a 2020 deadline. Progress towards these targets differs widely depending on the accuracy of the datasets and the methods used. In an effort to update the current baseline of protection within the insular Caribbean, multiple governments, the Nature Conservancy and the Caribbean Marine Protected Area Management Network and Forum collaborated to develop a single insular Caribbean protected area dataset with accurate boundary information and the best available ecoregional and political boundaries. This study represents the most in-depth and spatially accurate effort to date to determine marine protected area coverage in the insular Caribbean. It is found that some form of marine management has been designated for around 7.1% of our study area in the insular Caribbean; progress towards Aichi Target 11 averaged among sovereign states within the insular Caribbean stands at approximately 3.25% and only three of the 10 participating governments in the CCI have reached their 20% target. Ocean protection was further assessed across the 25 governments and the three marine ecoregions by four different marine zones. Recommendations are made on regional to global cooperation for data sharing and reporting on indicators, highlighting possible directions to fill marine conservation gaps in the insular Caribbean.

1. Introduction

1.1. Background

The Caribbean is one of the world's most complex mosaics of marine and coastal habitats, comprising 10% of global coral reefs (26,000 km^2) [1]; 18% of global seagrass beds (66,000 km^2) [2]; and 12% of global mangrove forests (22,000 km^2) [3]. These highly diverse marine habitats provide ecosystem services, such as shoreline protection, and support livelihoods and economic activities, providing food security and underpinning tourism-based economies for the 43 million people living in the insular Caribbean. However, the health of these marine resources is rapidly deteriorating due to impacts such as unsustainable coastal development, overfishing, land-based and marine pollution, and climate change, threatening their ecological and economic value [1,4].

A variety of conservation mechanisms and strategies are available to resource managers to address the plethora of impacts on the insular Caribbean's marine ecosystems. Marine protected areas (MPAs) have gained increasing popularity as a strategy to conserve marine resources [5] and are typically implemented by civil society or through government action [6].

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1.2. Definitions

This study applies the IUCN protected areas categories and uses the International Union for Conservation of Nature (IUCN) definition of protected area as "a clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values" [7]. Marine protected area (MPA) was defined according to the IUCN as "any area of inter-tidal or sub-tidal terrain, together with its overlying water and associated flora, fauna, historical, and cultural features, which has been reserved by law or other effective means to protect part or all of the enclosed environment" [8]. Insular Caribbean MPAs are known by a variety of terms such as marine reserves, marine parks, marine managed areas, marine sanctuaries, fish sanctuaries, fisheries protection areas, environmental protection zones and protected seascapes, and this study includes these varying nomenclatures that share a common intent for marine protection.

1.3. Conservation targets

A key feature of Caribbean marine conservation has been the adoption of targets for protected area coverage. Globally, the Convention on Biological Diversity (CBD) has become the premier mechanism for setting MPA targets. In 2002, the Sixth Conference of the Parties of the CBD formalized the target by 2010 "to achieve a significant reduction of the current rate of biodiversity loss at the global, regional and national level as a contribution to poverty alleviation and to the benefit of all life on Earth" [9]. In the insular Caribbean, all governments except the United States of America are party to the CBD.

A number of reports on progress towards the achievement of MPA targets have been published [10–18]. Progressing slowly at a global scale, marine protection, at 3.4%, lags behind terrestrial protection at 15.4% [15]. In the Caribbean, regional reporting shows that MPA coverage is low when compared to global targets [10,11,15,19,20]. Consensus that the 2010 biodiversity targets had not been met led to Parties to the CBD adopting the Strategic Plan for Biodiversity and setting 20 new targets, named the Aichi Targets [21]. Of these, Target 11 states that "by 2020, at least 17% of terrestrial and inland water areas, and 10% of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscapes and seascapes" [22].

In the Caribbean, several national governments, donors and conservation organizations are seeking to accelerate regional progress towards biodiversity conservation through the endorsement of the Caribbean Challenge Initiative (CCI) that was launched in 2008 to build political support and generate long-term funding for marine conservation. At the CCI Summit of Political and Business Leaders in 2013, CCI participants declared the overarching goal "to support the conservation and sustainable use of biodiversity for the maintenance of critical ecosystem services provided by marine and coastal resources, that support livelihoods and the economic and social future of the countries and territories of the Caribbean through the Caribbean Challenge Initiative." The "20-by-20" goal seeks in each participating country and territory to effectively *conserve and manage at least 20% of the nearshore marine and coastal environment*. As of 2015, 10 governments have endorsed the Caribbean Challenge Initiative including The Bahamas, Dominican Republic, Jamaica, Puerto Rico, the United States Virgin Islands (USVI), the British Virgin Islands (BVI), Saint Kitts and Nevis, Saint Lucia, Grenada and Saint Vincent and the Grenadines [23].

1.4. Geographic scope of this study

This article reports on the status of coastal and marine protection in the insular Caribbean defined by 25 island governments and three marine ecoregions. The total study area (Fig. 1) includes the combined areas under national jurisdiction of the 25 island governments and the Bahamian, the Greater Antilles and the Eastern Caribbean marine ecoregions. This area encompasses the islands of the Lucayan Archipelago, the Greater Antilles and a majority of the Lesser Antilles stretching from the United States (US) and British Virgin Islands down to Grenada.

The relationship between MPA size and sovereignty was examined, with non-sovereign states being the dependent territories and/or integral overseas territories of the US (Puerto Rico and USVI), the United Kingdom (Anguilla, BVI, Cayman Islands, Montserrat and the Turks and Caicos Islands), France (Guadeloupe, Martinique, Saint Martin, Saint Barthélemy) and The Netherlands (Sint Maarten, Saba and Sint Eustatius only). The insular Caribbean's sovereign states were defined as large or small according to the common benchmark of 1.5 million people. The large sovereign states included in this study are Cuba, the Dominican Republic, Haiti and Jamaica. The small sovereign states include Antigua and Barbuda, The Bahamas, Barbados, Dominica, Grenada, Saint Lucia, Saint Kitts and Nevis, and Saint Vincent and the Grenadines. Population numbers were drawn from the 2012 Revision of the World Population Prospects of the United Nations.

2. Methods

Spatially explicit protected area datasets are at the foundation of reporting progress towards the achievement of MPA targets, enabling tracking of the extent to which marine resources are conserved. At the global level, MPAs have been mapped through the joint efforts of the United Nations Environment Programme's World Conservation Monitoring Centre (UNEP-WCMC) and the IUCN, which compiles global protected area information in the World Database on Protected Areas (WDPA). Stemming from the United Nations List of National Parks and Equivalent Reserves in 1962 (subsequently renamed the United Nations List of Protected Areas) the WDPA is the only comprehensive global inventory of the world's protected areas [7,14,24,25]. It is made-up of a mosaic of regional, national and sub-national datasets sourced from authoritative data providers responsible for the governance and management of protected areas in every country and across regional protected area conventions. The WDPA is used as the baseline dataset on protected areas for global analyses such as the UN Millennium Development Goals (MDGs) and biodiversity indicators of the CBD as well as in other assessments [10,19,26,15,17].

In the Caribbean, the first attempt to spatially document and create an inventory of MPAs was made at a workshop in 1988 hosted by the US National Oceanographic and Atmosphere Administration and the Organization of American States [27]. This provided the first official MPA baseline for the Caribbean. The Caribbean Marine Protected Area Management Network and Forum (CaMPAM) MPA Database was established in 2000 under the framework of the Caribbean Environment Programme of the United Nations Environment Programme and the Specially Protected Areas and Wildlife Protocol of the Cartagena Convention and is hosted online (http://campam.gcfi.org/CaribbeanMPA/CaribbeanMPA.php) by the Gulf and Caribbean Fisheries Institute. However, there was no regional coordination or maintenance of a geographic information system (GIS) database of Caribbean