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Marine conservation challenges in an era of economic crisis and geopolitical instability: The case of the Mediterranean Sea

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ABSTRACT

In the Mediterranean Sea, socio-economic drivers may accelerate the process of exclusive economic zone (EEZ) declarations. Despite the challenges, the EEZ declarations may provide important opportunities for leveraging change to national policy towards the development of large-scale conservation of marine ecosystems and biodiversity in this zone. Using the Mediterranean Sea as a case study, we aim to highlight a set of best practices that will maximize the potential for the development of large-scale marine conservation initiatives. These include a range of approaches, such as using surrogates to fill the many biodiversity data gaps in the region, further the development of consistent and open access databases, and the utilization of technological developments to improve monitoring, research and surveillance of less accessible and under-explored marine areas. The integration of Mediterranean-wide and local conservation efforts, the facilitation of transboundary collaboration, and the establishment of regional funds for conservation will further enhance opportunities for marine conservation in this region.

1. Introduction

1.1. Towards EEZ conservation planning

Spatial prioritization is challenging at large scales, especially when following an integrated approach that accounts for biodiversity features, threats to ecosystems, the feasibility of conservation actions and related costs [1,2]. While terrestrial conservation planning has rapidly advanced in recent decades, large-scale marine conservation prioritization, which includes socio-economic and political factors, remains challenging and underexplored. This is partially due to difficulties in obtaining data on the distribution of biodiversity and human activities, and the fact that many marine areas have an ambiguous jurisdictional status [3].

The right to establish an exclusive economic zone (EEZ) is considered to be one of the most important provisions of the United Nations Convention on the Law of the Sea (UNCLOS) (Table S1 a). EEZs are defined as marine areas extending up to 200 nautical miles from the baselines from which the breadth of the territorial sea is measured. Within an EEZ, the coastal state has sole exploitation rights over all natural resources, but also the responsibility for the conservation and management of the zone

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(Article 61 of UNCLOS). In many countries around the globe, the declaration of EEZ has catalyzed marine conservation efforts offering new wide-ranging opportunities (Table S2).

Several countries have established or are in the process of establishing conservation areas and networks of marine protected areas (MPAs) within their EEZs. Often this is set within a broader framework of marine spatial planning (Table S2). Marine spatial planning is the process of analyzing and allocating the spatiotemporal distribution of human activities to achieve specific ecological and socio-economic objectives. It has emerged as a tool for resolving inter-sectorial disputes over maritime space [4,5]. Conservation planning places emphasis on the protection of ecological features and processes, and the persistence of biodiversity and other natural values [6,7]. These two approaches have started to converge within an overarching framework of ecosystem-based marine spatial management [5,8,9], and may often overlap in practice (Table S2).

The main aim of this work is to analyze the challenges and the opportunities for EEZ-scale conservation within an ecosystem-based marine spatial management approach, focusing on the Mediterranean Sea as a case study.

1.2. The Mediterranean Sea: A model for the world's oceans

The effective protection of biodiversity requires that nature conservation targets are reconciled with social, economic, cultural, and political needs. One of the best case studies for building a framework for marine conservation planning in a complex geopolitical context is the Mediterranean Sea. This basin has been described as a miniature ocean that can serve as a mesocosm of the world's oceans in order to investigate the impacts of climate change and other natural processes [10,11]. This also applies for the socioeconomic and political context. The Mediterranean Sea is a semi-enclosed sea (2969,000 km^2) connecting three continents, surrounded by over 20 countries [12]. Inherent geopolitical complexity and the diversity of political, cultural, and legal systems have raised obstacles to marine conservation efforts, which are currently largely confined in coastal territorial waters [2,13–15].

In addition to the large diversity of species and habitats that the Mediterranean Sea hosts, there is wide variety of bathymetric and geological features, from shallow seagrass meadows and rocky reefs to deep trenches and hydrothermal vents [12,16–18]. Due to increasing levels of human use and the associated threats to biodiversity [19,20] (Fig. 1), the Mediterranean marine ecoregions are among the most impacted globally [21,22].

Despite many efforts for regional-scale conservation planning and increasing agreement on priority areas for conservation [23], the targets set by the convention for biological diversity are far from being achieved in the Mediterranean. Existing MPAs currently cover only about 4.6% of the region, with merely 0.1% under strict protection or designated as no-take reserves [14] and under-representation of off-shore areas [13].

The inherent geopolitical complexity and disputes over marine borders and jurisdictions (Fig. 2; Table S3) have raised obstacles to EEZ declarations and marine conservation efforts offshore in the Mediterranean. However, many of the drivers for EEZ declaration will expedite the process in the near future (see Section 2). This situation poses challenges to large-scale conservation planning in the EEZs of this region. Conversely, this could be a unique opportunity for the development of a coordinated regional conservation effort.

The Mediterranean Sea is unique in the fact that once all countries declare their respective EEZs there will be no 'High Seas'. This will make the EEZ a basic administrative unit for marine spatial planning and marine conservation [24]. Consequently, the legal obligation to protect biodiversity and manage marine resources within an EEZ will provide an unprecedented opportunity to expand the spatial scale of conservation planning in the Mediterranean. Concurrently, there will be an opportunity to improve international coordination and integrate conservation efforts. The offshore areas of the region face reduced threats compared to the coastal areas, yet at the same time they include several biodiversity hotspots (Figs. 1 and 3).

2. Drivers for EEZ declaration in the Mediterranean

The relevant legal instruments applicable at global, regional, and European level (Table S1a and Table S1b) provide a wide-range of regulatory frameworks for environmental protection in the Mediterranean Sea. However, important legal instruments, such as UNCLOS, have not yet been signed and ratified by all Mediterranean states (Table S1a), while the level of application of these instruments varies widely among parties. A broad range of EEZ boundaries, ecological zones, and fisheries zones further complicate the situation. Some countries have a large number of potential EEZ boundaries [15], which suggests that successful conservation actions may depend on transboundary collaboration [25], the resolution of geopolitical or socio-economic conflicts, or mutual exploitation [26]. Overall, there are over a dozen marine border disputes in the Mediterranean Sea (Fig. 2; Table S3) that complicate the declaration of EEZs. In some instances these have led to military crises, such as the case of the Imia/Kardak conflict between Greece and Turkey in 1996 (Table S3).

However, multiple drivers for the acceleration of the EEZ declarations have recently emerged. These drivers, acting independently or synergistically, have forced multi-lateral discussions and negotiations, and even unilateral decisions by some countries to declare their EEZ.

Vital economic and political interests of States to secure marine resources can lead directly to the declaration of an EEZ. Coastal states located within geopolitically unstable regions may have greater incentives to secure independent energy resources (Box S1 in Suppl. material). The recent European sovereign debt crisis has severely struck the EU Mediterranean countries leading to a series of austerity measures and tough bailout programs [27]. In their struggle to recover from the crisis many governments are looking at fossil fuel reserves to reduce energy costs. In Greece the prospect of offshore gas and oil reserves in the Aegean and Ionian Seas are heralded by many politicians as the future 'El Dorado' that will save the country from bankruptcy. Similarly, the exploitation of hydrocarbon resources is closely linked to the recovery of the Cypriot economy. A direct result of this was that Cyprus and Egypt signed an agreement on their EEZs in 2003 [28]. Later Cyprus and Israel also agreed on the borders of their EEZs and to cooperate in the discovery and exploitation of joint hydrocarbon resources.

Ever progressing drilling technologies, dwindling shallow reservoirs, together with a rise in oil prices and demand for natural gas, encourage the hydrocarbon industry to explore and drill ever deeper [29]. Most of the large hydrocarbon discoveries in the eastern Mediterranean are within EEZs and in some cases on the border between countries (e.g. Israel and Cyprus). Plans for development are also being discussed in Western Mediterranean, e.g. in Spain. The viability of offshore drilling in the Mediterranean Sea is liable to speed up the process of EEZ declaration (Box S1 in Suppl. material).

3. Challenges and concerns for EEZ-scale conservation

The declaration of an EEZ brings a series of challenges and concerns for large-scale conservation efforts. The most important ones are highlighted below.