



An overview of the management policy for marine sand mining in Israeli Mediterranean shallow waters



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ABSTRACT

In Israel, the ever-increasing interest in mining and dumping of marine sand in the shallow waters of the Mediterranean (up to depth of 30 m) on the one hand, and the growing concern for the marine environment on the other, have led to the formulation of various policy tools intended for the rational management of this resource. However, the comprehensiveness and sustainability of this policy, and its adherence to international obligations and customs, remains unclear.

This paper provides a structured overview of the management policy governing the extraction and dumping of marine sand in the Israeli Mediterranean shallow waters, and the way environmental values are being taken into account in the regulatory process. It then examines the way in which two main international policies—UNCLOS (not yet ratified by Israel) and the protocol on ICZM (ratified by Israel), which provide principles and standards for the management of environmental risks associated with marine mining activities in the Mediterranean Sea—are transposed into local legal procedures and regulatory requirements.

The study reveals that the Israeli marine sand regulatory framework embraced most of the environmental principles and guidelines laid down in the main international conventions. However, several essential issues still need to be addressed. At present, the use of marine sand is usually managed with one key activity in mind, without an all-encompassing policy and monitoring program. As a result, the impact of cumulative effect of extracting and dumping activities (the “big picture”) is overlooked. The study recommends to formulate a sound policy that can be adjusted for social/economic developments as they occur, and can facilitate the response to a wide range of future scenarios while adhering to a sustainability agenda. This policy should be based on up-to-date and standardized data gathered through a national monitoring program and stored in an accessible database. The analysis method and results can form a basis for discussion with other experts working in the field, and may be useful for future management decisions and for other coastal regions in the world.

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1. Introduction

Marine sand resources are used in the modern era for many purposes, such as land reclamation (e.g., for building/extension of ports), industry, protection and restoration of coastal areas and wetlands, and nourishment of recreational beaches to compensate for sand loss in areas susceptible to erosion (Drucker et al., 2004; Gubbay, 2005). Since the 1980s, the increasing demand and inefficient management of seabed mining, including of marine sand, have led several countries to allocate substantial funds for marine

studies, and to regulate and provide guidelines and procedures to mitigate the potential environmental damage from these activities (Cayocca and Du Gardin, 2003; Vivian, 2003; Drucker et al., 2004; Birklund and Wijsman, 2005; Gubbay, 2005; Marine Mineral Services, 2006; UNEP, 2014; Uścińowicz et al., 2014). To date, however, only a fraction of the sea has been scientifically studied and there is a dearth of conceptually sound analytical studies for estimating environmental damage resulting from marine sand extraction (Phua et al., 2004; UNEP, 2014); hence, limited information exists on which sound management decisions can be based. Nonetheless, given the nature, scale, and location of proposed seabed sand extraction activities, serious and, in some cases, widespread negative impacts on habitats and marine life can

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reasonably be expected. Therefore, marine sand management may be improved by studies that shed light on extraction policies aimed at reducing negative impacts and increasing social benefits. In assessing possible policies, it is appropriate to consider what can be learned from the development and implementation of regulatory frameworks in other countries, in similar contexts.

In Israel, marine sand deposits situated on the continental shelf of the country's coastal waters in the Mediterranean Sea (CWMS) represent a valuable resource, which is allocated mainly for building and extension of ports, and for ongoing and future beach nourishment and coastline protection programs. During the past two decades, both public and regulatory authorities in Israel have increased their focus on sustainable management of coastal and marine resources generally, including marine sand. In the context of offshore sand extraction and dumping on the continental shelf in the CWMS, this trajectory manifests itself, explicitly and implicitly, in various decisions, policy papers, regulations, guidelines, procedures, and planning instructions. Yet, the comprehensiveness and sustainability of the regulatory framework for the management of these activities is not clear. The ever-increasing demand for marine resources in the CWMS on the one hand, and the growing concern for the marine environment, on the other, underscore the need for better understanding of the current policy for seabed sand mining and its adherence to international requirements.

This study was conducted in response to the need to understand the policy for marine sand management in Israel. The paper focuses on sand situated in the shallow waters (up to a depth of 30 m) along the continental shelf in the CWMS, and discusses the institutional frameworks within which the extraction and dumping activities take place. The main objective of this paper is to provide a structured overview of laws, policies, plans, and regulations concerning shallow marine sand mining in Israel and the way environmental values are being taken into account in the regulatory process. The fundamental question addressed herein concerns the degree of comprehensiveness and sustainability of the current management policy. The detailed study goals are as follows:

- a) to review and analyze the current regulatory framework applicable to shallow marine sand in CWMS, including context-specific seabed extraction/dumping measures to mitigate negative ecological effects; and
- b) to examine the adherence of the Israeli shallow marine sand extraction/dumping regulations and activities to the environmental management principles required by the 1982 United Nations Convention on the Law of the Sea (UNCLOS), and by the 2008 Protocol on Integrated Coastal Zone Management (ICZM), from the 1978 Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean (Barcelona Convention).

2. Seabed sand mining

2.1. Definitions

"Seabed mining" is defined as the commercial recovery of minerals (including sand) at or below the seabed surface (Conwell, 1976). Seabed mining is variously referred to as sea-based mining, seafloor mining, offshore marine mining, shallow-water mining, shallow marine mining, mid-water mining, deep-water mining, and deep sea mining. The mining activity is also variously referred to as extraction, excavation, or dredging. The different names reflect a spectrum of activities that differ in methods of mineral mining and in the depth or geographic location at which mining is undertaken. In this paper, when referring to all sand mining

activities in the shallow marine area (up to a depth of 30 m), "seabed sand mining" and the following synonyms will be used: seabed sand extraction, marine sand mining/extraction, offshore sand mining/extraction, and shallow marine sand mining/extraction.

2.2. Brief history of seabed sand mining

The reduction of historic landside sources of sand has led to a corresponding move toward mining the continental shelf to meet the growing demand for this resource (Rona, 2002, 2008; Littleboy and Boughen, 2007; Parr, 2008). In the 1970s, the mineral potential of the seabed was widely discussed; the industry grew throughout the 1980s and then stalled in the 1990s (Cook, 1974; Conwell, 1976; Clark and Clark, 1986; Littleboy and Boughen, 2007). The stalling was largely due to questions about sea mineral rights, lack of cost-effective enabling technology, low market prices for minerals of interest, the existence of unexploited ore bodies on land that could be exploited with new technologies, uncertainty about environmental impacts, difficulty of internalizing mining externalities, inefficiency of management policies, and the absence of a strong "social license to operate" in the seabed environment (Earney, 2005; Littleboy and Boughen, 2007; Rosenbaum, 2011). Many of these factors and issues remain relevant or unresolved. However, in light of the current resurgent interest in seabed sand mining and the expected continuation and escalation of offshore sand mining, several companies and countries are pursuing dedicated research and programs of technological innovation (Littleboy and Boughen, 2007; Schroder, 2010; Van Dover, 2011; Epa, 2012).

2.3. Impacts of seabed sand mining

Compared to land-based mining, seabed sand mining is relatively novel, technically innovative, and constrained by limited information on the actual or potential impacts on the marine environment, on other marine resource industries, and on methods for managing these impacts.

Most serious physical and biological impacts of marine sand extraction/dumping are related to substratum removal; alteration of the bottom topography and sediment composition; changes in depth and current strength; modification of hydrologic conditions; burial of productive habitats during beach nourishment or other shoreline stabilization activities; release of harmful or toxic materials either in association with actual mining or from incidental or accidental releases from machinery and materials used for mining, and the creation of plumes through disturbance by the drag head and from screening (De Groot, 1986; Krautkraemer, 1998; Newell et al., 1998, 2004; Hacking, 2003; Allsopp et al., 2013; Uscinowicz et al., 2014). Next to the indirect physical effects of sand extraction on the macrofaunal community, the direct removal of species and individuals is considered as the main biological impact. Dredging causes an initial reduction in abundance, species diversity, and biomass of the benthic community in the extraction area (Pearce, 1994; Desprez, 2000; Sardá et al., 2000; Van Dalfsen and Essink, 2001; Newell et al., 2004; Sanchez-Moyano et al., 2004; Desprez et al., 2010; Krause et al., 2010).

2.4. The demand for marine sand in Israel

The Israeli shoreline along the Mediterranean Sea extends 197 km from the border with Lebanon in the north to the border with Gaza Strip in the south. Israel's marine space contains three zones, the definitions of which are excerpted from the 1982 United Nations Convention on the Law of the Sea (UNCLOS): (a) the coastal (territorial/sovereign) waters, which extend to a distance of 12

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