Ocean & Coastal Management 104 (2015) 159-169

Contents lists available at ScienceDirect

Ocean & Coastal Management

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

The role of environmental impact assessment in protecting coastal and marine environments in rapidly developing islands: The case of Bahrain, Arabian Gulf

Humood A. Naser

Department of Biology, College of Science, University of Bahrain, P.O. Box: 32038, Bahrain

ARTICLE INFO

Article history: Received 26 July 2014 Received in revised form 10 November 2014 Accepted 8 December 2014 Available online 19 December 2014

Keywords: Environmental impact assessment Coastal development Dredging Reclamation Bahrain

ABSTRACT

Bahrain, a group of islands, is facing several environmental challenges, including degradation of coastal and marine environments due to intensive dredging and reclamation activities. Presently, reclamation activities have resulted in adding around 110 km² representing an increase of 14% of the total land area of Bahrain. Recognizing the role of Environmental Impact Assessment (EIA) in protecting environment from degradation and pollution associated with coastal developments, Bahrain formally adopted EIA in its environmental system in 1998. The present study investigated the practice and effectiveness of EIA in protecting coastal and marine environments in Bahrain by reviewing selected EIA reports and soliciting views of EIA experts, consultants, academics and other relevant bodies. Shortcomings in environmental and ecological assessment practices related to coastal and marine developments were recognized and constrains that restrict the effectiveness of EIA in protecting coastal and marine and were identified. Maintaining a sustainable use of coastal and marine natural resources in Bahrain requires measures to holistically address the interactions among the several dredging and reclamation projects and their additive and cumulative impacts. This could be achieved through enhancing the current practice of EIA process and adopting Strategic Environmental Assessment (SEA) for dredging and reclamation activities.

© 2014 Elsevier Ltd. All rights reserved.

1. Introduction

The Arabian Gulf is a semi-enclosed sea situated in the subtropical zone and characterized by marked fluctuations in sea temperatures and high salinities. Flora and fauna species in the Arabian Gulf inhabit one of the harshest marine environments due to natural stressors represented by higher levels of salinity and temperature, and more recently lower levels of pH (Uddin et al., 2012). Marine organisms in the Arabian Gulf are living close to the limits of their environmental tolerance (Sheppard et al., 2012).

Despite extreme climatic conditions, the Arabian Gulf supports a range of coastal and marine habitats such as mangrove swamps, seagrass beds, coral reefs, and mud and sand flats (Naser, 2014). However, these ecosystems are under ever-increasing pressure from anthropogenic activities that are associated with the rapid economic, social and industrial developments in the Arabian Gulf countries. Reclamation and dredging, industrial and sewage

effluents, hypersaline water discharges from desalination plants, and oil pollution are examples of anthropogenic stressors that contribute to environmental degradation in the Arabian Gulf, which is classified among the highest anthropogenically impacted regions in the world (Halpern et al., 2008). These threats warrant the designation of the Arabian Gulf, which constitutes part of the Arabian Sea Ecoregion, as "critically endangered" by the International Union for the Conservation of Nature (IUCN) and the World Wildlife Fund (WWF) (http://wwf.panda.org).

Coastal and marine environments in the Arabian Gulf are the prime target for most of the major housing, recreational, and economic developments. Coastal developments along the Arabian Gulf have accelerated at an unprecedented rate in the past decade to accommodate large-scale projects, including artificial islands, waterfront cities, ports and marinas. Consequently, the coasts of the Arabian Gulf are undergoing rapid construction activities that often associated with intensive dredging and reclamation (Naser, 2014). It is currently estimated that more than 40% of the coasts of the Arabian Gulf have been developed (Hamza and Munawar, 2009).





CrossMark

E-mail addresses: hnaser@uob.edu.bh, humood.naser@gmail.com.

The Kingdom of Bahrain is an archipelago composed of 40 islands in addition to several islets, shoals and patches of reefs located in the Arabian Gulf (Fig. 1) between latitude $25^{\circ} 32'$ and $26^{\circ} 20'$ north and longitude $50^{\circ} 20'$ and $50^{\circ} 50'$ east. The total land area of Bahrain in 2012 is about 777 km². With over than one million inhabitants (ClO, 2012), Bahrain is among the highest population densities in the world.

Like most of islands countries, Bahrain is facing several environmental challenges (Douglas, 2006), including degradation of coastal and marine environment due to various sources of anthropogenic activities. Nonetheless, the major environmental challenge for Bahraini coastal and marine environments is the increasing demand for urban infrastructures to sustain commercial, industrial, residential, and tourism developmental projects (Naser, 2010). Consequently, coastal reclamation is regularly carried out in Bahrain to meet the demand of rapid coastal developments.

The increasing rate of land reclamation has contributed significantly to the deterioration of marine habitats and resources, including coral, seagrass and mangrove ecosystems as well as fishing industry. Signs of environmental degradation in several ecosystems in Bahrain have been reported. Zainal et al. (1993) reported a loss of 10.2 km² of seagrass beds on the east coast of Bahrain detected by remote sensing imagery between the period of 1985 and 1992. Similarly, the same study recorded a loss of 218,700 m² of corals in Fasht Al-adhm (the largest reef in Bahrain). These losses were mainly attributed to dredging and reclamation activities and increasing levels of sedimentation and pollution. The marine area of Tubli Bay, which hosts the last remaining mangroves in Bahrain, has been reduced from to 25 to 12 km² in 2008 due to intensive reclamation activities. These activities significantly destroyed mangrove stands and reduced their spatial distribution to 0.31 km² (Abido et al., 2011).

According to the Central Informatics Organization in Bahrain, reclamation activities have resulted in adding around 110 km² representing an increase of 14% of the total land area of Bahrain in 1963 (667 km²). Reclamation has been more marked in Muharraq; the second main island in Bahrain. The total land area of this island

has increased from 13 km² in 1951 to 56 km² in 2008 (Modara et al., 2014). The escalation of reclamation activities has resulted in altering more than 80% of the Bahraini coastlines (Fuller, 2005). It is likely that reclamation will accelerate in the coming decades in order to secure land for large-scale projects as population in Bahrain continues to grow. This is reflected in the Bahraini National Land Use Strategy 2030, which recognizes reclamation as the major option for securing the future needs for land (Naser, 2011).

Large-scale dredging and reclamation activities may affect both integrity and productivity of several coastal and marine ecosystems, which include seagrass beds, mangroves, coral reefs, and muddy shores. These ecosystems are considered Valued Ecosystem Components (VECs) because they provide important ecological, economic, cultural and aesthetic goods and services (Jenson and Bourgeron, 2001).

There are several potential physical, chemical and biological impacts on valued ecosystem components in coastal and marine environments that are associated with dredging and reclamation activities. The removal and deposit of marine sediment may lead to changes in topography and bathymetry, alterations of tidal currents and sediment transport pathways, and increases in suspended sediment concentration, organic material, heavy metals and other pollutants (Tillin et al., 2011).

Removal and destruction of habitats due to dredging and reclamation may reduce abundance, diversity and biomass of benthic organisms, degrade coral reef and seagrass ecosystems due to sediment runoff and turbidity (Erftemeijer and Lewis, 2006; Erftemeijer et al., 2012), and lead to the loss of spawning grounds, nursery and feeding areas for fish, crustaceans and waders (Doorn-Groen and Stephanie, 2007).

Environmental Impact Assessment (EIA) is considered a standard tool for decision-making in most countries throughout the world. EIA aims at integrating environmental considerations in the decision-making system, avoiding or minimizing adverse impacts, protecting natural systems and their ecological processes, and implementing principles of sustainable developments (Noble, 2012).



Fig. 1. A map showing the location of the Kingdom of Bahrain within the Arabian Gulf.

Download English Version:

https://daneshyari.com/en/article/1723536

Download Persian Version:

https://daneshyari.com/article/1723536

Daneshyari.com