



ELSEVIER

Contents lists available at ScienceDirect

## Ocean Engineering

journal homepage: [www.elsevier.com/locate/oceaneng](http://www.elsevier.com/locate/oceaneng)

# Environmental site selection for oil jetty using the analytical network process method case study: Boushehr, Iran



Mansoureh Hasanzadeh <sup>a,1</sup>, Afshin Daneshkar <sup>b,\*</sup>

<sup>a</sup> Ports & Maritime Organization of Iran (Bushehr), Ports and Coasts Engineering Department, Karaj, Iran

<sup>b</sup> Faculty of Agricultural & Natural Resources, University of Tehran, P.O.Box:4111, Karaj, Iran

## ARTICLE INFO

## Article history:

Received 7 November 2012

Accepted 2 November 2013

Available online 25 December 2013

## Keywords:

Environmental site selection

Oil jetty

Analytical Network Process

Iran

## ABSTRACT

Large amounts of oil pollution are being released to marine and coastal ecosystem and destroying these natural resources daily. So, what is the real scientific and applicable solution for this global disaster? This paper is focused on oil jetties and terminals site selection studies as a stepping stone for preventing this problem and keeping coastal regions safe from this pollution. In fact, it shows how Analytical Network Process (ANP) can be used for finding a logical spatial prioritization which has more consistency to environment. This is the first time that the Analytical Network Process method is applied for this subject. First of all, four spatial alternatives were selected in Boushehr (the Persian Gulf coast lines). Then BOCR values were calculated through “Overall Factor” processes. The necessary criteria were also classified in BOCR merits and were used to compare the alternatives. The results identified Negin Island as the best site for oil jetty’s geographical location. Monitoring observations of study area admitted the priority which was extracted from the ANP method. Therefore ANP can be used for environmental planning and environmental site selection of oil jetties which is supposed as the best solution for mitigating oil pollution of coastal area.

© 2013 Published by Elsevier Ltd.

## 1. Introduction

The high rate of land change has been increased greatly over last decades, as human populations continue to grow and migrate (Alig et al., 2004; Theobald, 2005). Urbanization growth rate has caused the aggregation of different types of industries in urban areas which are allocated to preparing human needs. These factors force mankind to occupy and alter natural land covers to manmade ones and consequently release their solid and water wastes to earth resources. As there are complex interactions and feedbacks between the direct manifestations of human activities and their diverse ecological consequences, across a range of interacting spatial and temporal scales (Grimm et al., 2008), these processes have reduced natural ecological capabilities in all resources. Coastal ecosystems have a different vulnerability among these resources, and then are exposed to more anthropogenic effects. In this case, land uses which cause more hazardous pollution such as oil and petroleum industries are known as the first sources responsible for these problems. One of these industries is oil port and jetties which receive, store and distribute all types of oil products. Ignoring health and environment rules and non-standard site selection of these coastal constructions

(Hasanzadeh and Daneshkar, 2011), disposing waste waters from tankers and oil ports, and leakage of oil products during maritime transmission (Port and Maritime Organization of Iran, 2013) have made oil jetties as a critical source of coastal and marine ecosystem destruction during last few years. Our literature reviews have not shown any specific and scientific research about coastal construction or oil jetties environmental site selection. But we can find some basic factors which seem very important in site surveying of these terminals. Oil jetties are one of the fixed backshore coastal constructions (Haver, 2008) that are affected by all social, economic, political, geotechnical and environmental conditions (Richards et al., 2009). Some other criteria such as seismic features, berthing area, energy and environmental risks (PIANC, 2007), depth, bathymetry, hydrologic indexes, water height and water pollution (Alfred, 2005) can be remarked as more necessary ones. Deputy of Fishing Ports Department (1992) has addressed sedimentation, near shore circulation, long shore currents, littoral drift, population density, and job opportunities as more important. On the other hand, Healy et al. (2002) showed that benthic fauna, waves, depth and socio-economic conditions should be used in these researches.

Boushehr Township is one of these areas which does not have any spatial oil jetty, while it is considered as the most important center for oil products production and distribution in Iran and the Persian Gulf region. This encouraged us to perform an environmental oil jetty site selection through the Analytical Network Process (ANP) method for the first time. This method is Multi

\* Corresponding author. Tel.: +98 912 3094 861.

E-mail addresses: [m.hasanzadeh2@yahoo.com](mailto:m.hasanzadeh2@yahoo.com) (M. Hasanzadeh), [danehkar@nrf.ut.ac.ir](mailto:danehkar@nrf.ut.ac.ir) (A. Daneshkar).

<sup>1</sup> Tel.: +98 9362772921.

Criteria Decision Making (MCDM) (Ozkan and Banar, 2010), a flexible and comprehensive technique that captures the effects of dependencies between all factors in every case (Saaty, 1996), and helps decision makers to chose the best solution for their problem

(Saaty, 2004; Khan and Faisal, 2007). Therefore, in the case of coastal management and oil jetty site selection, which due to their complicated environment have a multilateral management, we applied this method's capability.

## 2. Application of Analytical Network Process (ANP)

### 2.1. Alternatives selection

Boushehr Harbor, which is located in south of Iran, as the most important center of oil products distribution in the Persian Gulf region, does not have any independent jetty with the necessary safety and technical equipments. Therefore, the reception of oil products from tankers, transmission through pipe lines to current oil storage, and loading by other vehicles to destinations have led to different oil pollution in the study area. Then four initial spatial alternatives were chosen in these areas to be compared for finding the best site for constructing an oil jetty. As site surveying of coastal oil jetties was studied in this research, all coastal lines of Boushehr Township were investigated by land use map, satellite images and field surveying for selecting the appropriate sites. These alternatives, Negin Island, Shiff Island, Lashkari and Bandargah, were selected with respect to our goal.

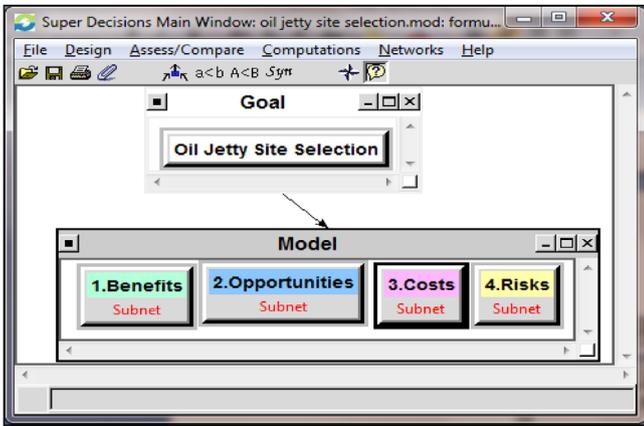


Fig. 1. Modeling Goal-BOCR network in Super Decision software.

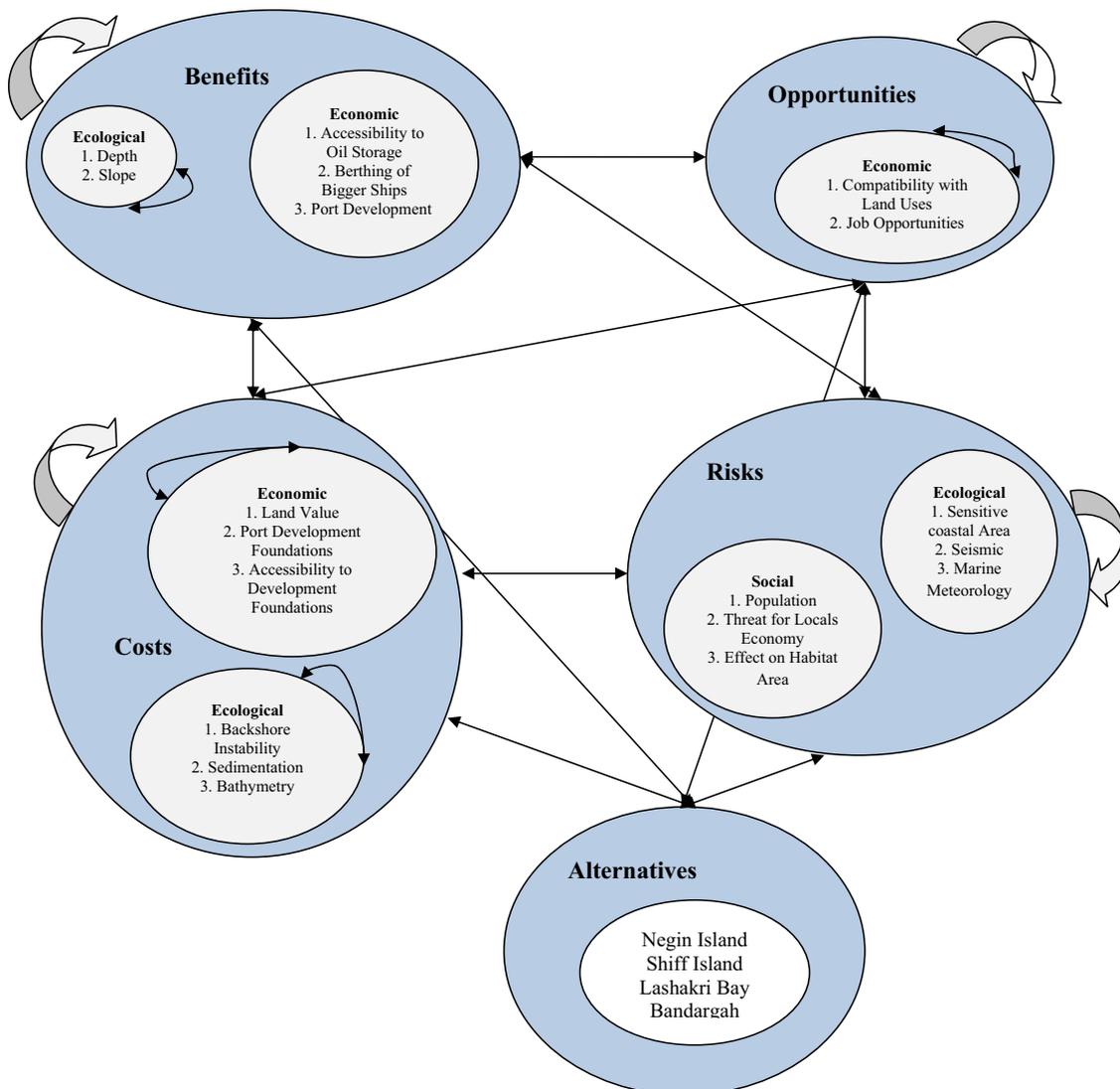


Fig. 2. BOCR structure, control criteria and sub criteria and reciprocal relations.

Download English Version:

<https://daneshyari.com/en/article/1725855>

Download Persian Version:

<https://daneshyari.com/article/1725855>

[Daneshyari.com](https://daneshyari.com)