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## **GIS-BASED APPROACH FOR ENVIRONMENTAL SENSITIVITY INDEX ASSESSMENT OF COASTAL AREAS TO OIL SPILLS**

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### **INTRODUCTION**

New discoveries of giants oil sources in caspian sea by margin countries and problems related to the time of extraction and transportation of oil such as, leak of oil by extraction, leakage from transportation pipes, accidents of oil transporters, have lots of irrecoverable environmental effects such as, damage of human health, death of sea birds and other aquatic, pollution of ports and coastal promenades, and decrease of welfare.

A sensitive sea area needs to be supported by international sea organizations, because of its importance of ecologic, public, scientific, economic aspects and its vulnerable toward the maritime activities [1].

It is very important to present some methods for development and domestication of Caspian Sea coastal areas where would have a lot of oil pollution in the future and there was not any movements for identification of sensitive coastal areas till now [2,3].

### **MATERIALS AND METHODS**

#### **Data collection**

In this paper, first according to the past experiences and experts ideas, the coastal line is divided to appropriate distances. Then the necessary data related to any areas is added. The necessary data are:

- Human criteria: historical, ancient, economic, tourism places, and ...
- Ecological criteria: importance of ecological and variety of aquatics and sea birds, sensitivity toward oil spills, and ...
- Hydrodynamic criteria: sea streams, waves, wind, and ...
- Morphologic and coastal condition criteria: cliff, sand, gravel, and ...[4].

#### **Giving weight and Calculate the overall sensitivity of each area**

After identification of sensitivity criteria, arrangement, and consideration of their effects, it is necessary to account the quantity of mentioned criterions. In order to identify the sensitivity of an area, this procedure is necessary:

- Allocating a weight factor to any mentioned criteria according to their importance
- Ranking of parts related to any mentioned criteria according to their sensitivity against the effects of oil spill.
- Multiplying of these assigned value to weighting factor and creating a numerical data called priority index
- Adding of priority indexes and accounting of total sensitivity for any areas [4].

In order to create a weight factor, there are different methods. In this investigation, two methods AHP, and fuzzy AHP are used and compared. After creating the weight factors, layers are produced by GIS software [5].

### **Combining the layers in GIS**

In this step, according to the available parameters and their traits, consideration of available models from all aspects and the methods of their performances on different parameters, and the precision of them, an appropriate model is selected for combining of layers, Index models in this case are: boolean logic model, index compiling model and fuzzy logic model. These models are used for combining the layers together [5].

Finally, the results of the model are presented as environmental sensitivity maps for any areas.

### **Results**

The environmental sensitivity model related to oil pollution and the sensitivity identification maps are used by experts to identify the endangered resources. By ranking the areas, they can perform the clearing procedures and preserve the more sensitive areas in a short period. In this paper, comparison of different methods of weighting factor creation and combining of layer are performed by GIS software.

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