Application of spatial multi criteria evaluation with AHP method for coastal sensitivity assessment

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1- INTRODUCTION

A Sensitivity Sea Area (SSA) is an area that needs special protection because of its significance for recognized ecological, socio-economic, or scientific reasons and which may be vulnerable to damage by human activities (DOE/MEC, 2002). Assessing the sensitivity of coasts is in fact assessment of the extraordinary biological richness of the coasts away from polluting sources with the specified and pre-determined standards and criteria. The goal of going through the process of assessing sensitivity of coastal zone of Boushehr Province is to realize the capability of the province coasts to select the areas that should be covered by protection program in the coastal region of the country.

2- MATERIAL

The area subject of study in this research is the coastal zone of Boushehr Province, one of the southern provinces of Iran with 744.49 kilometers coastline at the northern parts of Persian Gulf.

Limited of study:

- **In Land**
  - Back shore (set back line)

- **In sea**
  - Depth line of 10 meters

3- METHOD

Regarding presentation of a linear mathematical model for the weights given to assess the sensitivity of the area, it was first necessary to select sensitivity assessment parameters in a suitable and scientific method; therefore, based on accumulating parameters used in Iran and the world and by considering special conditions of the area and using the traditional Delphi method- as one of the known procedures of Fuzzy theory, questionnaires named the questionnaire for surveying the views of specialists were paneled and finalized and the work of identifying major and minor parameters were done in form of the criteria for assessing the potential sensitivity and the criteria for measuring actual vulnerability. These parameters were identified in 50 controlled points. Then, by using the analytic hierarchical process (AHP) and using EC software, the procedure was amended and based on the needs, the priority were checked and the coefficients of parameters importance were calculated.

4- RESULTS

Based on the method, the criteria determined to assess the sensitivity of the area and with the goal of protection, consisted seven major parameters, 22 minor first degree parameters and 25 second degree minor parameters and the criteria determined to assess the vulnerability the area with the goal of knowing the polluting and threatening sources, consisting 10 major parameters and 25 first grade minor parameters.

The matrices of parameters duplicate comparisons as completed by the specialists were inputted to EC software after final summation of the views so the coefficient of criteria importance could be calculated based on the geometrical mean average method and the priorities would be known.

$$C_{SM} = K(0.044\text{CU} + 0.319\text{CH} + 0.157\text{SA} + 0.319\text{OG} + 0.128\text{RW} + 0.095\text{GA} + 0.045\text{SE} + 0.034\text{FE} + 0.033\text{FP} + 0.052\text{CP} + 0.042\text{PC})$$

$$K(0.217\text{IN} + 0.021\text{AG} + 0.319\text{OG} + 0.128\text{RW} + 0.217\text{IN} + 0.021\text{AG} + 0.319\text{OG} + 0.128\text{RW} + 0.095\text{GA} + 0.045\text{SE} + 0.034\text{FE} + 0.033\text{FP} + 0.052\text{CP} + 0.042\text{PC})$$

Where:

- **C**: Coastal Marine
- **CU**: Coastal Literature
- **CH**: Coastal Health
- **SA**: Shallows
- **OG**: Oceanic Geology
- **RW**: River Watershed
- **GA**: Geographical of Chile Sea Sources
- **SE**: Shellfishes
- **FE**: Fishery Eeeks
- **FP**: Commercial Ports
- **CP**: Pollution of Coastal Water
- **PC**: Pollution of Coastal Water

The model was employed for layers by using Arcmap software. The expansion map of positive indices (fig 2) that shows intrinsic sensitivity of the area was obtained once and the second time, the negative indices expansion map (fig 3) that shows the polluting sources and actual vulnerability of the area was obtained. The potential sensitive layer of the area was deducted from the expansion of critical areas map and was then cut in the limits of subject of study. The classification was performed based on deviation procedure from the score criteria of each cell in order to define the rare environmental areas in four levels: too high, high, average and low while the areas with high, average and low vulnerability were specified so by administrating and managing those areas, least damage could occur to the sensibly environmental areas (fig 4).

5- CONCLUSION

According to figure 4, sensitivity zones in the environment were observed in the coasts of the townships of Kanghan and Davar, as well as in the boundaries of the South Pars oil operation activities. But, in view of the fact, that these areas are located next to expanding threatening factors, and because of them, these areas have broken off and separated from each other, forming isolated islands. Because of these factors, these areas cannot be considered as acceptable protected areas, and can only be considered as environmental monitoring stations. As far as it can be foreseen in the future, the aforementioned areas cannot achieve the values that this study has identified for them, because of economical development factors. It is obvious that drawing up environmental quality standards, especially in regard to the discharge of effluents into the coastal waters, the quality of the air and sound control can be examples of priority actions.

REFERENCE