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GIS-BASED FUZZY MULTI-CRITERIA DECISION MAKING MODEL FOR COASTAL AQUACULTURE SITE SELECTION

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Abstract

The first step for scientific and sustainable aquaculture development is appropriate site selection, and the success or failure of any aquaculture development largely depends on the right selection of the site. Due to favorable climatic conditions, suitable water quality, soil high natural productivity and space availability, the long southern coastline of Iran is regarded as highly suitable for aquaculture development. Site selection can be viewed as a multi-criteria decision making (MCDM) problem. The analytical hierarchy process (AHP) method has been widely used to solve MCDM problems. However, the conventional AHP method is inefficient in handling the inherent uncertainty and imprecision embedded in the pairwise comparison procedure. To overcome this problem, the AHP method can be combined with fuzzy set theory to provide flexibility in making judgments and decisions.
In this paper, a structured GIS-based fuzzy MCDM model is applied through combining the concepts of fuzzy set theory, hierarchical structure analysis, and the AHP method, for the selection of the site to shrimp farm in the coastal area of Hormozgan, Iran. To create the model, important criteria for site selection are determined, and thematic maps are developed in GIS. Then, the criteria are weighted and scored. The layers are combined, and final suitability maps are prepared. After performing the combination models, the results of fuzzy model and weighted linear combination (WLC) model are presented. The paper shows that the applied method is an effective method to evaluate suitable sites for shrimp farming development.

Key words: AHP, aquaculture site selection, fuzzy AHP, GIS, MCDM

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