

*Application of Multi Criteria Decision Making for Site Selection of Artemia Farming in Arid Region Using Saline Water (Case Study: Siah Kouh Playa, Yazd)*

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**Extended Abstract**

**Introduction**

The major threat to habitability of a region may be degradation of arid lands, particularly in developing countries where many people depend upon restricted resources for their livelihood. Although land degradation process in arid regions (desertification) is not new or site specific, the environmental awareness in a world board scale has extended and generated a wider public interest, extensive to the scientific circles and governments. Desertification affects the livelihoods of millions of people, including a considerable proportion of the poor in arid lands which occupies about 41% of the Earth's land and are home to more than two billion people. The persistence of unresolved stabilization of these fragile environments and a substantial decrease in ecosystem services as a result of intensive use of resources, incapacity of wide spread suitable technologies for providing increased supply of food, forage and fuel, water scarcity, and climate change all made desertification as one of the main environmental challenges today and a major limitation to meet human needs. Recently, arid regions and desert ecosystems with several potential and various resources such as unconventional water became remarkable areas for economic projects. With desert condition and in order to guarantee both rich and sustainability and prevent undesirable consequences of these economic projects, it is essential to address suitable areas for aquaculture in any aquaculture activities. In the case of suitable site selection research, the researchers apply MultiCriteria Evaluation (MCE) in Geographical Information Systems (GIS) to determine suitable sites for aquaculture in Iran.

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Therefore, this study was conducted to identify suitable sites for *Artemia* farming development in SiahKouh Playa, Yazd, using Multi Criteria Decision Making (MCDM).

### **Materials and Methods**

The method is based on Analytical Hierarchy Process (AHP) as one of the multi-criteria decision making methods. Analytical Hierarchy Process usually includes three phase: first, the decomposition of a complex problem into a decision hierarchy in order to determine the main components of the problem, second the evaluation of options (comparative judgment) by means of a pairwise comparison, which enables the decision maker to assess the contribution of each criterion to the overall goal, and finally the synthesis of the priorities so as to identify the relative preferences for the selected policy options. One of the major advantages of this method is that it considers the interrelations among different levels of decision as well as the interconnection of the decisions in one level. After the decision makers groups are determined, the most important criteria effective in determination of suitable areas in the study area were identified through comparison questionnaires filled by the experts and researchers. The second questionnaire was designed to determine the rate of each criterion to choose the best alternative. The thematic layers of slope, geology, geomorphology, soil, vegetation, climate, hydrometry, land use, power lines and management quality indices are the main data required to determine the suitable areas for *Artemia* farming. These layers were extracted and manipulated from the available topographic, geologic maps, aerial photographs and field survey data analyses. Spatial analyst function in ArcGIS 9.2 software was used for matching of the thematic layers and evaluating the aquaculture indices.

### **Results and Discussion**

The results of this research showed that three main factors are effective to determine the suitable areas for aquaculture units in desert ecosystem. These factors according to their importance are environmental, technical, and infrastructure, socio-economic conditions. The environmental criteria were included geomorphological faces and rangeland areas. The indices in the technical criteria were slope percentage, soil texture, unconventional water resources and climatic elements such as evaporation, rainfall and temperature. The indices in the infrastructure, socio-economic criteria were based on distance to cities, roads and power sources and also land use. Finally, those criteria and indices were applied to address the optimal areas for *Artemia* farming by using weighted linear combination assessment. In the final result of this study, suitability levels were determined as suitable areas (the areas with high potential, located east and eastern south of study area) and non- suitable areas.

### **Conclusion**

It can be concluded that the best choice among three alternatives is the geomorphological landforms as assessment and monitoring unit of other criteria in arid and desert ecosystems. Application of multi criteria analysis methods will also help the planners make better decisions and choose effective alternatives.