Assessment of The Jaz_Murian Desertification Hazard Using ESAs and IMDPA Models

Hamzeh Ahmadi[1], Yahya Esmaeilpour[*2], Abbas Yasser Mohammadi[3], Hamid Gholami[4]

Extended Abstract

Introduction: Desertification, the process of land degradation in arid semi-arid and sub humid areas, is one of the most complex environmental and socio-economical threatening events. Global desertification has serious implications for biodiversity, environmental safety, poverty eradication, socioeconomic stability and sustainable development around the world. The most suitable method for determining the severity of desertification hazard is the use of empirical models. To evaluate desertification, various studies have been carried out both inside and outside the country, which has led to the provision of many regional models, including ESAs and IMDPA models. In the Jaz_Murian basin, the presence of natural constraints along with the lack of suitable economic and cultural infrastructures has led to excessive utilization of natural resources and has exacerbated secondary problems such as migration and poverty.

In addition, in recent years, the Jaz_Murian wetland has been wrecked and the desertification signs are intensifying in the region, so that the studied area has been identified as one of the centers of refuge in Iran. Therefore, the purpose of this study is to use IMDPA and ESAs desertification hazard models to assess the hazard of desertification.

Research Methodology: The studied area is located in Kerman and Sistan and Baluchestan provinces with coordinates 33 26 to 36 29 north latitudes and 16 56 to 26 61 east and 69374 square kilometers. In this study, according to Jaz_Murian province conditions, studies of two ESAs and IMDPA models were used to assess

1. PhD. Candidate, Department of Natural Resources, Faculty of Agriculture and Natural Resources, University of Hormozgan
2. Assistant Professor, Department of Natural Resources, Faculty of Agriculture and Natural Resources, University of Hormozgan, Corresponding Author y.esmaeilpour@hormozgan.ac.ir
3. Assistant Professor, Department of Geography, Faculty of Humanities, University of Hormozgan
4. Assistant Professor, Department of Natural Resources, Faculty of Agriculture and Natural Resources, University of Hormozgan.
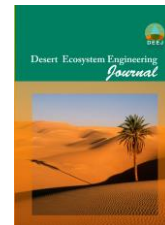
the hazard of desertification. Five criteria were used to assess the hazard using the IMDPA model. Each criterion consists of indicators that according to its effect on desertification and according to the region conditions, weighted from 1 to 4. Finally, based on the average of the indicators, a map of each criterion was obtained. Based on the weighted average of the criteria map, the IMDPA model for the desertification hazard map was prepared for Jaz_murian. The ESAs model also uses a mathematical method similar to that of IMDPA. In the ESA model, three soil criteria, vegetation and climate were used. The range of scores for model indicators is 1 to 2. Finally, desertification hazard maps were obtained using two models. Here Q1 is indicative of water and climate components, Q2 the geology and geo-morphology, Q3 the ground cover and geo-morphology and Q4 the societal aspect.

Results: Geomorphic facies were used to assess the hazard of desertification using IMDPA and ESAs desertification models. The Jaz_murian area consists of twelve facies; the upper facies of the highest mountains with the highest 1837679.51 hectares (26.3%) were Jaz_Murian. Desertification models were evaluated in each of the geomorphic facies and finally the desertification hazard class was obtained for each facies. The results of the study of the hazard map of desertification with the IMDPA model showed that Jaz_Murian province consists of three classes I, II and III of desertification, with the lowest class with 52.22% of the area's area has the highest area. 19.46 percent of the area is in severe desertification. Based on the ESA model, the Jaz_Murian area was divided into four classes (No effect, potential, fragile and critical) and seven subclasses (N, P, F1, F2, F3, C1, C2). Among the classes, the sub-class F2 (29.68%) of the region had the highest surface area.

Discussion and conclusion: The results of this study showed that, based on the IMDPA model, the majority of the study area (52.22 percent) is at low risk class (I). The ESAs model also divides the area into four classes of desertification risk that the fragile class having the largest area. Soil and vegetation criteria in both IMDPA and ESAs are the most effective factors in desertification of Jaz_murian area. Flood plain units have been identified as the most critical part of the region due to heavy clay, clay and drainage, with the highest ESAI (ESAI = 1. 53), which requires more attention. The sand dune workshop with a value of 1.52 is next due to the depth of the soil and the lack of vegetation, and requires management arrangements in this area. The results of the two models show that the ESAs model is efficient in the Jaz_Murian area versus the IMDPA model. Finally, it is suggested using ESA model to propose appropriate management plans to control desertification.