

Assessing Desertification hazards in North Khorasan province Via MICD and IMDPA Models

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Extended Abstract

Introduction: As a manifestation of land degradation, desertification is regarded as one of the natural hazards that is spreading rapidly due to human interference in and misuse of nature. There are many challenges caused by this phenomenon in most regions of Iran throughout recent years including the loss of fertile lands, reduction of forest populations, biomass of rangeland and fertile plain, decrease of aquifer water level, decline of water quality, poverty, and migration.

Materials and methods: North Khorasan Province with an area of 28182 square kilometers is located in northeast of Iran. A considerable part of the province has been suffering from reduced tolerance due to significant land use changes, vegetation degradation, and deforestation. The region is highly vulnerable to desertification because of environmental pressure and extreme equilibrium changes. However, few studies have been conducted so far on desertification mapping and the identification of its main factors in the province. This study, therefore, sought to identify the main destruction criteria in the province, providing a map and assessing the hazards of desertification through the two Iranian MICD and IMDPA models. To end this, the required data including aerial photos, topographic maps, *etc.* were collected at the first stage. Having converted the collected data to appropriate formats, the initial maps of slope, aspect, DEM, land use, and land units were extracted. As for the assessment of desertification hazards, IMDPA and MICD models were applied, in each of which the desertification criteria were identified and scored. Moreover, the severity of

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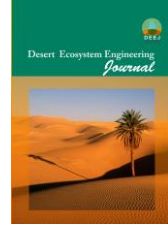
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desertification of each land unit and that of the whole area were determined by the two models. Finally, the present desertification map of the area was obtained through the abovementioned methods.

Results: According to the intensity map of desertification hazard extracted from the IMDPA model, the average numerical value of desertification intensity in North Khorasan province was reported as being 2.67, indicating the moderate to severe desertification hazard class in most parts of the province. Based on the model, effective criteria in desertification included climate (3.2), erosion (2.76), agriculture (2.9), geology (2.2) vegetation (2.8) and soil (2.3) respectively. The results of the study showed that based on the MICD model, 80 percent of the province's regions faced with moderate to severe desertification hazards.

Conclusion and Discussion: Northern Khorasan province includes several species affected by special environmental conditions and two vegetation regions of Iran i.e. Turonian and Hirkani. Land Use Intensive changes and vegetation destruction precipitate the desertification in this region. It results in increasing the risk of flood, decreasing groundwater levels, salinization, poverty and migration of inhabitants. As found by the study, desertification criteria were classified in the following order: climate (3.2), agriculture (2.9), vegetation (2.8), erosion (2.76), soil (2.3) and geology (2/2). Therefore, the climatic factor with the value of 3.2, low rainfall, and potential evapotranspiration indicators (more than 70%) could be regarded as the main factor in increasing the desertification intensity of the region. Moreover, it was found that the destruction of agriculture and vegetation which represents direct human intervention in the environment and resources, was, after the climate, the second highest influential factor on the severity of the desertification of the region, accounting for the excessive exploitation especially in rangelands (in the form of excessive gravel and picking plants). The ecosystems, being subject to overgrazing, constant land use changes, exploitation, and degradation are, according to results derived from the application of both two major models mentioned on vulnerable ecosystems in the province, located in the rangeland landscape. Thus, in addition to being highly vulnerable, they reduce the production of forage and medicinal plants and turn into desert lands. Land use changes in forest ecosystems and their transformation into agricultural lands have played a significant role in changing the face of these ecosystems in recent years. These changes have increased flood conditions at different levels, risking the inhabitants of the area being flooded after every rainfall. Considering the inherent potential of desert ecosystems, high erosion which reflects the low soil capacity against erosion could accelerates salinity, drought and, consequently, degradation of vegetation. Maintaining balance of livestock and pasture, administering some other methods for exploiting the pasture including planting medicinal herbs, beekeeping, ecotourism development, floodwater spreading (which maintains the economic conditions of local communities and preserves vegetation) and controlling flood are regarded as the managerial priorities in the province. Considering the importance of the multi-dimensional phenomenon of desertification in the region, it is, therefore, suggested that preparing the strategic plan for risk management of desertification of the province and introducing appropriate, conservative, aggressive and competitive strategies for various conditions could be an important step forward toward improving the vegetation of rangelands, increasing forage production, controlling water and soil erosion, controlling water and soil, controlling flood and damages, feeding and strengthening groundwater resources, improving environmental conditions of the areas, and managing the drought consequences.

Keywords: Desertification Hazard, IMDPA Model, MICD Model, North Khorasan.