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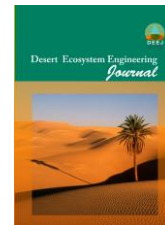
Application of TOPSIS algorithm in order to identify the most suitable plant species to form Nebkhas for stabilizing sand particles (Case study: Samad-Abad, Sarakhs, Iran)

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Abstract

Environmental crisis and the consequent loss of natural resources are the main reasons which force managers to pursue methods to manage risks and solve environmental tensions. This study was conducted in Samad-Abad as a center of wind erosion located in the southern part of Sarakhs region, Islamic Republic of Iran, near the Turkmenistan border and the Tajan River. Following field investigations and satellite imagery analysis, the study area was determined. Using 6 transects (3 upwind and 3 leeward), each 100 m long, we measured nebkhas' morphometric characteristics (including height, length & volume) and plant characteristics (including height, perimeter & volume). Fourteen nebkhas were analyzed for each species (*Stipagrostis*, *Alhagi* and *Peganum*). In a comparative analysis of nebkhas associated with *Stipagrostis*, *Peganum* and *Alhagi* using TOPSIS model, the final weight was calculated as 0.434, 0.521 and 0.055 for *Alhagi*, *Peganum* and *Stipagrostis*, respectively. Therefore, as clearly explained by the TOPSIS model, *Peganum* is revealed to be the most suitable plant species for stabilizing moving particles in the region followed by *Alhagi* and *Stipagrostis*. Regarding nebkhas' morphometric characteristics and plant morphological features as the input criteria for AHP model, the results showed *Peganum* to be the most suitable species for stabilizing moving sands followed by *Alhagi* and *Stipagrostis*. *Stipagrostis* nebkhas, with an average weight of 0.073, showed the least efficiency and desirability. Therefore, it was concluded that the observed result was due to this species' undesirable morphological traits compared with the two others species in the study. Consequently, developing the landscape cover by this species is not advised.

Keywords: Sarakhs, Nebkhas, TOPSIS algorithm, stabilizing sand, Samad-Abad.

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