The Comparative Analysis of Ecogeomorphology Properties of Sirjan and Shahr–e Babak Nebkas

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Extended Abstract

Introduction
Nebkhas stabilized aeolian landforms in arid and semiarid areas which have been formed due to the deposition of sediments around trees, shrubs and bushes (Cooke et al, 2006:61). In addition to the wind pattern, sand resources and other natural factors like topography, rainfall and depth of the groundwater play a role in the formation and development of this landform (Melton, 1940: 113; Kocurek and Lancaster, 1999: 506, Wang et al, 2006: 129, wang et al, 2010: 698). These geomorphic landforms develop well in areas in which wind energy is low (Wang et al., 2008: 363; Lang et al., 2013: 346) and one usually observed as an appropriate index of earth destruction and the condition of the environment in an area (Gile, 1975: 322; Tengberg and Chen 1998: 183; Wang et al. 2006: 131). Due to their important role in stabilizing the environment of areas, these phonemes have been noticed by the researchers (Du et al., 2010: 712).

Materials and Methods
The analysis of nebkha began with specifying the targeted areas for study through the picture of Google earth software. In the first place, in March 2015 in a 400*500 areas five transects on the targeted areas was taken troughs GPS each of which was 500 meters with the distance between them being 100 meters. Then, morphometric properties like: height, length, width, the wind-faced slope, the wind-beaked slope, height at the hill, diameter and height at the crest and height at the plants at 51 Nebkhas located in Sirjan transects and 55 Nebkhas located in Shahr-e Babak transects were measured. In the next stage, in each area one Nebkha was selected for sampling and after digging a vertical profile on the Nebkha four sediment samples with specified distance were taken. The samples were then taken to laboratory and analyzed by GRADISTAT4.0 software. Afterwards, descriptive statistics and regression analysis at the morphometric data at the Nebkhas was provided through SPSS. Although, to specify the speed and orientation at the wind, the orientation and speed of the weather station of Sirjan and Shahr-e Babak for 26 years were investigated and the Wind rose plots were drawn in WRPot software. In the next stage to measure the groundwater level and their relations to Nebkha changes, the piezometric data at 70 wells in Sirjan and 61 wells in Shahr-e Babak was collected and the degree of water change for 10 years from 2001-2011 was examined. Finally, the development patterns of Nebkha in Sirjan and Shahr-e Babak was drawn based on the field studies, measurement of groundwater and the evaluation through each Nebkha goes in the course at its formation. The comparative analysis of Eco morphology properties of Sirjan and Shahr-e Babak Nebkas was presented.

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**Discussion and Results**

The results indicate that there is a significant relationship between most of the morphometric components of Nebkhas. The analysis shows that all the Nebkhas in the two investigated areas are formed around Tamarisc shrubs. The analysis of the wind rose plots along with the specific direction of the Nebkhas revealed that the major winds which have led to the creation of Nebkhas have a southwest and west direction in Sirjan and a southwest direction in Shahr-e Babak. The investigation of the sediments of Sirjan Nebkhas showed that all their sediments, except for a single period (the period in which the sediments have deposited) are sandy-Silty, like the sediments at the Shahr-e Babak Nebkas. The change detection of groundwaters indicates that the amount of reduction around Nebkhas in both areas is 2.5-3.0 meters. In addition to the analysis of groundwater, field studies demonstrate the presence of too many dead Nebkhas and the death of the vegetation of most of Shahr-e Babak Nebkhas. But in Sirjan, thanks to the existence of enough sand resources, gradual increase of wind speed and the suitable level of groundwater have set the conditions for the development of Nebkhas. Overall that Sirjan Nebkhas are in the growth stage while Shahr-e Babak Nebkhas are in the destruction stage.

**Conclusions**

The existence of significant relationship between most of the morphometric properties of Nebkhas shows that by having exact and enough data these geomorphic shapes can be modeled with a high level of accuracy. The results indicate that the destruction of Shahr-e Babak Nebkhas and transition from the growth to the destruction stage has resulted from limitations in water resources and if the sources of sand supply were limited or the wind speed decreased, instead of being in the destruction stage the Nebkhas should have been in the stability stage. Overall it can be concluded that considering the significance of Nebkhas in stabilizing the environment of deserts, one of the required measures to be taken in the domain of Desert greening of transport areas (the areas where the Nebkhas were created) is the identification of the developmental stages of the Nebkhas so that exact planning can be carried out.

**Keywords:** Nebkha, Tamarix macatensis, Groundwater, Sirjan, Shahr-e Babak.
References