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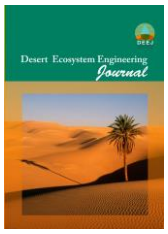

Evaluating Drought Effects on Soil Properties and Plant Species Diversity of Amiodendron Persicum Reserve in Haji Abad Rangelands, South Khorasan

Moslem Rostampour[1]*, Mohammad Saghari[2]

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Extended Abstract

Introduction: Lack of rainfall and the subsequent drought could lead to changes in rangeland ecosystems. Monitoring rangelands to distinguish climate change from management is considered as one of the favorite research areas among range experts. Several studies have so far conducted on the effects of drought on vegetation in rangelands whose results indicate that vegetation and species density are strongly affected by drought. For instance, Zhang et al (2016) investigated the drought events in China over the period 1982–2012 and examined the impacts of droughts on vegetation productivity. The findings of his study showed that vegetation productivity was significantly influenced by droughts, and that the effects of drought on vegetation productivity varied with vegetation type. It was also found that from among major vegetation types, grasslands displayed the greatest sensitivity to droughts. However, the impact of climate change on biodiversity indicators has been underresearched. In fact, the problem of biodiversity response to changing microhabitat conditions has not been fully elucidated (Jastrzębska et al, 2009). Therefore, *Ammodendron persicum* reserve was selected for an investigation of trend change of soil physical and chemical properties and plant biodiversity inn response to climate change.

Materials and Methods: Having studied the region's climate and annual rainfall, soil and vegetation sampling was done at a specified time and place in wet (2007) and dry (2018) years based on Standardized Precipitation Index (SPI), taking a specific framework into account0. Inside the reserve, three points were selected as the known sites, digging 10 soil profiles 100 cm deep in the places that had already been determined. Physical and chemical properties such as soil texture, EC, pH, Organic matters, lime, and soil saturation were identified at the soil laboratory. In order to determine the plot size, a minimal area method was used for sampling. In each plot, a list of plant species, density, the percentage of canopy cover, stone and gravel, bare ground and litter were recorded. As for setting the range condition and its trend, four-factor and scale methods were used (Moghadam, 2009). The total vegetation, litter, soil, rock cover, species density and biodiversity indices such as total richness, average richness, Shannon-Wiener diversity index and Simpson

1. Assistant professor, Faculty of Natural Resources and Environment, University of Birjand, Corresponding author, rostampour@birjand.ac.ir
2. Assistant professor, Faculty of Natural Resources and Environment, University of Birjand
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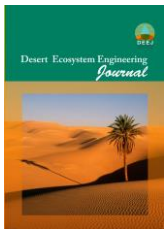

dominance index, were also estimated. Furthermore, physical and chemical properties of soil, vegetation cover percentage, and the number of individuals, richness and diversity of two years were compared by the t-test.

Results: The results of the study indicated that after 11 years, the amount of sand, silt and pH increased and clay, electrical conductivity and soil moisture content decreased significantly. Soil texture had also changed from loamy sand to fine sand. It was found that *Amiodendron persicum* reserve was changed from the hydrologic group B to the hydrologic group A because of drought. Moreover, differences of density, total richness and Shannon-Wiener and Simpson dominance indices were significant at 0.05 and 0.01 between 2007 and 2018. Also, the percentage of vegetation and rock cover, species density, total richness and species diversity showed a significant decrease, and the range condition changed from moderate to poor. However, there was no change in the soil organic material, lime, litter, and bare soil percentage.

Discussion and Conclusion: The soil and vegetation of the study area have undergone some changes due to wind erosion and the recent 10-year drought, the first of which seems to be the change in soil texture. Actually, the soil texture has changed from loamy sand in 2007 (as wet) to fine sand in 2018 (as a drought). In a similar vein, Zhao et al. (2006) investigated the effects of desertification on soil and crop growth properties in Horqin sandy cropland in Inner Mongolia, north China, concluding that wind Erosion increased soil pH from 8.66 to 8.92, and that soil clay and average soil moisture decreased by 59.6% and 51.8% respectively. The findings of our study suggested also a slow change in the percentage of litter, soil organic matter, and lime, and that drought, except for the average number of species in the plot (average species richness), had a significant effect on other biodiversity indices including the total richness, species diversity, and species dominance, resulting in a decrease in the number of species (total richness). Furthermore, the shannon-weiner diversity index was found between 2007 and 2018. It could be argued that the area has barely been covered by annual and seasonal species due to drought, and there are perennial species such as *Ammodendron persicum* and *Stipagrostis pennata* in most sampling plots, leading to an increase in the dominance of Simpson index in 2018.

Keywords: Climate Change, Soil Characteristics, Vegetation, Species Diversity, *Amiodendron persicum*.