Biodiversity enhances ecosystems global drylands: researchers

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An international team of researchers including Dr. Bertrand Boeken of the Jacob Blaustein Institutes for Desert Research at Ben-Gurion University of the Negev suggest in a new study that plant biodiversity preservation is crucial to buffer negative effects of climate change and desertification in drylands.

The study titled, "Plant species richness and ecosystem multi-functionality in global drylands", published in the journal *Science* is the outcome of a five-year research effort involving more than 50 researchers from 30 institutions in 15 different countries, including Dr. Boeken of the BGU Jacob Blaustein Institutes for Desert Research. Dr. Boeken and Dr. Eli Zaady of the Gilat Research Center, the Volcani Institute - Agriculture Research Organization contributed research data from two long-term ecological research sites in the northern Negev.

The results of this study indicate that the ability of ecosystems in drylands worldwide to maintain multiple functions, such as carbon storage and buildup of nutrient pools (multi-functionality) is enhanced by the number of perennial plant species, mainly shrubs and dwarf-shrubs, whereas increased average annual temperature reduces this ability.

While small-scale controlled experiments have provided evidence of the positive relationship between biodiversity and multi-functionality over the years, this study is the first in explicitly evaluating such relationship among real ecosystems at a global scale.

The fieldwork of this study was carried out in 224 dryland ecosystems from all continents except Antarctica, where direct measurements of plant diversity and other biotic and abiotic features of the ecosystem were taken. To assess ecosystem multi-functionality, researchers assessed more than 2,600 soil samples for 14 ecosystem functions related to carbon, nitrogen and phosphorus cycling and storage.

The functions measured deliver some of the fundamental supporting and regulating ecosystem services (e.g. soil fertility and climate regulation), and are also used to identify the onset of desertification processes.

Drylands constitute some of the largest terrestrial biomes, collectively covering 41 percent of earth's land surface and supporting over 38 percent of the global human population. They are of paramount importance for biodiversity, host many endemic plant and animal species, and include about 20 percent of the major centers of global plant diversity and over 30 percent of the designated endemic bird areas. However, dryland ecosystems are also highly vulnerable to global environmental change and desertification. "This study provides empirical evidence on the importance of biodiversity to maintain and improve ecosystem multi-functionality in drylands.

Dr. Boeken says, "Our results also suggest that the increase in average annual temperature predicted by climate change models will reduce the ability of dryland ecosystems to perform multiple functions, which are crucial to support life on earth. Plant biodiversity enhances this ability, therefore, maintaining and restoring it can contribute to mitigating the negative consequences of global warming and to promoting the resistance of natural ecosystems to desertification."

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