

Perennial vegetation, an indicator of desertification in Spain

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In this image is a Murcian landscape of dryness. Credit: Photo: Coming out in photographs Seconds.

A team of scientists has analyzed 29 esparto fields from Guadalajara to Murcia and has concluded that perennial vegetation cover is an efficient early warning system against desertification in these ecosystems. The study has been published in the *Ecology* magazine.

In order to foresee the appearance of desertification processes, defined by the United Nations as the "degradation of the land into arid, semi-arid and sub-humid areas, resulting from various factors, including [climatic variations](#) and human activity", the team of scientists from the Rey Juan Carlos University (URJC) has evaluated the spatial distribution of vegetation as an "early" indicator of the appearance of desertification

processes.

To do so, they analyzed the formations dominated by esparto or needlegrass (*stipa tenacissima*), one of the most representative ecosystems in the Iberian Peninsula.

Fernando T. Maestre is the main author of the study published in the *Ecology* magazine and is the Senior Lecturer at the Higher School of Experimental Sciences and Technology of the URJC. "The losses of vegetable cover in the ecosystems studied lead to a decrease in the fertility and functionality of the ecosystem and bring about the beginning of desertification processes", he explained to SINC.

After characterizing the spatial distribution of the vegetation and analyzing the fertility of the soil and the capacity of the ecosystem to recycle the [organic matter](#) into nutrients which can be assimilated by the plants, the researchers showed that the spatial distribution of the vegetation on all the plots of land was characterized, from the statistical point of view, by displaying a potential "truncated" distribution. This takes place when the areas of vegetation of the greatest size are lost.

In spite of the above, "the plots studied showed, for example, a great variation in aspects as important as the content of [nitrogen](#) and [phosphorus](#), while many of them did not display any symptoms of undergoing desertification processes", indicated Maestre. The researchers also found that the total vegetation cover was "positively and significantly" related to the fertility of the soil.

The conclusions indicate that perennial vegetation cover, "a parameter easily attainable by means of taking samples in the field or air photographs", can be used in a "satisfactory and robust manner" in order to evaluate the early appearance of desertification processes in semi-arid esparto fields.

18% of the surface area of Spain, at risk

Identifying that a specific ecosystem is undergoing desertification is of "great importance" when identifying the causes which are leading to its desertification and for knowing how this complex phenomenon may affect its functioning and the services it provides. Besides, "the search for early warning desertification indicators allows us to establish management and restoration measures before the degradation process of the ecosystem becomes irreversible", indicated Maestre.

Nevertheless, these results do not support those obtained by another team of researchers, whose study was published in 2007 in *Nature* (449: 213). This research endorsed the use of the spatial distribution of vegetation as a universal indicator of the early appearance of desertification processes. "In that work, it was suggested that when the vegetation of a specific area characterized by a potential distribution becomes characterized by a potential truncated distribution, the risk of desertification is imminent", clarified Maestre.

Spain is the country with the greatest risk of desertification in Europe. According to the estimates of the Ministry of the Environment and Rural and Marine Affairs, 18% of the surface area of Spain displays a high or very high risk of suffering this phenomenon. Desertification has already had significant consequences from the ecological and socio-economic point of view all around the world, and "directly affects about 250 million people in the developing countries", according to the estimates Maestre made in another study published in 2007 in *Science* (316: 847-851).

More information: Maestre, Fernando T. y Escudero, Adrián, "Is the patch size distribution of vegetation a suitable indicator of desertification processes?", *Ecology* 90(7):1729-1735, julio de 2009.

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