

HORIZON
2020

A global initiative to understand gypsum ecosystem ecology

Results in Brief

Beneath the surface: unveiling the biodiversity of gypsum ecosystems

Gypsum-rich areas were part of the first global study of plant communities in extreme soils, revealing their uniqueness and importance.





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In the elaborate domain of Earth’s biosphere, gypsum ecosystems – formed by a highly restrictive soil rich in the soft sulfate mineral gypsum – stand as unique landscapes spreading over more than 100 million hectares worldwide.

They are home to a singular biodiversity, which includes very specific species that survive these extreme environments, and they affect the livelihood of millions of people since they limit the development of agriculture where they occur. Despite their importance and the fact that they need to be preserved globally,

gypsum-rich regions have not been deeply studied.

To change this scenario, research undertaken with the support of the [Marie Skłodowska-Curie Actions programme](#)  was carried out for more than 5 years. During the [GYPWORLD](#)  project, scientists made expeditions into eight gypsum regions to investigate their diversity, evolutionary origins and functional structure, as well as to explore how their conservation can mitigate the effects of climate change.

“Most gypsum areas are understudied and lack protection. Indeed, they are frequently perceived by local populations as uninteresting areas. This highlights the need to raise awareness of the importance of gypsum ecosystems globally,” states Sara Palacio Blasco, GYPWORLD project coordinator.

Shedding light on the biodiversity of gypsum ecosystems

Many of the regions studied had never been surveyed before from a biological perspective. Therefore, the project was vital for the identification of hidden biodiversity and the description of new species of plants and lichens - organisms that result from an association of algae and fungi.

The study explored gypsum-rich areas in the Mediterranean Basin (Cyprus, Spain, Italy), the Anatolian Peninsula (Turkey) and the Middle East (Iran). It also carried out research in Australia, southern Africa (Namibia and South Africa), the Chihuahuan Desert (Mexico and the USA), the Atacama Desert (Chile) and in the province of Neuquén (Argentina).

With more than 160 plots sampled, GYPWORLD is the first global assessment of plant communities in extreme soils. When analysed, this dataset will clarify important issues on how plant and lichen communities are formed under severe conditions.

“We have compiled the first global checklist of an atypical substrate. GYPWORLD researchers, with a network of experts connected across 17 countries, have identified more than 1 200 taxa with a high affinity for gypsum soils,” describes Palacio. “Half of these taxa are narrowly distributed species, with only a few localities known, and one third is listed for conservation needs. This exemplifies the uniqueness of the gypsum flora.”

Climate change in gypsum-rich areas

Beyond the extreme environmental conditions faced by plants growing in gypsum soil, their habitats are being increasingly destroyed by human action.

“We visited several areas of the Atacama Desert where plant communities had been reduced to dry wood remains. The persistent drought conditions of the last years in an inherently dry area have limited the survival of the few tolerant species, leaving a desolate landscape of scattered plant remains,” says Palacio.

Mining, overgrazing and the increasing development of urban areas also threaten gypsum habitats around the world. To help preserve these ecosystems, the project has determined the best restoration practices that should be applied after gypsum

mining and has raised awareness of the importance of these habitats amongst local people.

Keywords

GYPWORLD, gypsum ecosystems, biodiversity, gypsum soil, climate change, lichen

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Project Information

GYPWORLD

Grant agreement ID: 777803

[Project website](#) 

DOI

[10.3030/777803](https://doi.org/10.3030/777803) 

Project closed

EC signature date

21 November 2017

Start date

1 January 2018

End date

31 October 2023

Funded under

EXCELLENT SCIENCE - Marie Skłodowska-Curie Actions


Total cost

€ 747 000,00

EU contribution

€ 724 500,00

Coordinated by

AGENCIA ESTATAL CONSEJO
SUPERIOR DE
INVESTIGACIONES CIENTIFICAS
 Spain

Last update: 22 March 2024

Permalink: <https://cordis.europa.eu/article/id/450212-beneath-the-surface-unveiling-the-biodiversity-of-gypsum-ecosystems>

European Union, 2025