

On the conservation of subterranean ecosystems

Stefano Mammola ‡, §

‡ Water Research Institute (IRSA), National Research Council (CNR), Verbania Pallanza, Italy

§ Finnish Museum of Natural History, University of Helsinki, Helsinki, Finland

Corresponding author: Stefano Mammola (stefano.mammola@cnr.it)

Abstract

Subterranean ecosystems harbor a broad diversity of specialized organisms that are of interest from both a conservation and evolutionary perspective. These species are often short-range endemics, and some represent ancient faunas that disappeared from surface habitats. Thus, they account for a unique fraction of the global taxonomic, phylogenetic, and functional diversity that is currently imperiled by human activities, including the destruction of subterranean habitats, pollution, and climate change. Furthermore, subterranean ecosystems and landscapes deliver critical nature contributions to people, most notably the provisioning of potable water. To emphasize the importance and urgency of protecting subterranean biodiversity, the year 2021 was elected the International Year of Caves and Karst (later extended to 2022). Yet, the subterranean biome is still systematically overlooked in global biodiversity targets and climate change agendas. For example, only 6.9% of known subterranean ecosystems overlap with protected areas globally. Importantly, most of these subterranean ecosystems are protected simply because they occur within protected areas established for surface species or habitats, and therefore not designed to account for their vertical dimension and efficiently protect subterranean biota. Given this scenario, the time is ripe to provide a quantitative assessment of solution-based approaches to safeguard subterranean biota and associated habitats. During this lecture, I will discuss the available evidence for the effectiveness of conservation interventions in subterranean ecosystems and future directions concerning subterranean conservation. I will emphasize the importance of making conservation efforts in subterranean systems more practical, cost-effective, and long-lasting.

Keywords

Karst; Subterranean fauna; Evidence-based conservation; Protected areas; IUCN

Presenting author

Stefano Mammola

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