More than burrows: Why and how we should keep an eye on burrowing mammals (i.e. hamsters, ground squirrels)

Csongor I. Gedeon1, 2; Olivér Váczi1; Vilmos Altbäcker3

1 - Herman Ottó Institute Nonprofit Ltd., 1223 Budapest, Hungary
2 - Institute for Soil Sciences, HUN-REN Centre for Agricultural Research, 1116 Budapest, Hungary
3 - Institute for Wildlife Management and Nature Conservation, Hungarian University of Agriculture and Life Sciences, 7400 Kaposvár, Hungary

Corresponding author: Csongor Gedeon (gedeon.csongor@hoi.hu)

Abstract

Burrowing mammals are great ecosystem engineers. Beavers get all the press as hydrologists, but ground squirrels, common hamsters and similar burrowing mammals dig, translocate, and mix soils, contributing to soil functions and development. Their burrows, mounds, and subterranean activity create fine-scale, belowground heterogeneity, enhance water infiltration and aeration, redistribute organic matter, and support diverse plant and invertebrate communities.

Yet many burrowing mammals are undergoing population declines driven by anthropogenic activities. Their loss represents not only a biodiversity crisis but a functional erosion of soil processes and functions that can underpin the resilience of primarily grassland ecosystems. Moreover, observing and monitoring these animals, detecting and understanding these population declines are complicated, labour-intensive, and often invasive due to the challenges of their underground lifestyle and their non-continuous activity pattern, inter alia.

During the last decades, we conducted field, lab, and long-term data studies aimed at investigating population trends, activity and hibernation patterns, reintroduction ecology, and, more recently, developing novel, non-invasive monitoring methods to map burrow systems and improve population estimation methods. Our studies focused on ground squirrels primarily, but the results could be extended to comparable species, such as hamsters, molerats, moles, etc.

Our keynote speech plans to show how multifaceted research, sometimes driven by available resources and not by big ideas, can explain how soil megafauna becomes a functional domain. It will illustrate the benefit of targeted behavioural and ecological studies that can provide evidence for conservation measures. Moreover, it will show the disappointing results of time-series analysis, but the long-term potential of conservation measures, such as translocations or captive breeding programs, to counterbalance declines. Eventually, the recent experience and advances in non-destructive, high-resolution monitoring technologies using proximal sensing offer new ways for animal surveys or non-destructive monitoring. In simple terms, our research has been developing ways of learning more about them or their habitat, so that we can better protect them and the ecosystem they live in.

Keywords

burrowing mammals, soil ecosystem, evidence, proximal sensing, conservation