

## Poo power: the value of vertebrate diets for measuring the biological control ecosystem service in urban environments

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**Abstract:** Biodiversity provides ecosystem services that are essential for human health and well-being. However, in the last few years, the increase of urbanization and the fragmentation of natural habitats led to a decline in biodiversity. The use of fecal samples is an important source of data for underpinning the ecological roles of urban vertebrates and their value in terms of contributions to the ecosystem services: the diet of vertebrates, such as birds and lizards, can provide ecosystem services by consuming arthropod pests or it can result in disservices by consuming beneficial arthropods. The study of these samples allows us to understand the interactions between preys and predators. The technique used to identify prey from fecal samples is DNA metabarcoding.

The aim of this study is to investigate the regulatory ecosystem services (biological control) from vertebrate diets in urban environments. For this purpose, we collected 133 fecal samples of lizards (*Podarcis siculus Rafinesque* and *Podarcis muralis Laurenti*) in 8 different sites in Florence, 8 sites in Milan and 6 sites in Campobasso. During the breeding season, a total of 348 fecal samples were collected from chicks of Paridae birds (*Parus major Linnaeus* and *Cyanistes caeruleus Linnaeus*) present in the nests placed in urban green areas, within the city of Milan and Torino (8 sites with 8 nests in each city), together with sites in the “Parco Regionale della Pineta di Appiano Gentile e Tradate” used as a reference from natural areas. For each nestling, in addition to the fecal sample, weight and tarsus were measured to monitor individual-level biometrics that could explain variation in the diets. In addition, a feather sample was collected and will be analyzed to retrieve data about dietary isotopes, the presence of chemical contaminants and to determine the sex ratio through molecular sexing analysis. In addition, for at least one chick per nest, a blood sample was taken to assess the presence of blood parasites or to highlight the presence of any stress markers.

The results of this study will provide new insights in the contribution by urban vertebrates to fundamental ecosystem services for human society. Additionally, it gives essential information regarding ecology and biodiversity of urban environments. In turn, this information will assist the administration in restoring urban areas, promoting useful biodiversity and supporting conservation policies aimed at safeguarding biodiversity not only for the cities under study but also for other European metropolises.