# BioQuant:
# A tool for predicting urban biodiversity and informing science-driven nature-based solutions

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BioQuant provides a science-based, operational framework to integrate animal biodiversity into urban planning decisions.

Developed by researchers of Task 5.2 within Spoke 5 of the National Biodiversity Future Center, the tool builds on a large integrated dataset comprising thousands of monitoring records collected across hundreds of sampled urban green areas in six Italian cities (Milan, Turin, Florence, Rome, Naples, and Campobasso). The dataset includes presence–absence data for species belonging to multiple animal taxa, including bees, wasps, birds, small mammals, bats, and meso- and large mammals. Species' observations were translated into quantitative biodiversity indices combining species richness with a numeric score attributed to individual species based on biological and ecological traits. These indices allowed, for the first time at the national scale, the definition of reference biodiversity ranges characterizing Italian urban green areas and the identification of target levels (i.e. upper percentiles of the national biodiversity range). The dataset is directly integrated within the tool and made accessible to users, allowing transparent reuse of standardized national-scale biodiversity information.

BioQuant applies statistical and machine-learning approaches to model the relationships between biodiversity indices and environmental characteristics (e.g. vegetation structure, diversity, etc.) of sampled green areas, identifying robust and generalizable patterns. Based on these relationships, the tool enables predictive estimation of expected biodiversity levels in any urban green area using only environmental descriptors, without requiring complex and time-consuming faunal monitoring. By comparing predicted biodiversity values with national reference targets, BioQuant quantifies the gap between current and desired ecological conditions and identifies measurable environmental restoration actions to enhance biodiversity potential through nature-based solutions.

By operationalizing integrated biological data into predictive and quantitative guidance, BioQuant supports public administrations, planners and green space managers in implementing evidence-based strategies for biodiversity enhancement, facilitating the practical adoption of nature-based solutions in urban green infrastructure planning.