We tested the hypothesis that cities are composed of different degrees of ecological novelty by studying four urban habitats with differing degrees of management and human legacy: park lawns, roadsides, residential vacant lots, and industrial vacant lots. We focused on community compositional novelty, by comparing the plant, fungal and bacterial species composition between urban habitats and two reference pre-urban habitats: forest remnants and hay meadows. We used a compositional novelty index based on multidimensional ordination, which is straightforward to calculate and only requires species co-occurrence data for urban and reference habitats. As expected, (1) plant communities displayed the highest novelty and soil bacteria the lowest; (2) urban communities were markedly different from forest communities and relatively more similar to meadow communities; and (3) the degree of compositional novelty was highest in industrial vacant lots. On the contrary, managed park lawns, which we had expected to be highly novel, were relatively close to hay meadows. The lowest novelty among urban habitats was recorded in residential vacant lots, which had biological communities that more closely resembled those of pre-urban habitats. Our results highlight the effect of habitat type as a major driver of urban community composition and compositional novelty. These results suggest that city biodiversity can be enhanced by an integrative approach to the urban landscape that favors habitat heterogeneity by passive rewilding of managed park lawns, non-intervention on residential vacant lots, direct restoration of industrial vacant lots, and conservation of natural and agricultural habitat remnants as sources of native species.