

Science for Environment Policy

Urban habitats as a refuge for biodiversity: A case study in Greece

Cities located in biodiversity hotspots can provide valuable refuges for a wide range of plants, a recent study suggests. Of the 379 plant species and sub-species recorded in the city of Ioannina, Greece, 27 were of conservation interest. Town planners can ensure that cities play an important role in supporting regional biodiversity when designing future urban developments, the researchers say.

Cities are part of the wider landscape and those that are located in or near [biodiversity hotspots](#) may be home to a range of wildlife. However, [urban](#) development also destroys and fragments habitats, resulting in a loss of species, as well as enabling the introduction and spread of invasive plants and animals.

In this study researchers aimed to understand the extent to which cities located in biologically important areas can provide suitable habitats for a wide diversity of plants. The researchers focused on Ioannina, a city in north western Greece which is in or near several national and EU protected areas, including a [national park](#), an urban pine forest and a lake. They surveyed four areas, each 16 hectares in size, from the city centre to the outer suburbs, which represented different states of urbanisation.

Altogether, the researchers identified 11 different habitat types containing 379 species and sub-species of plants, including native and non-native species. Twenty-seven (approximately 7%) were plants of conservation interest which are either endemic to Greece or the Balkans, or are considered under threat by EU or international bodies. Non-native plants accounted for approximately 11% of the identified species and subspecies and only four non-native species were found in all four study areas.

Habitats were classed as either semi-natural or anthropogenic, i.e., extensively altered by human activities. Semi-natural pine forests contained the smallest proportion of non-natives and the greatest proportion of plants of conservation interest. However, over half (68%) of all plant species and subspecies were found in anthropogenic habitats and the largest range of habitats and plant diversity was found in the citadel in the centre of the city.

Two plants of conservation interest were found in all 11 habitats, both semi-natural and anthropogenic, which is uncommon for studies of urban ecosystems. Some of these species were in fact found growing in highly disturbed anthropogenic habitats, including rubble, roadways and pavement cracks. Anthropogenic habitats contained 30 non-native plants that were not found in semi-natural habitats; however, compared with cities in central and northern Europe, there was a relatively small proportion of non-native plants found overall.

These findings suggest that there are European cities in which typical anthropogenic habitats are important to biodiversity protection. According to the researchers, future studies should be directed towards discovering these urban hotspots, assessing the key habitats, and introducing urban planning policies based on *in situ* nature conservation.



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