How the Scale of Human Population Density affects Biodiversity

In a recent paper, a European researcher has studied the link between human population density and species richness. By compiling the results of several studies, he has shown that the correlation between human population presence and biodiversity is scale-dependent. This highlights the need to conserve green areas in regions where urbanisation is increasing in order to design sustainable cities.

There is much scientific evidence that global human activity is affecting species richness, in particular through anthropogenic global warming, land-use changes and pollution. On the other hand, fauna and flora sustain human beings and there is a need for ways to reconcile conservation and development in regions of high species richness and human population density.

On a regional scale, scientists have recently shown that areas of high population density largely coincide with high biodiversity levels, especially for plants, amphibians, reptiles, birds and mammal species. On the contrary, on a local scale the reverse pattern has been observed since the 1960s, particularly linked to the extension of urban sprawl. Some studies have however shown that on an intermediate scale, high population density is not necessarily accompanied by poor biodiversity. Nevertheless, all these studies have been performed independently of each other and a comprehensive assessment of them is still needed.

A recent paper has thus analysed the influence of study scale on the correlation between population density and species richness by compiling the results of published studies on the impact of urbanisation on plants and vertebrates species richness. Nearly half of these studies come from European regions. The analysis applied statistical models to test whether the correlations observed are independent of the scale of the studies.

The results of this work are:

- The independently-observed correlations between human population density and species richness are scale dependent.
- On a regional scale, higher species richness is generally observed where human population is more densely present.
- The opposite is the case on a local scale. Here, biodiversity is usually negatively correlated with increasing human presence.

The results imply that, on a broad scale, human beings have chosen to settle in areas of high species richness (or may have contributed to it with increased habitat heterogeneity). In these regions people are competing for living space with biodiversity, given that on local scales there is a negative correlation between human presence and biodiversity. In addition, this scale-dependence of the correlation between human presence and species richness may provide an explanation of why studies on intermediate scales have often reported the peaking of species richness at intermediate levels of urbanisation.

As urbanisation is increasing worldwide and in particular in Europe, this study suggests that it is essential to take into account the scale of studies when analyzing the effects of human density on biodiversity. Since human beings have urbanized regions of high productivity, and thus of high species richness, the effects of urbanization on species richness have been magnified. Further biodiversity loss may be avoided by the preservation of green areas in densely populated regions. This would also contribute to sustainable urban design and human well-being.


Contact: m.pautasso@ic.ac.uk

Theme(s): Biodiversity, urban environment.

Additional Information: The EC’s LIFE programme co-financed several projects that aimed to support sustainable urban design and to raise awareness of the benefits of urban biodiversity. Some of these innovative projects are featured in the LIFE Focus brochure "LIFE in the City"; such as the Sun project (LIFE03 ENV/UK/000614), which demonstrated how urban municipalities can develop effective and inclusive community participation tools for the planning and carrying out of measures to enhance the environmental value of their green space (see project summary). A Swedish project, Extensive roof greening, (LIFE98/S/000482) showed how millions of square meters of rooftops could be easily converted into natural green areas (see project summary, website and layman’s report). Living River Liesing (LIFE02 ENV/A/000282) successfully applied biological engineering to a large-scale river restoration project in Vienna (see project summary and website). Urban woods (LIFE00 ENV/S/000868), a joint Swedish-French LIFE project, demonstrated new means of managing urban woodlands in a sustainable manner while increasing their recreational value (see project summary, website and layman’s report).

Opinions expressed in this News Alert do not necessarily reflect those of the European CommissionTo cite this article/service; ‘Science for Environment policy’, European Commission DG Environment News Alert Service, edited by BIO Intelligence Service.