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Global urban expansion threatens biodiversity and carbon storage

Over the next 30 years, there is a vital need for planners to shape urban expansion to minimise the impact on biodiversity and carbon losses from land use change, according to a recent study.

The number of people living in urban areas is expected to increase by 1.3 billion to a total of nearly 5 billion people by 2030. Habitats, biodiversity and carbon stored in vegetation will all be under threat as land is converted to accommodate this growing population.

In this study, the researchers forecast urban expansion to the year 2030 and the impact this would have on changes in land cover, biodiversity and above ground carbon storage over 16 world regions. Using land cover from around the year 2000 as a starting point, a forecast of urban expansion was based on projected increases in the urban population and economic growth. The researchers then estimated the impact that this urban development would have on: biodiversity hotspots, or areas considered most important for conservation; endangered and critically endangered species; and carbon losses from vegetation removal and land use changes.

By 2030, it is likely that a further 1.2 million square kilometres of land will be converted to urban use, if urban populations grow as projected and areas with a high probability of urbanisation are developed. Nearly half of this projected expansion will occur in Asia, with urbanisation in China and India accounting for over half (55%) of this regional development. Africa will experience the highest rate of urban development, with urban cover increasing by 590% compared with 2000 levels. North America already has a largely urban population, with 78% of people living in urban areas and by 2030, urban expansion is likely to nearly double the extent of urban land cover.

Urban areas occupied less than 1% of 34 biodiversity hotspots in 2000, but by 2030, urban encroachment will most likely affect a further 1.8% of hotspot territories. Five hotspot regions are most at risk from large parts of their area becoming urbanised: the Guinean forests of West Africa (7% increase in urban cover), Japan (6%), the Caribbean Islands (4%), the Philippines (4%), and the Western Ghats and Sri Lanka (4%). Some hotspots are less likely to be affected by urban expansion, but if they are, the area at risk of conversion could be large, including the Caucasus (24% of area) and the Mediterranean Basin (14%).

Urban expansion will likely destroy or affect the habitats of 139 amphibians, 41 mammals and 25 species of birds that are classified as critically endangered or endangered species. The largest number of affected species (134) will be in Central and South America, and the highest proportion of species affected by urban development will be in Africa (30%) and Europe (33%). Even relatively small habitat losses can lead to increased extinction rates of species in areas where habitats have been diminished and fragmented, such as in Mediterranean and Atlantic biodiversity hotspots.

In areas across the tropics that have a high likelihood of urban development, clearing land could result in a loss of 1.38 PgC (Petagrams or billion metric tonnes of carbon) between 2000 and 2030, or about 5% of all carbon emissions from tropical deforestation and land use change. The greatest losses are likely to be in the tropical Americas (0.50 PgC) and Africa (0.49 PgC) reflecting the high carbon densities and amount of land likely to be converted.

Given that more land will be converted to urban use over the next 30 years than historical land conversions, the researchers suggest there is an important window of opportunity for planners to ensure that the massive infrastructure construction accompanying urbanisation will have the least impact on biodiversity and carbon losses as possible. Sound spatial planning that considers urban growth at both the regional and global scale can make a big difference.

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