Gigalopolises: Urban Land Area May Triple by 2030

Suburbs, slums and city centers may grow by more than a million square kilometers—much   
of it now home to wildlife

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More than half of the world’s expected nine billion people will live in giant urban areas by 2030 as cities and the surrounding areas expand over an additional 1.2 million square kilometers, thereby tripling in size. That’s an additional 1.35 billion people living in cities, meaning that urban areas that now occupy about 3 percent of the Earth’s surface will continue to expand. By comparison, urban areas increased by just 58,000 square kilometers between 1970 and 2000.

In new work published in the *Proceedings of the National Academy of Sciences*, urban environment researcher Karen Seto of Yale University and her colleagues first divided the global land area into sections using predicted gross domestic product (GDP) growth, population growth, and urban land area cover in 2000. They then projected which sections had a high or low probability of becoming urbanized over the next few decades. Based on their model, 1.2 million square kilometers of land have probabilities higher than 75 percent of becoming urbanized and nearly six million square kilometers have some probability of doing so.

“More than half of the urban land cover on the Earth by 2030 has yet to be built,” Seto explains. “The expansion of urban areas will have a direct impact on **biodiversity** hot spots.”

Fifty-five percent of that expansion would come from the growth of urban areas in India and China—a trend that has been increasing in recent decades. For example, a **megalopolis** similar to the urban stretch between Boston and Washington, D.C., in the U.S. is likely to form between Hangzhou and Shenyang in China. However, the fastest urbanization is predicted to occur in newly developing regions in Africa, such as the coast of west Africa along the Gulf of Guinea and the shores of Lake Victoria farther south, which includes Burundi, Kenya, Rwanda and Uganda.

This may be bad news for the rich variety of plants, animals and microscopic life on Earth. The Eastern Afromontane, Guinean forests of west Africa and Western Ghats of India, along with Sri Lanka, all have extensive biodiversity yet are projected to undergo rapid urban expansion that will **encroach** on the territory of already endangered plants and animals. Seto and her colleagues project that the worst impacts of urban growth will occur in Central and South America.

In addition, such land use change is likely to result in even more of the greenhouse gases that are driving climate change. An estimated 1.38 billion metric tons of carbon could be released as forests are replaced by roads, buildings and homes. The world’s cities now account for at least 70 percent of global CO2 emissions. “We need to be more careful as a society about what we want urban places to become so that they serve people,” Seto argues. “Too often, urban expansion is unplanned.”

This is bad news not only for animals or the atmosphere, of course. Unplanned urbanization can also harm people who lack adequate supplies of clean water or food. Furthermore, the impact of urban residents does not end at city limits; a typical Australian from Melbourne or Sydney requires greenhouse gas emissions, water diversion and land use from outside the city or even from far away. “Cities have always relied on outlying areas for food, fuel, and places for waste disposal,” the researchers wrote.

Limiting the spread of urban areas may not be the answer either. The same population growth without urbanization might cause even more severe environmental damage as subsistence farming expands, keeping residents in poverty. If urbanization fails in developing regions, whether in Africa or the Indian subcontinent, the world could see continued migration of people to London, Los Angeles and other developed world megacities, suggests physicist Luis Bettencourt. Indeed, Seto and her colleague’s modeling suggests that the area of cities in North America will nearly double by 2030.

The next 20 years or so represent a window of opportunity to learn how to grow. Seto suggests more research is needed on the types of urban growth that minimize negative environmental and social impacts. Her group plans to continue its work by projecting global density of population, which is a key statistic for minimizing environmental impacts. In addition, the world will need to avoid relying on older, problematic infrastructure such as coal-fired power plants that produce cheap electricity but also pollute. Addressing this to support urbanization may require as much as $30 trillion in infrastructure investments by 2030.

Of course, as Bettencourt observes, “Cities were never formed or grew to save energy or protect the environment.” Nonetheless, cities often serve that purpose. One characteristic of slums is a very high density of people, and more developed city areas often have high land values that then encourage the construction and use of tall buildings. Such tall buildings are packed with people and businesses; this further encourages walking or using public transit. Bettencourt suggests that such opportunities should be intentionally and systematically seized in the future.

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