Growth of cities endangers global environment

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The explosive growth of cities worldwide over the next two decades poses significant risks to people and the global environment, according to a meta-analysis published today in *Plos One*.

Researchers from Yale, Arizona State, Texas A&M and Stanford predict that by 2030 urban areas will expand by 590,000 square miles—nearly the size of Mongolia—to accommodate the needs of 1.47 billion more people living in urban areas.

"It is likely that these cities are going to be developed in places that are the most biologically diverse," said Karen Seto, the study's lead author and associate professor in the urban environment at the Yale School of Forestry & Environmental Studies. "They're going to be growing and expanding into forests, biological hotspots, savannas, coastlines—sensitive and vulnerable places."

Urban areas, they found, have been expanding more rapidly along coasts. "Of all the places for cities to grow, coasts are the most vulnerable. People and infrastructure are at risk to flooding, tsunamis, hurricanes and other environmental disasters," said Seto.

The study provides the first estimate of how fast urban areas globally are growing and how fast they may grow in the future. "We know a lot about global patterns of urban population growth, but we know significantly less about how urban areas are changing," she said. "Changes in land cover associated with urbanization drive many environmental changes,

from habitat loss and agricultural land conversion to changes in local and regional climate."

The researchers examined peer-reviewed studies that used satellite data to map urban growth and found that from 1970 to 2000 the world's urban footprint had grown by at least 22,400 square miles—half the size of Ohio.

"This number is enormous, but, in actuality, urban land expansion has been far greater than what our analysis shows because we only looked at published studies that used satellite data," said Seto. "We found that 48 of the most populated urban areas have been studied using satellite data, with findings in peer-reviewed journals. This means that we're not tracking the physical expansion of more than half of the world's largest cities."

Half of urban land expansion in China is driven by a rising middle class, whereas the size of cities in India and Africa is driven primarily by population growth. "Rising incomes translate into rising demand for bigger homes and more land for urban development, which has big implications for biodiversity conservation, loss of carbon sinks and energy use."

More information: The paper, "A Meta-analysis of Global Urban Expansion," can be viewed on the *Plos One* website at dx.plos.org/10.1371/journal.pone.0023777

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