Urban sprawl is on the rise, but not in the Bay Area

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As metropolitan areas expand rapidly to fit the world's ever-growing population, a first-ever global study of street networks indicates that sprawling roads are on the rise, cementing a future in many places where relying on personal vehicles is the norm.

Streets crowded with carbon-spewing commuters are an obvious source of greenhouse gas emissions. But the layout of a community's streets might be the driving force behind a person's preferred transportation. Adam Millard-Ball, a co-author of the study published in January in Proceedings of the National Academy of Sciences, said that more connected streets provide better access to "greener" options for getting around, like public transportation, walking routes and bike paths.

But the cul de sacs, looping streets and dead-ends that are common in many suburbs and gated communities encourage driving. Millard-Ball, who is an environmental studies professor at UC Santa Cruz, said street disconnectedness is one indicator of sprawl. And the Bay Area, while having less sprawl than the U.S. average, is still a mixture of different road networks with varying levels of connectivity.

“Much of what has been built over the last 50 years has been in kind of sprawling style of development,” he said. But places like Redwood City and Palo Alto have maintained “much of their original character, even though they’ve been subsumed by urban growth.”

The researchers developed an index of sprawl by measuring the connectivity of all the world’s streets. An algorithm scanned an open-source online map system, identifying obstructions to pedestrian paths, like loops and dead-ends. With this data, the researchers assigned a score based on how disconnected an area’s streets were — the higher the number, the more sprawl — and mapped their results. The map is available at www.sprawlmap.org.

City centers, like downtown San Jose or San Francisco, are highly connected. Their grid networks often reflect their origin in an era before widespread vehicle use, when they were smaller, more walkable towns. As in many places around the world, most sprawl is due to rapidly expanding developments on the edge of dense cities.

If downtown grids are among the most connected network types, Millard-Ball said gated communities, which have few entry and exit points, represent the other extreme. People in these communities are more prone to driving, because the walled-off neighborhoods become a hindrance to accessing public services.

“You might live 20 feet from a bus stop, but it’s a 10-minute walk (to get there),” he said. “By design, it’s circuitous. It’s doing everything it can as a neighborhood to force you to drive.”

With America’s vast highway system and expansive suburbs, Millard-Ball said the U.S. has historically been “the poster-child” of urban sprawl, but that trend has been on a slow decline since 2000.

Now, other world cities have surpassed the U.S., with Bangkok and Guatemala City topping the list of world’s most sprawling cities, according to the study. And while the global trend is that sprawl is increasing, alternatives exist in places like Japan, where well-connected street networks and accessible public transportation have led to much lower rates of car ownership than other wealthy nations.

“It’s not like people in Japan can’t afford cars,” Millard-Ball said. “It’s that their cities are designed in a way that people choose to walk or take public transport instead.”

The trend toward sprawl is troubling, he said, because the streets are mostly permanent, and difficult to change once a community develops around them.

“If you look at cities, the streets that are there today have the same patterns as when they were first laid down, even if that was more than one hundred years ago,” said Millard-Ball. “Get the streets of a city wrong, you’ve locked yourself into car dependence and high greenhouse gas emissions for decades, and maybe even a century or more.”

In Santa Clara County and other Bay Area counties, sprawl had been declining at a faster rate than the rest of the U.S. since 2000. Ria Lo, the transportation manager for Mountain View, said that increased connectivity is due to more progressive urban planning for new developments.

“The conversation is happening, the change is happening, but my concern is we’re starting from so far behind,” she said. “It’s always better to get things right the first time.”

Lo said that new developments in Mountain View often require access for bikers and pedestrians, and include more connected road systems. But many developments from earlier decades are trapped with their original design.

“We don’t expect areas that are low-density residential (areas) to get demolished and get rebuilt as something else,” she said. “It’s like this in much of Silicon Valley … it’s a lot more tricky.”

Millard-Ball said there are ways to retrofit communities to improve connectivity. Advocating for paths at the end of cul de sacs to connect streets is one example. And residents can demand that new developments aren’t built to be car-dependent. But he said, even if there are solutions, it can be hard to implement them, because people don’t like seeing their neighborhoods change around them.

“Get it right the first time,” he said. “Stop building disconnected streets now, because that’s going to affect energy and quality of life and walkability for a long time to come.”