

Population Growth and Sprawl in Minnesota

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Does a growing population contribute to urban sprawl? The relationship between population growth and sprawl appears obvious to some but is denied or minimized by just as many. What has been lacking is a systematic, comprehensive, consistent means of quantifying the role of population growth in sprawl in recent decades. A national study, "Weighing Sprawl Factors in Large U.S. Cities" released in March, 2001 does just that.

Dozens of factors contribute to sprawl, from federal highway subsidies to the pursuit of more affordable housing and better public schools. All but one of these, population growth, have the net effect of increasing the amount of land consumption per resident, that is, of decreasing density.

The amount of land taken up by a city, town, or any urbanized area is the simple product of the number of residents times the amount of land consumed per resident, as shown in the following equation:

$$A = P \times a$$

Where: A = Area of urbanized/developed land in acres or square miles
P = Population of the urban/suburban area
a = urbanized land per person (i.e. the inverse of density, which is number of people per unit area of land)

One means of measuring the amount of sprawl then is the increase in 'A' over time. Fortunately, it is easy to measure the amount of overall sprawl because of a painstaking process conducted by the U.S. Bureau of the Census for a half-century.

"Weighing Sprawl Factors in Large U.S. Cities" and the figures below rely solely on Census data on Urbanized Areas of the United States to measure Overall Sprawl. The Census Bureau uses a rather complicated but consistent set of conditions to measure the spread of cities into surrounding rural land. The Bureau calls the contiguous developed land of the central city and its suburbs an "Urbanized Area."

The relationship between population growth and sprawl can be quantified by comparing rates of change in population and urbanized land area over the same period of time. The table on the next page makes this comparison for five urbanized areas the Census Bureau has identified in Minnesota. What it shows is that in Minnesota both population growth and growth in per capita land consumption contribute to sprawl, although there is substantial variation from one city to the next. Since the Duluth-Superior Urbanized Area actually declined in population from 1970 to 1990, population growth is associated with 0% of the sprawl there; 100% of its sprawl is related to declining population density (rising land consumption per capita). On the other hand, 100% of the sprawl in St. Cloud from 1980 to 1990 can be explained by population growth, because average density actually rose during that decade. St. Cloud residents were living more closely together on average in 1990 than 1980, but not by enough to accommodate all new residents, and so, development expanded onto open space on the periphery.

Urbanized Area	1970 Population	1970 Land Area (sq. mi.)	1970 Acres per capita	1980 Population	1980 Land Area (sq. mi.)	1980 Acres per capita	1990 Population	1990 Land Area (sq. mi.)	1990 Acres per capita
Duluth-Superior	138,352	110.9	0.5130	132,585	132	0.6372	122,971	143.2	0.7453
Fargo-Moorhead	85,446	23.5	0.1760	104,643	45	0.2752	121,336	51.5	0.2716
La Crosse	63,373	23.5	0.2373	67,966	27	0.2542	78,928	34.4	0.2789
Minneapolis - Saint Paul	1,704,423	721.4	0.2709	1,787,564	980	0.3509	2,079,676	1,063.0	0.3271
Saint Cloud				58,375	24	0.2631	74,037	28.7	0.2481
Totals	1,991,594	879.3	0.2826	2,151,133	1,208	0.3594	2,476,948	1,320.8	0.3413

Urbanized Area	1970-90 Sprawl related to Population Growth	1970-90 Sprawl related to Growth in Per Capita Land Consumption	1970-80 Sprawl related to Population Growth	1970-80 Sprawl related to Growth in Per Capita Land Consumption	1980-90 Sprawl related to Population Growth	1980-90 Sprawl related to Growth in Per Capita Land Consumption
Duluth-Superior	0%	100%	0%	100%	0%	100%
Fargo-Moorhead	45%	55%	31%	69%	100%	0%
La Crosse	58%	42%	50%	50%	62%	38%
Minneapolis-Saint Paul	51%	49%	16%	84%	100%	0%
Saint Cloud	NA	NA			100%	0%
Weighted Average	54%	46%	24%	76%	100%	0%

The upper table presents raw data from the U.S. Census Bureau's delineations of Urbanized Areas in the 1970, 1980, and 1990 censuses. 1990 is the most recent year available. (The 2000 Census Urbanized Area data will be available in two or three years.)

The lower table apportions sprawl, as measured by the growth in urbanized land area over the period given, between shares related to population growth and growth in per capita land consumption. Three periods are shown: 1970-90, 1970-80, and 1980-90. One trend in evidence is that average population density declined (i.e. land consumption per resident grew) in the 1970s, contributing to more sprawl than population growth in that decade. In the 1980s, however, average density rose, which means that population growth was linked to substantially more sprawl in that decade than rising land consumption per resident.

For the cities that were already urbanized areas in 1970, 54% of 1970-90 sprawl was associated with population growth and 100% of 1980-1990 sprawl was associated with population growth.