# Urbanization and Population Change

The total number of people and their distribution on the landscape can affect the condition of the environment in many ways. Increasing population often means increased urbanization, including conversion of forest, farm, and other lands for housing, transportation, and commercial purposes. In recent years, many communities in the U.S. have seen an increase in developed land (residential, commercial, industrial, and transportation uses) that outpaces population growth. This pattern is of concern for numerous health and environmental reasons (Frumkin et al., 2004). For example, studies indicate that when land consumption rates exceed the rate of population growth, per capita air pollutant emissions from driving tend to be higher. Urbanization and population growth also tend to increase the amount of impervious surfaces and the quantity and types of products that humans produce, use, and discard, thereby affecting waste generation and management, water quality, and chemical production and use.

The information presented in this indicator is based on population data collected and analyzed on a decadal basis by the U.S. Census Bureau—as well as annual "intercensal" population estimates—and data collected by the U.S. Department of Agriculture Natural Resources Conservation Service's National Resources Inventory (NRI) to track "developed" land. Between 1977 and 1997, the NRI developed estimates every 5 years on non-federal lands in the contiguous U.S. Since 2000, NRI data have been gathered annually, though major releases of these data continue to be reported at 5-year intervals, i.e., 2002, 2007, and 2012. This indicator captures trends in overall population growth for both rural and urban populations; the amount of developed land relative to the amount of population change, nationally and by EPA Region; and overall population density, also nationally and by EPA Region.

## What the Data Show

The U.S. population grew from a little over 4 million people in 1790 to over 308 million in 2010 (Exhibit 1). The U.S. population more than doubled between 1950 and 2010. Since 1910, the urban population has grown by nearly 500 percent while the rural population has grown by 19 percent. As of 2010, 81 percent of the U.S. population was considered urban.

The rates of population and developed land growth over 5-year intervals increased between 1982 and 1997, before declining slightly between 1997 and 2007. Over the four 5-year intervals between 1982 and 2002, the amount of developed land increased at nearly twice the rate of the population. From 2002 to 2007, it increased 44 percent faster than the population; then between 2007 and 2012 the trend reversed and population grew about 52 percent faster than the amount of developed land (Exhibit 2). Between 1982 and 2012, the amount of developed land in the 49 states (not including the District of Columbia and Alaska) grew by 42 million acres, representing a cumulative increase of 58 percent. The Census Bureau estimates that during the same 30-year period, the population of the 49 states grew by more than 82 million people, or 36 percent (Exhibit 3).

There are substantial variations in population and land development trends in different parts of the U.S. (Exhibit 3). Between 1982 and 2012, the growth rates for developed land were higher than population growth rates in every EPA Region except 8 and 10. The largest rate of increase in population between 1982 and 2012 occurred in Region 9, where it was over 65 percent (more than 19 million people). Developed land in Region 9 increased by 68 percent (more than 3.7 million acres). Region 4 had the largest rate of increase in developed land (nearly 92 percent) and the largest

absolute increases in both population (22 million) and developed land (13 million acres).

Although growth rates of population and developed land were high in most Regions, population density varies significantly from one Region to the next (Exhibit 4). In 2010, EPA Region 2 was the most densely populated Region, at 516 people per square mile; EPA Region 10 was the least densely populated, with an average of approximately 15.7 people per square mile (including Alaska). Between 1950 and 2010, the population density of EPA Region 9 showed the greatest percentage change, increasing by nearly a factor of four from 31 to 124 people per square mile. During the same period, the nationwide average population density doubled, from 43 to 87 people per square mile.

## Limitations

Census data:

- Intercensal figures are estimates based on administrative records of births, deaths, and migration, and thus differ from the decennial census data in methodology and accuracy.
- Sampling and non-sampling errors exist for all census data as a result of errors during the data collection and processing phases.
- The criteria for estimating urban population have changed over time as defined by the Census Bureau (U.S. Census Bureau, 2012).

NRI data:

- NRI sampling procedures changed in 2000 to an annual survey of fewer sites than had previously been sampled (starting in 1977, the NRI sampled 800,000 points every 5 years). Fewer sample points mean increased variance and uncertainty for annual samples, but 5-year data releases (such as 2012) rely on the full set of sample points and are considered comparable to previous 5-year data releases.
- The NRI has collected data about non-federal land across the 48 contiguous states for many years. Alaska and Hawaii were made a regular part of the inventory in 2007.

## Data Sources

Urban and rural population data for Exhibit 1 were obtained from two U.S. Census Bureau publications: data from 1790 to 1990 are from U.S. Census Bureau (1993); 2000 and 2010 data are from U.S. Census Bureau (2013).

In Exhibit 2, population change was calculated from population estimates published in U.S. Census Bureau (1993, 2002a, 2009, 2015). Changes in acreage of developed land were calculated based on acreage figures reported every 5 years by the NRI (USDA NRCS, 2015).

Exhibit 3 is based on population estimates by state for 1982 and 2012, published in U.S. Census Bureau (1993, 2015), and NRI developed land estimates by state, published in USDA NRCS (2015). The figure was developed by grouping the published state data by EPA Region, then calculating percent change between 1982 and 2012.

Population density by EPA Region (Exhibit 4) was calculated based on three published data sets: population every 10 years from 1950 to 2010 by state (U.S. Census Bureau, 2002b and 2011); and

land area by state (U.S. Census Bureau, 2002c).

**References**

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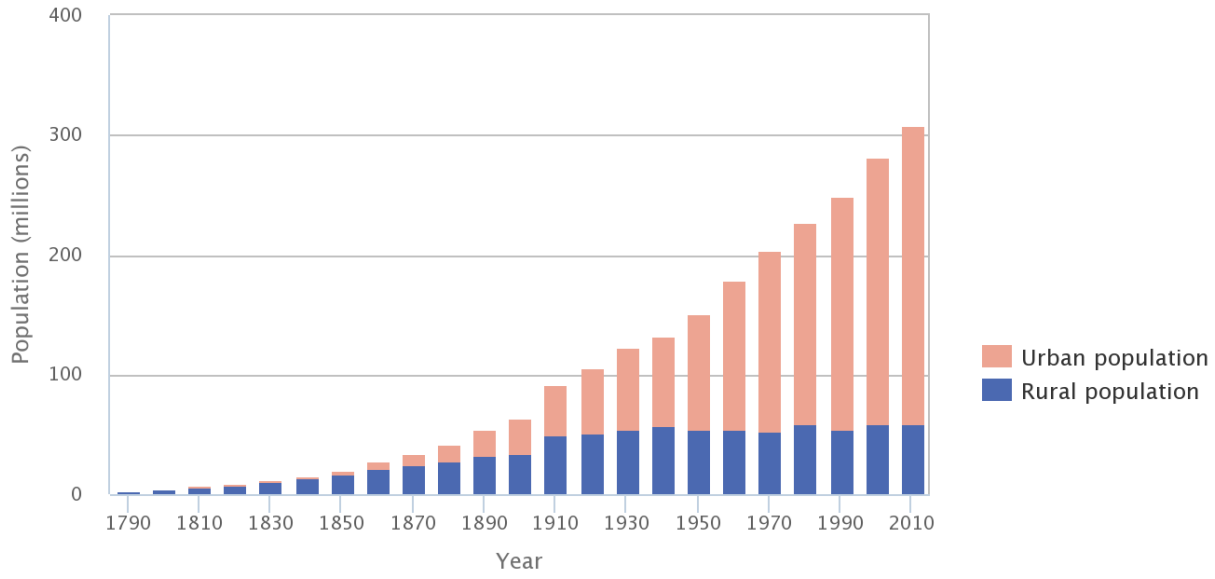
USDA Natural Resources Conservation Service (NCRS). 2015. Summary Report: 2012 National Resources Inventory. Washington, DC. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcseprd396218.pdf (PDF) (210 pp; 6.6 MB).

## Exhibit 1. Population and urbanization in the U.S., 1790–2010

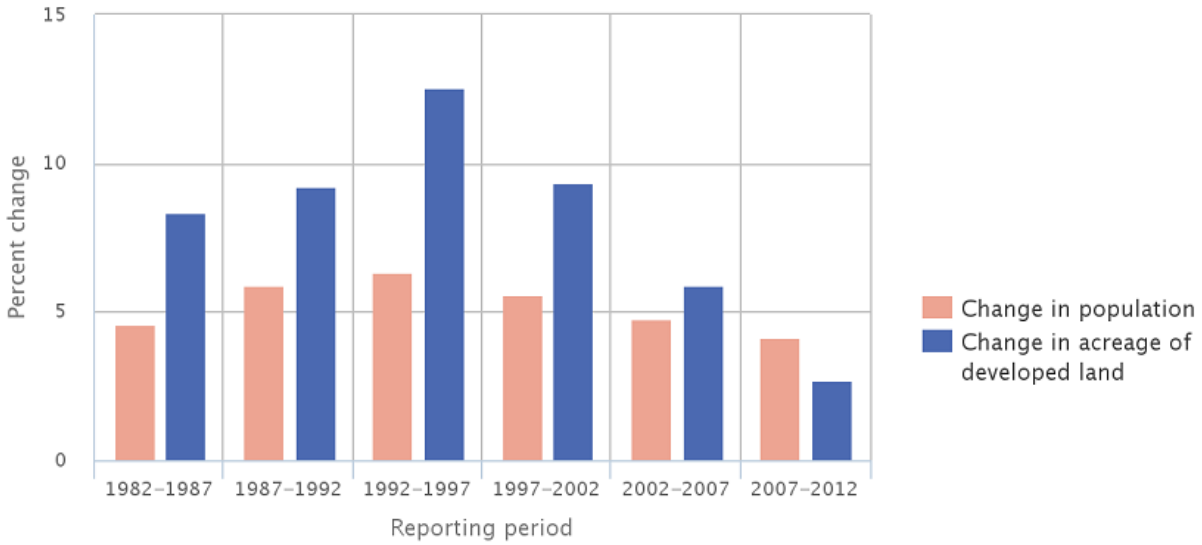



**Coverage:** 50 states and the District of Columbia.

Information on the statistical significance of the trends in this exhibit is not currently available. For more information about uncertainty, variability, and statistical analysis, view the technical documentation for this indicator.

**Data source:** U.S. Census Bureau, 1993, 2004, 2013

**Exhibit 2. Percent change in population and developed land in the U.S., 1982–2012**

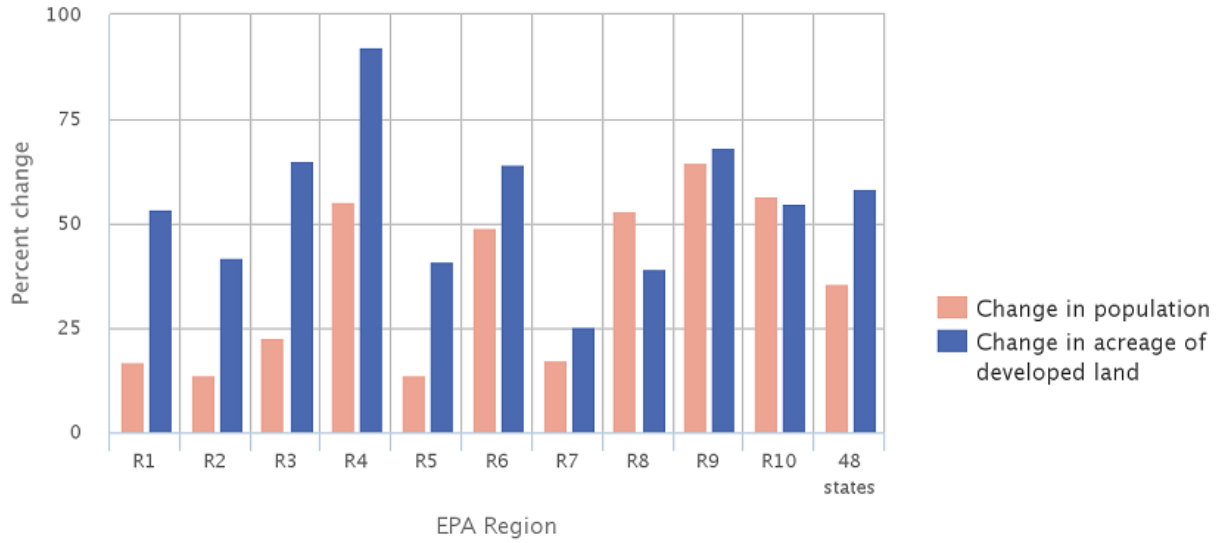



**Coverage:** 49 states (excluding Alaska and the District of Columbia).

Information on the statistical significance of the trends in this exhibit is not presented here. For more information about uncertainty, variability, and statistical analysis, view the technical documentation for this indicator.

**Data source:** U.S. Census Bureau, 1993, 2002a, 2009, 2015; USDA NRCS, 2015

**Exhibit 3. Percent change in population and developed land in the U.S. by EPA Region, 1982–2012**

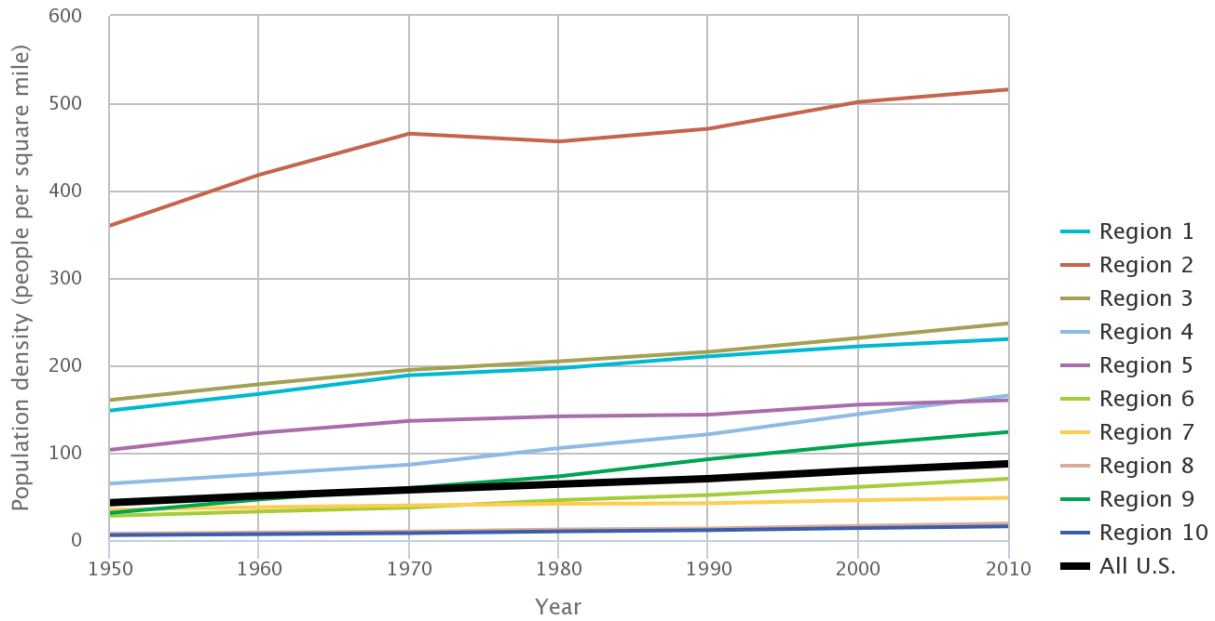



**Coverage:** 49 States (excluding Alaska and the District of Columbia).

Information on the statistical significance of the trends in this exhibit is not presented here. For more information about uncertainty, variability, and statistical analysis, view the technical documentation for this indicator.

**Data source:** U.S. Census Bureau, 1993, 2015; USDA NRCS, 2015

## Exhibit 4. Population density in the U.S. by EPA Region, 1950–2010




**Coverage:** 50 states and the District of Columbia.

Information on the statistical significance of the trends in this exhibit is not presented here. For more information about uncertainty, variability, and statistical analysis, view the technical documentation for this indicator.

**Data source:** U.S. Census Bureau, 2002a,c; 2011