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# Environmental Quality of Life by the Numbers: The Charlotte Regional Indicator Project's Environmental Indicators

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## INTRODUCTION

The Charlotte Regional Indicators Project is an effort launched by the UNC Charlotte Urban Institute in 2007 to monitor key measures of the region's quality of life over time. "Environment" is one of several areas covered by the Indicators Project, and includes six indicators:

- Unhealthy Air Quality Days
- Vehicular Emissions
- Water Consumption
- Impaired Streams
- Landfill Waste Disposal
- Developed Acres per Person

This article presents the most recent data for selected Environmental Indicators for Mecklenburg County and the region. Data for all but one of these indicators is compiled from state and federal agencies for the fourteen individual counties in the region, including Mecklenburg. Data for the Developed Acres per Person indicator is provided by the Center for Applied Geographic Information Science at UNC Charlotte (CAGIS), through its partnership with the UNC Charlotte Urban Institute as part of the Renaissance Computing Institute at UNC Charlotte.

By examining historic trends on these indicators and monitoring progress over time, we can evaluate how well we are doing as communities and as a region in sustaining our environmental quality of life. The indicators are intended to serve as a foundation for community and regional dialogue and action. More information about the Indicators Project can be found at <http://ui.uncc.edu/content/charlotte-regional-indicators-coming-soon>.

## UNHEALTHY AIR QUALITY DAYS

This indicator looks at the number of days per year the region's Air Quality Index is rated as "Unhealthy for Sensitive Groups" or worse, as a percent of monitored days (generally 365 days). The EPA calculates a daily "Air Quality Index" (AQI) for the Charlotte-Gastonia-Rock Hill Metropolitan Statistical Area (MSA) based on the measurement of five major air pollutants regulated by the Clean Air Act, as recorded at monitoring stations. AQI measurements are rated by the EPA as "Good," "Moderate," "Unhealthy for Sensitive Groups," "Unhealthy," "Very Unhealthy," or "Hazardous." Data is currently available from 1997 through 2008, and is displayed in the chart below.

After four years of very low percentage of unhealthy air quality days from 2003 through 2006, the region returned to higher levels of

unhealthy air quality days in 2007 and 2008. In 2008, 8.6% of monitored days were rated “Unhealthy for Sensitive Groups” or worse.

### VEHICULAR EMISSIONS

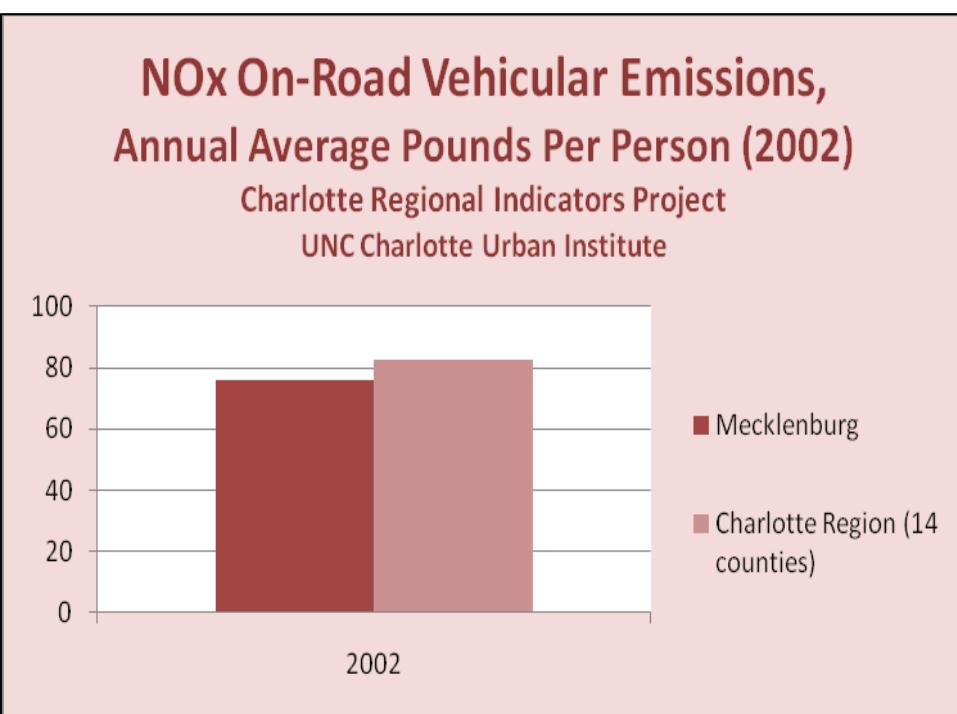
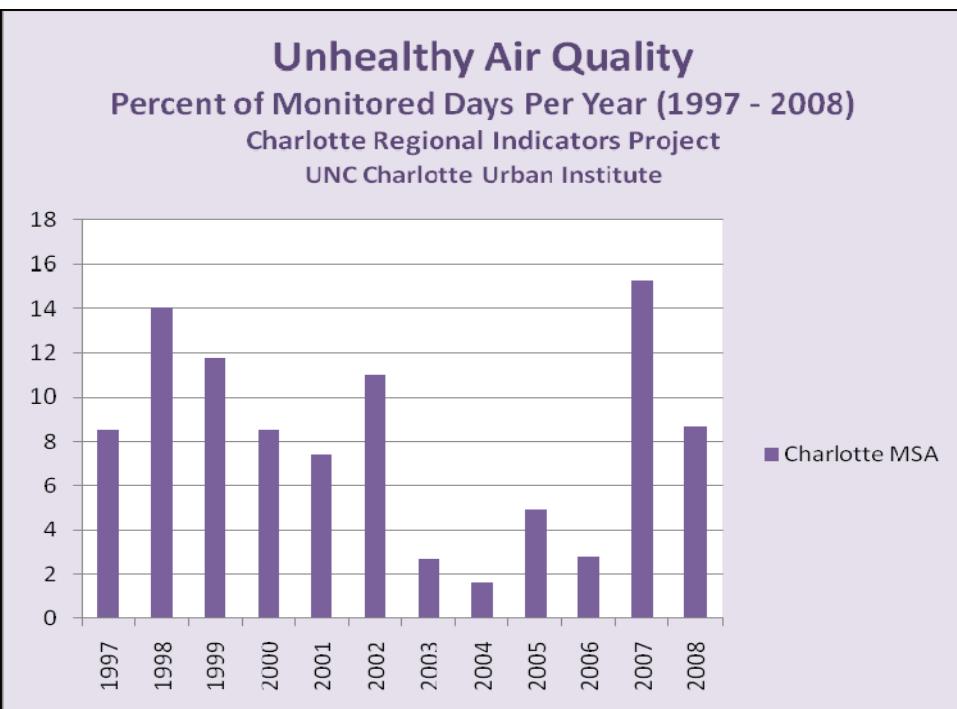
This indicator captures on-road vehicular emissions of nitrogen oxides (NOx) for each county in the 14-county region, and calculates a per person figure. States are required by the EPA to collect and report NOx emissions data. The amount of NOx in the air determines how much ground-level ozone, a harmful pollutant, is produced. Emissions of NOx are also monitored for other categories of mobile sources (such as “off-road non-vehicular” sources, e.g., lawn mowers) and for stationary sources (such as manufacturing or power plants.) Data are available for 2002, with 2007 data not available until later in 2010.

Mecklenburg County had slightly lower NOx on-road vehicular emissions per person in 2002 than the region as a whole: 76 versus 83 pounds per person.

### WATER CONSUMPTION

Our local water systems are the second-largest users of the region’s water supplies, after power generation. This indicator measures average gallons per day of water withdrawn from water supply sources by local water systems, and reports it on a per person served basis. North

Carolina requires reporting every five years of water withdrawals by all local water systems over a certain size (1,000 service connections or 3,000 people,) including municipal, county, or private systems. Reported water withdrawals include purchases of water from other systems and exclude sales of water to other systems, yielding a “local consumption” figure. The data does not include withdrawals by users other than



local water systems, such as for agriculture or power generation, water drawn from individual wells, and permitted water intakes by residential or industrial water users. Data are available by county and for the region, for 1992, 1997, and 2002. Comparable data for 2007 are not yet available.

Mecklenburg County’s per person water withdrawals from local water systems remained in the range of 150-

165 gallons per day from 1992 to 2002. By comparison, the 11-county region was using water at the rate of 185-190 gallons per person per day in 1992 and 1997, but decreased its usage to 160 gallons per person per day in 2002.

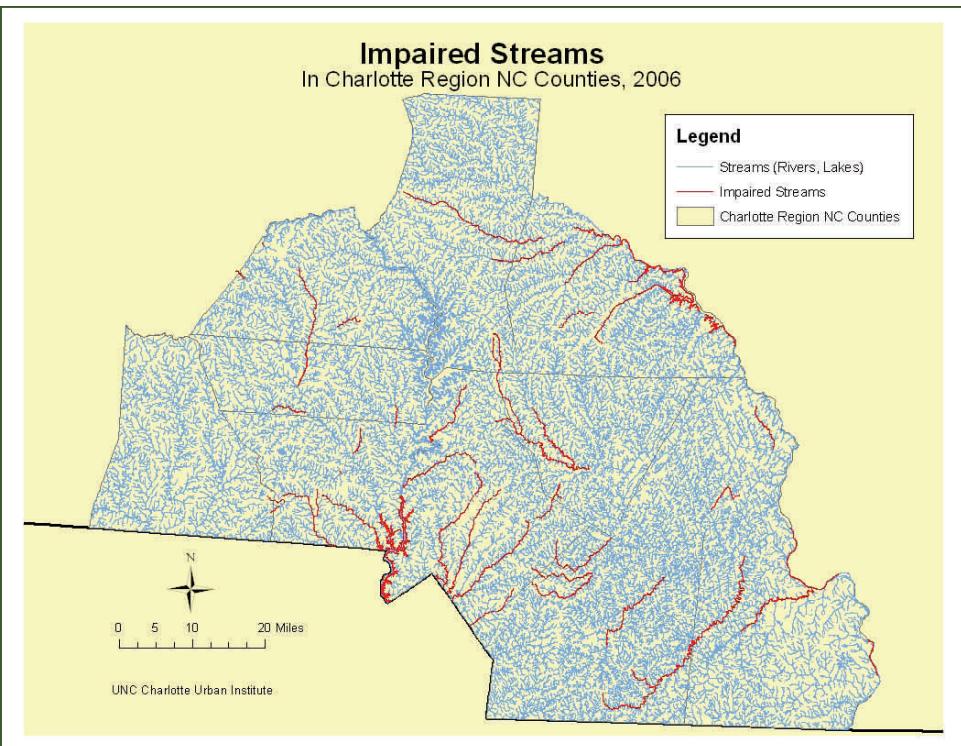
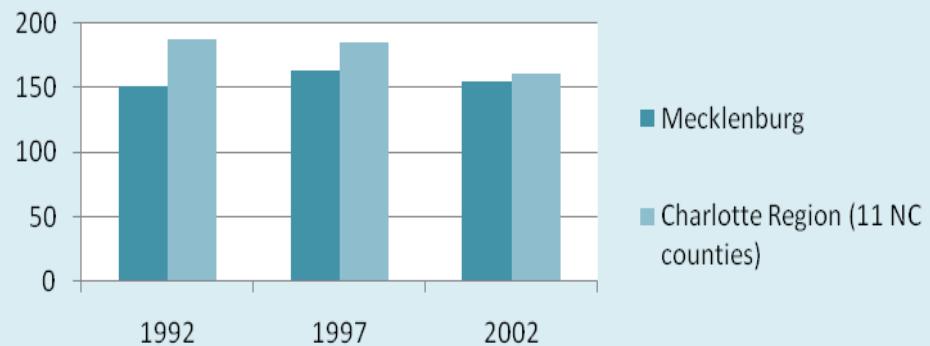
An important point to keep in mind is that local water systems supply the water needs of some, but not necessarily all businesses and residences within their service area, and that the nature and proportion of those categories of customers may vary from system to system and county to county. For example, one community may have more industrial companies that have their own water intake permits than another community in which most businesses are on the public water supply system. The indicator does not represent "household water usage," but rather the water usage of the combination of households and businesses on the water system.

## IMPAIRED STREAMS

Polluted lakes, rivers and streams can negatively impact activities such as fishing and swimming, increase drinking water treatment costs, and reduce the viability of aquatic ecosystems. The federal Clean Water Act requires states to collect and report data on streams with impaired water quality by measuring pollutants that exceed standards for the stream's intended use or designation. The term "stream" encompasses all surface waters, including rivers and lakes. This indicator looks at impaired stream miles as a percentage of total stream miles in the 11 North Carolina counties in the Charlotte region. In 2006, North Carolina published for the first time a map of perennial streams, rivers and lakes in Geographic Information Systems (GIS) format showing both impaired and non-impaired stream segments, making computation of the percentage of impaired stream miles practical for inclusion in the Indicators Project. The state's Impaired Streams report

## Average Daily Water Consumption From Local Water Systems, Gallons Per Person (1992, 1997, 2002)

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In 2006, the 11 NC counties including and around Mecklenburg had 16,546 stream miles, 5.6% of which were impaired.

for 2008 has not yet been finalized, and the 2010 GIS-formatted data are not yet available.

## LANDFILL WASTE DISPOSAL

The costs of landfill disposal are large and increasing. Reducing landfill solid waste disposal is a state goal that has not enjoyed much success, despite increases in recycling programs and other public awareness efforts. This indicator quantifies the disposal in landfills of municipal solid waste (MSW) and construction and demolition (C&D) debris on a per person basis. North Carolina maintains annual data by county on combined MSW and C&D waste disposed at landfills. That data excludes waste "imported" from other counties and includes waste "exported" to other counties, providing a measure of waste generated from within each county that is disposed at landfills. The indicator uses the total tons per year of MSW/C&D waste disposed at landfills, divided by the county population and converted to pounds per person.

Mecklenburg County's annual landfill waste disposal rate was in the range of 3,225 to 3,325 pounds per person for most of the time period from 2004 to 2008. It rose, however, to 3,641 in 2006, and declined only slightly to 3,561 in 2007. By comparison, the 11-county region's trend followed a similar trajectory, but at lower levels in the range of 2,845 to 3,215.

## DEVELOPED ACREAGE

This indicator measures developed land in acres per person. Over time, it illustrates how land development is keeping pace with population growth. UNC Charlotte's Center for Applied Geographic Information Science (CAGIS) uses satellite imagery to assess the amount of developed land (excluding agriculture) at four time periods roughly ten years apart from 1976 to 2006.

Development-related data for those four time periods (slope, road density, location of urban centers, location of interstate interchanges, and location of existing development) are then used to develop a predictive model of future development. When combined with population projections from the state demographer's office, the model's results yield projections for developed

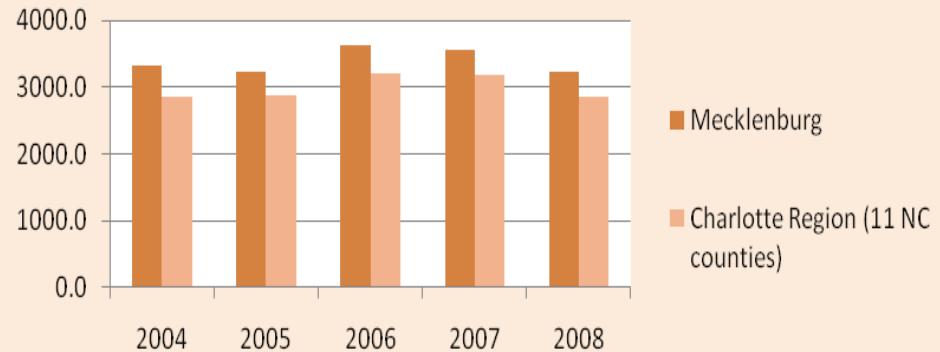
## Landfill Waste Disposal

Average Annual Pounds Per Person (2004 - 2008)

Municipal Solid Waste / Construction & Demolition Debris

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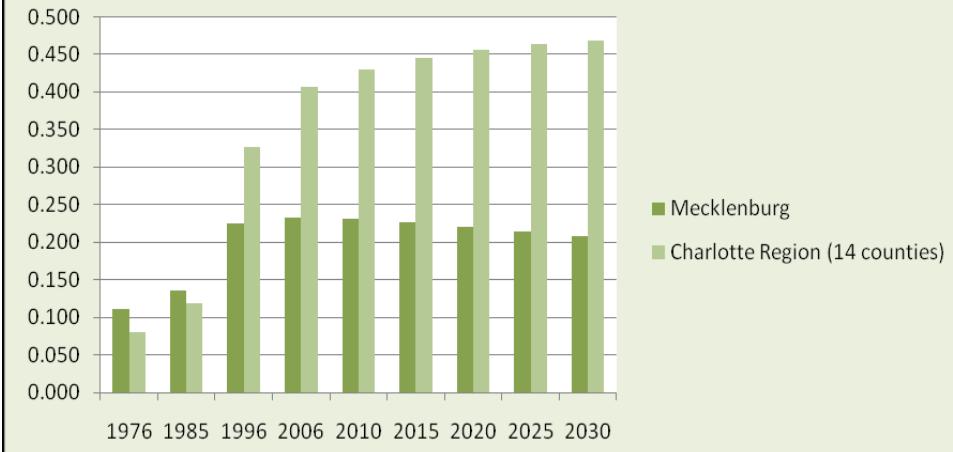
## Developed Acres Per Person

(1976, 1985, 1996, 2006, and projected

for 2010, 2015, 2020, 2025, 2030)

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acres per person, by county and for the region, for 2010 through 2030.

In 1976 and 1985, Mecklenburg County residents' "development footprint" was larger than the regional average. By 1996, both the County and the region had seen significant jumps in developed acres per person, with the region now having the larger average development footprint. In 2006, Mecklenburg County's developed acres per person remained virtually unchanged at 0.23, especially compared to the region,

which had increased its average developed acres per person by almost 25%, to 0.41. Looking into the future, Mecklenburg is expected to slowly decrease its development footprint even as it grows in population, reflecting a denser pattern of development through 2030. By comparison, the region is expected to continue increasing its per person development footprint as population grows.

## CONCLUSION

On all of the environmental quality of life measures that provide breakouts by county, Mecklenburg County performs somewhat better than the region as a whole. While this is true on a per person basis, Mecklenburg's large population means that in terms of total amounts of air pollutants or solid waste generated, total consumption of water, and total developed acreage, Mecklenburg County's is the largest contributor to these regional issues affecting our environmental quality of life.

As the region and Mecklenburg County continue to grow in population, the negative impacts of these environmental concerns will grow as well, unless we can improve the efficiency with which we use our air, water, and land resources, reducing the per person negative impacts. Each of us has a contribution to make, first in

our own lives – becoming more aware of ways we can reduce, reuse, and recycle and minimize our “environmental footprint” – and then in becoming informed and engaged participants in public policy dialogue on these issues. The Indicators Project's ongoing tracking of these environmental quality of life measures will allow us to see where we are making good progress and where more improvement is needed.

Population (update)		
in Mecklenburg County and the 14-county Region		
Population		
	Mecklenburg	Region
1970	354,656	1,215,422
1980	404,270	1,400,247
1990	511,433	1,620,075
2000	695,454	2,038,719
2008	877,007	2,598,084

Note: Population estimates are from the U.S. Census, except for 2008 data, which are from the NC and SC State Demographers Offices

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*Photo on page one by Nancy Pierce*