Local Comprehensive Land Use Plans in the North Carolina Piedmont: Forty Years of Natural Resource Planning Trends

by

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Executive Summary

Many North Carolina (NC) local governments choose to produce comprehensive land use plans. Outside of coastal areas, NC State law does not require plans. The General Assembly has provided several legislative studies of comprehensive planning, along with guides and incentives for local governments preparing comprehensive plans. Additionally, the State has made laws and regulations intersecting comprehensive planning issues related to natural resources. This study of local plans in the NC Piedmont, across forty years, provides insight into different areas of natural resource planning, parallel to state law and initiatives. Recommendations for state, regional, and local interactions are described.
I. Introduction and Background
What is a comprehensive plan and what purpose does it serve?
The comprehensive plan is a base tool in an overall suite of policy, planning, and action approaches to land use issues and physical development. The comprehensive plan coordinates and integrates policies and actions for various topics as well as separate functional plans and silos, creating a framework to bring together the content of stand-alone plans made in response to federal or state mandate or to the missions of non-governmental or professional organizations. The plan provides a framework to resolve conflicting and interdependent resource needs and address regional governance dilemmas, such as water supply and transportation. Plans offer strategic guidance and policies that underpin more targeted regulations and public investments.

What should comprehensive plans address and how?
Several components are considered best practice in plans. The plans should address a systemic set of interrelated social, economic, and environmental issues, with plan elements often organized as: Transportation, Housing, Economic Development, Facilities and Infrastructure, Natural Resources, and Land Use. Plans should progress through five components: 1) overview, 2) issues and vision statement, 3) information base, 4) goals, objectives, and policies, and 5) policy action commitments. See Appendix A for definitions. Plans are more complete and have greater potential to guide development if they progress through these components, from overview and issues to policy action commitments.

Local plans in North Carolina
North Carolina (NC), unlike other states, does not mandate the preparation or content of local comprehensive or land use plans (outside coastal counties). Therefore, whether and how local governments address natural resource issues in their plans is a local choice. This report examines whether local governments chose to address environmental issues in their comprehensive and land use plans, what issues they addressed, and how attention to the issues changed between 1970 and 2011.

While NC has generally left land use planning and regulations to local governments, NC and Federal entities have stepped in with targeted regulations affecting land use. The Federal government is the primary creator of environmental protection regulations, with responsibility often passed through the State, down to local governments. Local governments adopt ordinances related to natural resources when required by the State, but to what degree do their locally driven plans, visions, goals, and objectives address natural resources? NC lawmakers have recognized the importance of comprehensive plans in light of environmental resource issues.

II. Research Question
The research examined how natural resource planning expressed in local plans changed in NC Piedmont jurisdictions that have experienced substantial and sustained growth. This report demonstrates how the issues/vision, goals, information base, and objectives for water supply, water quality, soils, floodplains/wetlands, open space, farmland, air quality, and energy have changed in the plans of Piedmont growth jurisdictions between 1970 and today. Little substantive research on land use plans in these areas exists.

III. Methodology and Limitations
Cross-sectional and longitudinal data were collected through content analysis of the land use and comprehensive plans of local governments in NC Piedmont that had substantial and sustained population growth between 1980 and 2009. This study group included eight counties and 37 municipalities. See Appendix B. These jurisdictions were asked to provide each edition of plans from 1970 to the present (October 2011). Eight counties and 35 municipalities responded with a total of 97 plans. This represents: 96 percent of the study group jurisdictions, 99 percent of study group population, and 99 percent of the study group land area. Therefore, the results are representative of the study group.
The content of each plan was analyzed to see if each natural resource topic was discussed in the issues/vision of the plan, and if goals, information base, and objectives were included for each topic. To ensure reliability in identifying the plan and the components within, definitions were developed from planning and public administration literature to define plan, issue/vision, goal, information base, objective, policy, and the natural resource issues. See Appendix A.

The study provides insight into how the existence and prevalence of issues/vision, goals, information base, and objectives related to natural resources has changed in plans of local governments over time. The study does not attempt to ascertain or analyze the quality of plans or components. The study does not attempt to gauge success of implementation of plan policies. However, these are reasonable next steps for research.

IV. Findings and Analysis
The general trend is that vision and goals for all natural resources increased between 1970 and 2011, with the exception of water supply planning. However, vision and goals grew without matched growth of information base (to assess issues) or objectives (to measure implementation), with the exception of flood mapping information base.

Water Supply
Growing population demand for water and increased drought events\textsuperscript{10}, especially in recent decades, would lead one to expect increased evidence of water supply planning alongside land use and development planning. However, water quantity as an issue in the plans has declined since the 1970s, from 76 percent to 50 percent in 2010s. (See Figure 1.) Additionally, goals for water quantity generally declined down to 20 percent after an increase from zero to 45 percent in 1980s.

These trends seem in contrast to State initiatives and laws. In 1989, NC began water supply planning initiatives after the 1988 severe drought. In 1992, State law required local governments to submit local water supply plans (LWSP) to the NC Department of Environment and Natural Resources (NC DENR)\textsuperscript{11}. In 2006, State law gave priority points for Drinking Water Reserve loan and grant funding applications to local governments who adopt comprehensive land use plans.\textsuperscript{12}

These countering trends lead one to believe there is a gap between water supply planning and land use/growth planning. Did water supply planning become more the purview of specialized local

<table>
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<th>Percentage of Plans from 1970-2011 with Water Supply Issue and Goals</th>
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| ![Graph showing percentage of plans with water supply issues and goals from 1970 to 2011.](image)
| 1970s | 1980s | 1990s | 2000s | 2010s |
| Water Supply Issue |
| n=17 | n=22 | n=19 | n=29 | n=10 |
| Water Supply Goals |

Figure 1
departments in response to State required LWSP, leading to less coordination with land use and development planning? Until 2006, State law had not directly tied water supply planning to development planning; even then, the tie was a weak one, connecting the plans only through additional points for optional State funding.

Planning for new water reservoirs is a function of property patterns, development, and jurisdictional boundaries, indicating the need for coordination with local and regional comprehensive and land use plans. The data reinforce previous findings by the 2008 Water Allocation Study, which indicated local governing boards might not understand the degree to which their water supply is capable of supporting desired growth.

Water Quality, Stormwater, & Flood Planning
Water quality had a consistent and growing presence as an issue in the plans, growing from 76 percent in the 1970s to 90 percent in 2010s. (See Figure 2.) How the plans framed the issue of water quality has changed, with early concerns of septic systems contaminating groundwater to more recent focus on stormwater, nutrient discharge, and floodplains and how these affect surface water used for public consumption. Stormwater or drainage as an issue in plans grew from 71 percent in 1970s to 90 percent in 2010s. Flooding as an issue in plans was more sporadic but remained between 68 and 88 percent.

Goals for water quality had an even greater increase, suggesting progression from merely recognizing the issue to a more developed plan for water quality. Thirty-five percent of plans had goals for water quality in the 1970s growing to 80 percent in the 2010s. (See Figure 2.) Goals included: creating and protecting riparian buffers, reducing stormwater runoff, reducing and relocating development in floodways and floodplains, and limiting development in watershed water supply areas. Plans with stormwater or drainage goals increased from 18 percent in 1970s to 69 percent in 2000s. Plans with flooding goals increased from 47 percent in the 1970s to 72 percent in the 2000s.

Information base, such as flood mapping or defined areas of impaired waters, to further develop plans and build objectives for water quality were mixed. Information base for water quality and stormwater planning were not as prevalent as goals. Information base included in plans, relative to water quality, were sporadic ranging between 20 and 48 percent. However, flood related information base increased, after a slump from the 1970s to the 1980s. Flood information base grew to 70 percent of plans in 2010s from a 23 percent low in the 1980s, likely due to Federal and State mapping efforts.
The general upward trend in water quality and stormwater planning mirrored Federal and State law and incentives.15 The parallel of trends between law and local planning suggest local governments in this study understand the tie between water quality issues and regulation of growth and development.

The sporadic nature of flooding as an issue in plans may reflect reform and dramatic changes in Federal and State policy, moving from providing insurance subsidies for development in flood hazard areas to increasingly narrowed regulation to avoid development in flood areas.16 NC implemented narrower regulation of development in flood hazard areas in 2000, additionally authorizing local governments to designate even narrower regulations. Local governments appear to have responded by using newly developed flood maps in plans and increasing goals related to floodways, floodplains, and wetlands.

Open Space and Farmland
Open space was consistently the most recognized natural resource by local governments. As early as the 1970s, 82 percent of plans addressed open space as an issue and grew to 90 percent of plans by 2000s. Open space goals grew steadily between 1970 and 2011, from 41 percent in the 1970s to a high of 86 percent in 2000s.

Open space planning experienced synergy with goals and funding for: water quality, flood mitigation, wetlands, transportation, recreation, farmland, working forest, wildlife habitat and natural heritage sites, from numerous Federal and State program initiatives (along with nonprofit initiatives).17 Local governments and nonprofits preserved open space: in floodplains, riparian buffers, alternative transportation routes, and parks. State law and initiatives recognized the relation of open space to land use and conservation, but did not directly tie it to comprehensive planning or land regulations.18

Farmland is often considered a type of open space. The plans recognition of farmland as an issue had a modest showing. In the 1970s, 47 percent of plans considered farmland an issue and increased slightly to 60 percent of plans by 2010s. Goals and information base showed the greatest increase in the 1980s, from 18 percent to 41 percent and 24 percent to 41 percent, respectively. Goals and information base stayed around this level through the 1990s and onto the 2010s.

The greatest increase in goals and information base for farmland occurred parallel to the 1985 NC Farmland Preservation Enabling Act. The Act did not directly tie farmland to comprehensive planning. The Act did reward counties that prepared a countywide farmland protection plan with more matching funds than for counties without a plan.19 Sustained goal and information base levels beyond the 1980s may have been influenced by the 2005 Agriculture Development and Farmland Preservation Trust, which granted $7.6 million dollars between 2006 and 2008.20

Air Quality and Energy
Air quality had a consistent and growing presence as an issue in the plans, growing from 59 percent in the 1970s to 90 percent in 2010s. How the plans frame the issue of air quality has changed, with early concern to avoid attracting businesses that produce unpleasant fumes to more recent focus on vehicle miles traveled, development patterns, and transportation. Goals for air quality have also grown, from 35 percent in 1970s to 50 percent in 2010s. Information base and objectives for air quality were rarely found in plans.

Energy as an issue in plans and related goals were significant in the 1970s, but declined dramatically until recent years. In 1970s, 53 percent of plans considered energy as an issue and 29% of plans had energy related goals. In the 1990s, 5 percent of plans considered energy an issue. In the 2010s, 80 percent of plans considered energy an issue and 50 percent of plans had energy related goals. Plans of the 1970s focused on gasoline shortages; recent plans focused on rising gasoline cost and energy consumption of buildings.
State regulations or incentives for local governments were not the compelling factor for increased recognition or goals for air quality and energy. Air quality and energy in plans may have been driven by quality of life interest, or economic and environmental sustainability interests. The framework of a comprehensive plan offers a role for addressing these interests in the context of varied land use issues.

V. Discussion & Conclusions
This study has focused on one aspect of comprehensive planning, natural resources. The results of this study suggest State mandates and incentives that directly tie issues to land use and comprehensive planning have the most effective result in compelling local comprehensive planning. This is most evident when comparing water supply and water quality issues and goals in the plans. State regulations tied water quality directly to land use and development planning early in inception. Water quality made the strongest increase in local plan issues and goals. State regulation did not tie water supply to land use or development planning until 2006, more than 15 years after State initiatives. Water supply as an issue or goals had the largest decrease in local plans. Open space and farmland are more intuitively tied to land use planning, as they are land types. Open space and farmland were tied to planning and funding but not directly tied to regulations or local comprehensive planning like water supply and water quality. Increase in open space and farmland as an issue in the plans or goals may have been driven by State funding.

The State is a catalyst for change in local planning and should be cognizant of the individual and aggregate effect of mandates and incentives on local plans and community development. Local plans have increasingly addressed and created goals for natural resource issues since 1970, especially when tied to land regulation, funding, and comprehensive planning. The increase in issues and goals mirrored State mandates and initiatives. However, the existence and increase for information base and objectives in plans remained low, with the exception of flood mapping which was largely provided by the State. Communities respond to regulations, mandates, and funding and look to the State to inform local comprehensive planning by providing information base.

VI. Recommendations
State Lawmakers and Administrators
State level involvement in planning (not just regulations) is strongly associated with the strength of local goals, information base, and policies in plans. 21 Four recent NC legislative studies have recommended the State increase support for local planning through promoting, funding, and providing technical and information resources for a comprehensive approach to land use and development issues, and regional coordination of shared governance dilemmas. 22 Additionally, a recent study of state influence on local plans showed building local commitment (especially local elected officials) and clarity of goals provided by the state (avoiding vagueness) are most highly correlated with quality local goals, information base, and policies. 23

Incremental and reactive regulation and incentives have had mixed effects on local planning. A systemic planning approach to land use issues could provide better leadership for the state’s communities. The State should supplement and build on the extensive local plan making experience that exists, not supplant plans and local planning experience. Considerations will be needed for growing and shrinking communities, among piedmont, western, and eastern regions.

UNC-CH School of Government and Master of Public Administration Program
Comprehensive planning is a uniquely local government endeavor. The author challenges the School of Government and the Master of Public Administration Program to examine how coursework is preparing managers, boards, and public service leaders to better understand: comprehensive planning, the interrelated nature of local planning issues, regional governance dilemma of planning issues, and how to work with local and regional plans and planners.
2 Ibid., 11.
5 Ibid., 9.
7 G.S. 160A-383, G.S. 159G-23 (4), and G.S. 159G-10 (5.1b)
http://www.neleg.net/enactedlegislation/statutes/html/bychapter/chapter_160a.html
http://www.neleg.net/enactedlegislation/statutes/html/bychapter/chapter_159g.html
8 Jurisdictions of substantial and sustained growth are counties and municipalities that experienced moderate or high growth in the NC Piedmont, consistently from 1980 till 2009. Growth data and definitions are from the NC Office of State Budget and Management.
http://www.osbm.state.nc.us/ncosbm/facts_and_figures/socioeconomic_data/population_estimates/county_estimates.shtm
http://linc.state.nc.us/
9 See Appendix A for definitions
10 http://www.nc-climate.ncsu.edu/climate/climate_change#Severe
12 G.S. 159G-23 (4)
http://www.neleg.net/enactedlegislation/statutes/html/bychapter/chapter_159g.html
14 Ibid., 49.
15
- 1968 National Flood Insurance Act required adoption of local floodplain management ordinances as a condition for property insurance and provided for Federal flood mapping
- 1977 Federal Clean Water Act
- 1986 NC voluntary water quality program
- 1989 NC water quality law requiring local governments with surface water used for drinking water supply (water supply watersheds) to adopt minimum land use regulations to protect surface water, especially non-point source pollution from stormwater runoff.
- 1994, all local governments with water supply watersheds had adopted a local watershed ordinance.
- 1997, state law gave priority points for clean water revolving loan and grant funding applications to local governments who adopt comprehensive land use plans
- 2004, 49 local governments had adopted a sedimentation control ordinance that met or exceed state standards.
- 2007, phase II local adoption of stormwater management programs began.
- 2008 and 2010 regulations narrowed requirements further with soil erosion control plans required for developments and water basin specific water quality rules including: Neuse River Basin, Catawba River Basin, and Jordon Lake.
The National Flood Insurance Act and Insurance Program of 1968 provided insurance options for property in flood hazard areas. The 1994 and 2004 National Insurance Reform Acts increased development and redevelopment regulations and provided for increasingly more accurate and useable flood mapping.

- Clean Water Management Trust Fund for state and local acquisition of land for riparian buffers
- Federal Emergency Management Act’s Flood Mitigation Assistance Program
- Land and Water Conservation Fund for state and local parkland acquisition
- National Recreation Trails Program for state and local acquisition and development of land for trails
- NC Farmland Preservation Program to acquire development rights or conservation easements of agricultural land
- NC Parks and Recreation Trust Fund for state and local parks and open space protection
- Transportation Enhancement Grant for state and local open space preservation
- Water Resources Development Grants Fund for state and local land acquisition
- NC Wetlands Restoration Program for acquisition and restoration of wetlands

G.S. 113A-241
G.S. 106-744 (c).
Owens, Land Use Law in North Carolina, 262.
McKissick, Floyd B. et al "Legislative Study Commission on Urban Growth and Infrastructure Issues: Final Report to the 2011 General Assembly." North Carolina General Assembly (2010). 11.
No legislation was adopted as a result of recommendations in these reports.

Acknowledgements
I gratefully thank my capstone committee, dubbed “the dream team,” for their valuable insight and guidance: David Owens, Richard Whisnant, and Glenn Barnes. I thank Philip Berke for his dedicated teaching and writings. I also thank the planners, managers, and staff of the study jurisdictions for accommodating my request for plans, which surely required them to dig into their coffers. Finally, thank you to Steven Sandifer and Christine Perkins for their constant encouragement and confidence.
Appendix A

Below are the definitions used to guide discovery and detection of plan components and natural resource topics.

PLAN AND COMPONENTS

**Goal:** A component of the plan which includes broad statement(s) of intentions, policy, or desired future conditions, sometimes based on more in-depth discussion of issue/vision addressing needs and aspirations.

**Information base:** This component of the plan can include: numerical measurement of an issue, referenced data, or mapping data; factual data for validating an issue or need, may include existing and projected data, may be used to inform setting goals and objectives. Examples include: existing and future population data, maps or tables indicating acreage and location of farmland, and maps indicating floodways and floodplains. Also called fact base.

**Issue or Vision:** A component of a plan that identifies a matter of concern, a factor that may affect the future, or a conception of what the jurisdiction ought to be.

**Objectives:** Specific and measurable extension of a goal or policy, in the form of action or policy.

**Plan:** Comprehensive plan, land use plan, development plan, or general plan addressing issues related to land use. The report uses the terms “comprehensive plan”, “land use plan”, “development plan” interchangeably. However, a comprehensive plan is broader than a land use or development plan as it incorporates social and economic issues as well as land use and physical development issues.

The study did not include small area plans if a base plan driving the small area plans existed. If no base plan existed, small area plans in aggregate were used to represent the jurisdiction. If a jurisdiction did not update each element of the plan simultaneously, meaning elements were updated over a period of several years, then the plan was dated at the last element update. For example, if 4 elements of a plan were updated in 2000, 2001, 2003, and 2006, the aggregate plan was dated 2006 for the purposes of this study.

NATURAL RESOURCE TOPICS

**Air Quality:** An indication of healthiness or safety of air, may consider pollutants from point sources or non-point sources.

**Energy:** Supply, consumption, efficiency or conservation of any fuel source as it relates to comprehensive planning issues and development.
**Farmland:** Land used for crops, pasture, or timber

**Flooding or Wetlands:** Phenomenon of high quantity waters overflowing waterways affecting: floodways, floodplains, and wetlands

**Open Space:** Lands that are not developed; may include greenway, vacant, farm, wood or parklands

**Stormwater or Drainage:** Surface water and runoff due to storm event; water shedding and absorbing characteristics

**Water Quality:** An indication of healthiness or safety of water, may consider pollutants from point sources or non-point sources

**Water Supply:** Water quantity, storage capacity, typically measured in millions of gallons per day. Does not refer to supply in the sense of supplying areas of a jurisdiction through piping infrastructure.
Appendix B

Study Group: 8 Counties and 37 Municipalities

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Durham County

Durham

Orange County

Carrboro
Chapel Hill
Hillsborough

Alamance County

Burlington
Elon
Graham
Mebane

Guilford County

Gibsonville
Greensboro
High Point
Jamestown

Forsyth County

Clemmons
Kernersville
Rural Hall
Winston-Salem
Bibliography


