

1st Annual

State of the Environment Report

February 18, 2000

Prepared by the
Orange County
Commission for the Environment

Orange County
Environment and Resource Conservation Department

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Dear Reader,

Orange County's environment *is* Orange County, and to the extent that we maintain its integrity is the extent to which we maintain our quality of life. To be successful, the county's environmental policies must safeguard the quality of its air, the quality and quantity of its water, the integrity of its forests and farmland, and its rural character, open space and recreational opportunities.

In today's climate of rapid development, escalating costs for services and competing interests from both within and outside the county, environmental policies must be more specific than ever before. These environmental policies must also work with, rather than at cross-purposes to, each other and other county policies. And finally, environmental policies today must also address a longer term horizon than ever before, yet remain flexible enough to be adjusted according to new scientific understandings and technologies.

The Commission for the Environment has taken these needs into its consideration of matters affecting Orange County's environment. The attached State of the Environment report assesses the county's status in three focus areas:

- air quality
- biological resources
- environmental indicators and education

We look forward to the discussion of the materials herein and hope that they will inspire frank and vigorous dialogue about the many issues that affect Orange County as we work together to ensure a sustainable future.

Sincerely,

Kris Price, Chair
Commission for the Environment

Orange County
State of the Environment Report –2000

Executive Summary

February 7, 2000

The 1st annual State of the Environment report was developed by the Orange County Commission for the Environment, which advises the Orange County Commissioners on matters related to the County's natural environment. The Commission is comprised of 14 members and operates both as a committee-of-the-whole and in three committees that examine key components of the County's environment. The report is based on the work of these three committees -

- **Air Quality**
- **Biological Resources**
- **Environmental Indicators and Education**

- and is organized in this fashion, as three separate reports from the committees. The Commission adopted the three reports as its first State of the Environment report on December 6, 1999.

In developing the reports, each committee spent time in Commission meetings and in special sessions exploring existing data and trends, evaluating and discussing ideas and issues, and developing goals and recommendations for the Board's consideration.

As a result of a growing population, Orange County faces significant challenges to maintain its environmental quality. The Commission for the Environment is attempting to identify the status and trends of environmental quality in the County and to develop goals and recommendations to address environmental quality issues.

The following sections briefly highlight issues, goals and recommendations from each report. Note: this document is not intended to summarize all of the substantial findings and trend analysis contained in the reports.

Part I: Air Quality

Status/Issues:

- Mobile sources (motor vehicles) are the dominant source of air pollutants in the County
- Orange County may not meet National Ambient Air Quality Standards for ozone (i.e., be designated non-attainment) in the future if trends continue
- Quantitative measurements of air quality are lacking in the County

Goals:

- Greater awareness of transportation and air pollution issues in the County
- Need for a regional view of air quality issues
- Reduction in of County fleet on air quality

Recommendations:

- Attempt to increase amount of information available about County air quality (need for ozone monitoring in Orange County)
- County should assume a stronger role and be more proactive in addressing air pollution (such as recent actions taken to purchase low-emission vehicles for County vehicle fleet and institute ozone action plan)
- Greater support for alternative modes of transportation
- County should pursue Mobile Source Emission Reduction Grant in December 2000 for alternative-fueled vehicle pilot project

Part II: Biological Diversity

Status/Issues:

- Forest loss and fragmentation from residential construction (10% over the last decade)

Goal:

- Slow, halt or reverse natural area and resource losses (goal of 10% of County lands protected in some fashion by the year 2010)

Recommendations:

- Direct more county and matching funds toward acquiring critical natural resource lands (planned Lands Legacy program)
- County codes, ordinances, and regulations should better promote protection of biologically-significant sites
- Greater coordination of regional conservation across County boundaries
- Develop better monitoring/assessment programs for biological diversity and forest loss, such as review and update of the 1988 Inventory of Natural Areas and Wildlife Habitat

Part III: Environmental Indicators/Education

Status/ Issues:

- Parkland deficit of 645 acres in 2000, based on population standards
- Farmland has declined by 76% from 1967-1996, and 10% of hardwood forests have been lost in the last decade
- Increased vehicle miles traveled (up 43% from 1987-1997); limited bicycle-friendly infrastructure

Goals:

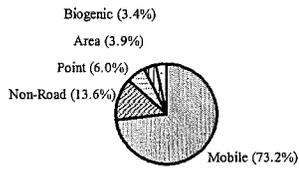
- Need more precise planning to avoid loss of future losses of key resources
- Need method of assessing sustainability levels via indicators that can be measured and evaluated annually
- Coordinate with environmental recommendations identified by other committees

Recommendations:

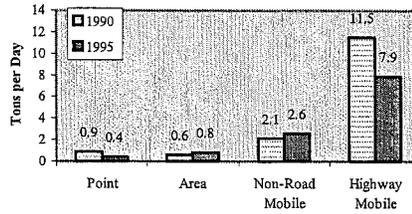
- Adopt and implement a farmland preservation plan including transfer of development rights (TDR) and purchase of development rights (PDR). Preservation of farmland will help the County's overall environment.
- Commit funds to developing bikeways according to the Bicycle Plan
- Update the natural areas inventory
- Use the Shaping Orange County's Future sustainability indicators report to begin monitoring the County's progress, and fund dissemination of the report when ready
- Increase dramatically public outreach and education, including expansion of the County ERCD/CFE web site for these purposes
- The Planning and ERCD departments should develop a more cohesive plan for open space that involves revising existing tools (such as the Environmental Impact Ordinance) and implementing new tools that the CFE is continuing to evaluate.

For more information or to receive a copy of the full report, visit the Environment and Resource Conservation Department web site at www.co.orange.nc.us/ercd, or call 245-2597.

Sources of NOx Emissions



Orange County NOx Emissions



STATUS of AIR QUALITY IN ORANGE COUNTY

Prepared by

The Orange County Commission for the Environment
Air Quality Committee

Prepared for

The Board of County Commissioners
Orange County, North Carolina

November 14, 1999

EXECUTIVE SUMMARY

Introduction

Clean air is a national, state, and local goal, the importance of which is well recognized. The Board of County Commissioners (BOCC) of Orange County has demonstrated their concern for protection of the environment and air quality in many actions that they have taken. In 1997, the BOCC approved creation of the Commission for the Environment (CfE). The mandate of the Commission is to advise the BOCC on matters affecting the environment, with particular emphasis on environmental protection. During the past year, the CfE has proposed the following resolutions related to air quality which were approved by the BOCC:

- a) Resolution to Create an Ozone Air Quality Action Plan for Orange County. Status: plan developed and implemented in summer of 1999
- b) Resolution Regarding Future Purchase of Low Emission and Fuel Efficient County Vehicles. Status: on-going activity
- c) Resolution for a Recommendation that Orange County Establish a Committee to Research a Plan for Use of Alternative-Fueled Vehicles, Improved Fleet Maintenance, ... and the Potential for Submitting a Mobile Source Emissions Reduction Grant Application. Status: on-going activity.

To assist the BOCC in identifying issues of concern to its constituents with respect to environmental quality, the Air Quality Committee of the CfE has prepared this report, which summarizes information about air quality in the County. It also includes goals and recommendations for actions that may maintain and/or improve air quality in the County.

Status of Air Quality in the County

The following briefly highlights the status of air quality in Orange County:

- a) Based on available information, mobile sources appear to be the major contributor to air pollutant levels in the County,
- b) Based on U.S. Environmental Protection Agency (EPA) models, 73% of the emissions of nitrogen oxides, precursors of ozone, are from mobile sources in Orange County compared to only 6% from stationary sources,
- c) The average vehicle miles traveled per person in Orange County increased from 20 miles per person in 1987 to 28 miles per person in 1997, a 40% increase,
- d) There are only 20 permitted stationary sources in the County and most are small sources,
- e) There is little historical data on air quality in Orange County; the only historical data are for carbon monoxide, a pollutant of decreasing concern to the U.S. EPA; carbon monoxide monitoring in Chapel Hill will be discontinued in 2000,
- f) A PM_{2.5} (fine particulate matter with a mean diameter of *less than 2.5 μm*) *sampler* was set up in Chapel Hill in 1999 in response to listing of PM_{2.5} as a criteria pollutant by the EPA; the monitor will facilitate trend analysis in the coming years,
- g) Other than PM_{2.5}, no other air pollutants are monitored anywhere in Orange County,

- h) Recent data from ozone monitoring sites in Chatham, Durham, and Wake County suggest that ozone concentrations are exceeding the ambient air quality standard at an increasing rate in recent years, and
- i) The State of North Carolina does not intend to locate an ozone monitor in Orange County in spite of the concern about ozone and its impact on human health.

Goals

The CfE has reviewed the goals developed by the Environment and Resources Protection Committee in the *Report of the Shaping Orange County's Future*. These are admirable goals that the County should address over the long term. We suggest that there are four primary goals that should be addressed in the short-term that will help meet the long-term goals, and may ultimately have significant impact air quality in the County. Those goals are the following:

- a) Gain a better *quantitative* understanding of the sources of air pollution in the County and the relationship between air quality and mobile sources within and outside the County,
- b) Gain a better understanding of *transportation issues* within the County and the region,
- c) Identify and define the role of Orange County in regional transportation issues and planning, and
- d) Reduce the impact of the County fleet on air quality.

Needs and Recommendations

To address the goals identified by the CfE and Shaping Orange County's Future, there are a number of actions that that can be taken, including the following:

- e) The County should commit matching funds for a Mobile Source Emissions Reduction Grant. A grant application should be submitted to the State of North Carolina Department of Environment and Natural Resources (DENR) in the next cycle (December 2000). One potential proposal is for the County to purchase alternative fuel vehicles for use by selected County agencies or Departments. The County's portion of funds would be for vehicles and refueling stations. The grant money from DENR would offset differences in costs between conventional vehicles and low-pollution alternative vehicles. Based on recent successful applications, the County should commit approximately \$80,000 to \$120,000 for a project to reduce mobile source emissions in the County. The scope of the project should be determined by County agencies and departments with the assistance of the County Transportation Planner and the CfE.
- f) The County should commit staff support to work on issues related to air quality and transportation in the County. We recommend that at least 5 to 10% of the time of one staff member in the Environment and Resources Conservation Department be devoted to research and data collection on air quality issues. We recommend that the County Transportation Planner in the Planning Department should spend at least 5 to 10% of his/her time in support of research and data collection on transportation issues as they impact air quality. Issues requiring staff support include the following:

Air Quality Issues and Recommendations:

- g) The County should evaluate its role in managing air quality in the County,
- h) The County should identify its role in management of regional air quality,
- i) The County should actively participate in management of regional air quality,
- j) The County should pursue actions to reduce air pollutant emissions from the County's fleet of vehicles by use of alternative vehicles, improved vehicle maintenance, and reduction in vehicle miles traveled, and
- k) The ERCD, with the assistance of the CfE, should develop initiatives that the County can implement to improve air quality in the County.

Transportation Issues and Recommendations:

- l) The County should collect information to better understand regional transportation issues,
 - m) The County should determine what role it will take in addressing County and regional transportation issues,
 - n) The County should take an active role in planning main travel corridors within the County and between regional jurisdictions,
 - o) The County should aggressively participate in the planning and implementation of alternatives to traditional transportation systems in the region, including light rail systems, bicycle paths, tele-working, etc.
3. The County should intensively lobby State and Federal Agencies to obtain more air quality data in and near the County in order to identify and control the major airborne sources that affect human health, environmental damage, and the quality of life in the County. Of particular concern is the lack of ozone air monitoring data in the County.

1.0 INTRODUCTION AND BACKGROUND

Protecting the environment and the quality of the air we breathe is an important goal for individuals, industry, organizations, and government agencies. Clean air is a national, state, and local goal, the importance of which is well recognized. In the *Report of the Shaping Orange County's Future*, the Environment & Resources Protection Committee recognized the importance of maintaining the current level of air quality in Orange County and setting goals to protect the health of people who live, work, and visit in Orange County.

The Orange County Board of County Commissioners (BOCC) has demonstrated their concern for protection of the environment and air quality in many actions that they have taken. In 1997, the BOCC approved creation of the Commission for the Environment (CfE). The mandate of the Commission is to advise the BOCC on matters affecting the environment, with particular emphasis on environmental protection. The CfE established a number of committees, including an Air Quality Committee. In 1998, the BOCC further demonstrated their concern for the environment by approving the formation of the Environment and Resource Conservation Department (ERCD).

To assist the BOCC in identifying issues of concern to its constituents with respect to environmental quality, the air quality committee of the CfE has prepared this report. The report summarizes available information on air quality collected from sources from the State of North Carolina Division of Air Quality. It also includes goals and recommendations for actions that may maintain and/or improve air quality in the County.

2.0 STATUS OF AIR QUALITY AND AIR CONTAMINANT SOURCES IN THE COUNTY

Under the Clean Air Act, passed by Congress in 1970, and amended in 1990, the U.S. Environmental Protection Agency (EPA) sets and enforces air pollutant limits on sources such as power plants and industrial facilities. Although the Clean Air Act is a federal law, much of the work to carry out the act is performed by the states. Each state has a State Implementation Plan (SIP) that describes how the state will meet the requirements of the Clean Air Act. The federal law allows the states to have stronger pollution controls. The states are responsible for permitting sources and for monitoring air quality to determine compliance with the Clean Air Act.

2.1 Air Contaminants of Concern

The Clean Air Act establishes standards for a set of pollutants termed "criteria" pollutants, which are listed in Table 2-1. A primary national standard has been set that protects human health. A secondary standard is intended to prevent environmental and property damage. The table also lists the North Carolina Standard. A geographic area that meets or does better than the primary standard is called an attainment area; areas that don't meet the standard are non-attainment areas. Non-attainment areas may be required to take special actions to reduce

pollutant emissions, such as implementing vehicle emissions inspections or the use of special gasoline additives. Under extreme cases, non-attainment areas may lose sources of Federal funding (e.g., for highway construction) for failure to take adequate action to meet Clean Air Act requirements. Geographic areas, usually metropolitan statistical areas (MSAs) are used to draw the non-attainment areas. Chapel Hill is generally considered to be part of the Raleigh/Durham/Chapel Hill MSA for the purposes of reporting air quality. But, with respect to the possibility that the Raleigh/Durham/Chapel Hill area may be a non-attainment area for ozone, the non-attainment area has not been drawn. Definition of the area is part of a “designation” process, which has not begun yet. Based on discussions with staff at the NC Division of Air Quality, there are three options for how non-attainment areas could be drawn.

Table 2-1 National and North Carolina Ambient Air Quality Standards^a

Pollutant	Primary National Standard	Secondary National Standard	North Carolina Standard
PM _{2.5} (24-hr avg) ^b	15 $\mu\text{g}/\text{m}^3$	15 $\mu\text{g}/\text{m}^3$	15 $\mu\text{g}/\text{m}^3$
	65 $\mu\text{g}/\text{m}^3$	65 $\mu\text{g}/\text{m}^3$	65 $\mu\text{g}/\text{m}^3$
PM ₁₀ (24-hr avg) ^b	50 $\mu\text{g}/\text{m}^3$	50 $\mu\text{g}/\text{m}^3$	50 $\mu\text{g}/\text{m}^3$
	150 $\mu\text{g}/\text{m}^3$	150 $\mu\text{g}/\text{m}^3$	150 $\mu\text{g}/\text{m}^3$
CO (1-hr avg)	9 ppm		9 ppm
	35 ppm		35 ppm
O ₃ (1 hr avg)	0.12 ppm	0.12 ppm	0.12 ppm
	0.08 ppm	0.08 ppm	0.08 ppm
SO ₂ (1-hr avg)	0.03 ppm		0.03 ppm
	0.14 ppm		0.14 ppm
		0.50 ppm	0.50 ppm
NO ₂ (1-hr avg)	0.053 ppm	0.053 ppm	0.053 ppm
Pb (24-hr avg)	1.5 $\mu\text{g}/\text{m}^3$	1.5 $\mu\text{g}/\text{m}^3$	1.5 $\mu\text{g}/\text{m}^3$

^a Abbreviations; PM: Particulate Matter; CO: Carbon Monoxide; O₃: Ozone; SO₂: Sulfur Dioxide; NO₂: Nitrogen Dioxide; Pb: Lead; Mean: Arithmetic Mean; Avg: Average

^b PM_{2.5}: Fine (respirable) particulate matter with diameter of less than 2.5 μm ; PM₁₀: particulate (inhalable matter with diameter less than 10 μm)

2.2 Air Quality Monitoring Sites in Orange and Adjacent Counties

The State of North Carolina Division of Air Quality is responsible for set up, maintenance, calibration, and operation of sites for monitoring air quality. The State does not monitor all of the criteria pollutants at all of its monitoring sites. Not all counties in the state have monitoring sites. The criteria for determining the locations of the monitoring sites vary by pollutant and depend on guidance given by EPA and the needs of the State of North Carolina to meet the requirements of the Clean Air Act.

At this time, there are only two air monitoring sites in Orange County. Both sites are located in Chapel Hill. They include the following:

- a) Carbon monoxide (CO) monitor - located at 147 East Franklin Street in Chapel Hill. CO is monitored on a seasonal basis from October to mid-March. This monitor has been operated for many years on a seasonal (fall/winter) basis. We have been advised by George Murray of the North Carolina Division of Air Quality that the monitor will not likely be run after this fall/winter season because (1) the EPA is working toward disinvestments in CO monitoring in the future, (2) the site is a "short-term" special purpose site, and (3) the CO concentrations are low.
- b) Fine particulate matter (PM_{2.5}) sampler - located at the U.S. EPA National Health and Environmental Effects Laboratory, 104 Mason Farm Road in Chapel Hill. Samples are collected for 24 hours every third day. The sampler was set up this year (1999) in response to the addition of PM_{2.5} by the EPA to its list of criteria pollutants to be regulated under the Clean Air Act

Because of the lack of monitoring sites in the County, there is little historical data on air quality in the County. Carbon monoxide, an air pollutant generated by combustion sources (e.g., motor vehicles and power plants), has been monitored in Chapel Hill for many years. But no other criteria pollutants have been monitored anywhere in the County. There are monitoring sites located in adjacent counties, which the State uses for assessing the air quality in the area. Table 2-2 lists locations of monitoring sites and the pollutants that are measured in this region.

There are no monitoring sites for ozone in Orange County. Ozone is a seasonal contaminant with the highest concentrations occurring in the summer. Ozone is not emitted from sources, but is formed by sunlight-driven reactions of other pollutants, especially hydrocarbons and nitrogen oxides. Nitrogen oxides are released from nearly all combustion processes, including industrial boilers, open fires, and mobile sources. Hydrocarbons are released from mobile sources, industries, painting, dry cleaning, fuel dispensing, and natural sources. Ozone reaches its highest concentrations 3 to 5 hours downwind from major sources of the ozone precursors (nitrogen oxides and hydrocarbons). The State does not intend to install an ozone monitor in Orange County. Based on our discussions with staff at the NC State Division of Air Quality, the State will use data from monitors in adjacent counties to assess the impact of reacted pollutant emissions from the city (Chapel Hill/Carrboro) in the middle of the monitoring sites. There are ozone monitors northeast of Orange County and the Chatham monitor is to the south-

southwest of Chapel Hill. Because the winds at Chapel Hill are most frequently from the northeast and the

Table 2-2. Locations of Monitoring Sites In and Around Orange County

Pollutant	County	City	Address
CO	Orange	Chapel Hill	147 East Franklin St.
PM _{2.5}	Orange	Chapel Hill	104 Mason Road
PM ₁₀	Durham	Durham	Health Dept., 300 E. Main St.
	Wake	Raleigh	Fire Station #9, Six Forks Rd.
Ozone	Guilford	Greensboro	Edgeworth and Bellemead
	Chatham	Pittsboro	Rt. 4, Box 62
	Durham	Durham	2700 N. Duke St.
	Wake	Raleigh	E. Millbrook Jr. High School
	Wake	Raleigh	808 North State
	Wake	Fuquay	201 North Street
	Wake	WRAL tower	5033 TV Tower Rd off 70E
	Person	--	SR 49
	Caswell	--	Cherry Grove Rec.
	Guilford	--	Keely Park
	Forsyth	Winston-Salem	Four sites
Nitrogen oxides	Durham	Durham	2700 North Duke St.
	Wake	Raleigh	808 N. State St.

southwest quadrants, the State believes the measurements at the monitors in the adjacent counties are representative of the affect of ozone precursor emissions from Orange County. However, because an ozone monitor is not located in the County, local ozone concentrations can not be determined. Nor can the County determine the impact of ozone precursor emissions from adjacent geographical areas on air quality in the County.

Due to the proposed lowering of the ozone standard and addition of the PM_{2.5} standard, ozone, nitrogen oxides, hydrocarbons, PM_{2.5}, and PM₁₀ are most likely to be the pollutants of greatest concern to the County in the coming years. Carbon monoxide is no longer of great concern. Advances in control technologies have reduced, but not eliminated, concerns about sulfur dioxide.

2.3 Historical Air Quality Data and Trends in the County and State

Air quality data for the criteria pollutants are available from the North Carolina Division of Air Quality. Data can be retrieved from the EPA Aerometric Information Retrieval System (AIRS) Air Quality Subsystem. Air quality data can be retrieved by accessing the NC Division of Air Quality Internet site at <http://daq.state.nc.us/Offices/Monitoring/qk1k98nc.html>. The Offices and Regions, Monitoring Branch, Data & Statistics page links to Quick Look summaries of data for the individual criteria pollutants as well as the EPA Pollutant Standard Index.

As discussed above, the only historical data on air quality in the County is for CO measured in Chapel Hill. There have been no exceedances above the CO ambient air quality standards at the Chapel Hill site during the last three years. For 1998, the maximum 1-hr CO measurement was 8.0 ppm, with no observations above the 35 ppm secondary standard. The maximum 8-hr measurement was 4.3 ppm, but there were no observations above the 9 ppm primary standard. There were also no observations above 9 ppm in 1997 or 1996. The CO data from Chapel Hill are consistent with data for the state. In the *1996 Ambient Air Quality Report*, published in April 1998 by the State of North Carolina Division of Air Quality Ambient Monitoring Section, there were no exceedances of the CO ambient air quality standards in the state of North Carolina in 1996.

Data reported in the *1996 Ambient Air Quality Report*, showed no exceedances of the PM₁₀, SO₂, NO₂, or lead standards in the state of North Carolina during 1996. The *1972 - 1995 Ambient Air Quality Trends Summary*, published in May 1998 by the North Carolina Department of Environment and Natural Resources, reports that levels of total suspended particles, PM₁₀, carbon monoxide, sulfur dioxide, and lead in ambient air in the state of North Carolina have dropped substantially since the 1970s. According to the report, the long term trends are less clear for ozone and nitrogen dioxide, both of which have remained fairly constant. There is no reason to believe that the air quality in Orange County did not follow the same trends for these pollutants.

Recent ozone data, available from the Division of Air Quality Internet site under the NC Ozone Forecast Center page, suggests that ozone exceedances are increasing. Data can be retrieved for each monitoring location in the state. Recent data for the two monitoring sites adjacent to Orange County and a site in Wake County are summarized in Table 2-3. The table also includes the number of exceedances measured in the Triangle with all nine monitors that the State operates in the Triangle MSA. As shown in the table, the number of exceedances was high in 1998. Tabulated data were not available for 1999.

Table 2-3. Trends in Ozone Exceedances at Sites in the Triangle Region

Site	Number of Exceedances			
	1995	1996	1997	1998
Chatham County	4	3	8	9
Durham - Duke Street	2	4	3	17
Wake County - WRAL Tower	6	5	15	20
Triangle - Based on all nine monitors	16	19	25	44

No trend data are available for PM_{2.5} because data are just starting to be collected. Fortunately, there is a monitoring location in Chapel Hill that will generate data for future trend analyses.

2.4 Sources of Air Contaminants in Orange County

There are two primary categories of sources of air pollutants - stationary and mobile. Stationary sources include power plants, manufacturing facilities, gas stations, incinerators, etc. Large stationary sources, such as power plants and large manufacturing facilities, must have permits from the State to operate if their emissions exceed certain threshold amounts. Smaller sources may also require permits, but the requirements for application and reporting are less stringent than for larger emitters. However, some sources, e.g., dry cleaners, generally do not require permits due to the small volume of emissions. Mobile sources include cars, trucks, buses, planes, trains, motorcycles, and gasoline-powered lawn mowers. Mobile sources may be classified as on-road (e.g., cars and trucks) and off-road (trains, lawn mowers, tractors, and construction equipment). In addition to the stationary and mobile sources, air pollutants, for example particulate matter, may be generated from agriculture activities, construction activities, or open burning.

2.4.1 Stationary Sources

Stationary sources may emit criteria pollutants (e.g., SO₂ from a power plant) or hazardous air pollutants (HAPs). The Clean Air Act requires the EPA to address 188 HAPs. The State of North Carolina is responsible for issuing permits to facilities that emit air pollutants. Each facility prepares an application for a permit with a list of emitted pollutants and estimates of annual emissions. Actual emissions are reported by the facility.

For this report, the NC Division of Air Quality provided the *NC Emissions: Facility Detail* report for 1997 for the 20 permitted facilities in Orange County. These data are also available from the EPA Aerometric Information Retrieval System (AIRS) and can be accessed via the Internet at http://www.epa.gov/enviro/html/airs/airs_query_java.html.

The first observation that can be made about permitted sources in Orange County is the small number. Compared to adjacent counties, Orange County has very few permitted facilities. The number of permitted facilities listed in AIRS for adjacent counties is as follows:

a) Orange	20
b) Alamance	159
c) Chatham	69
d) Durham	163
e) Person	36
f) Wake	309

The mass of air pollutants emitted in a County may not be directly related to the number of facilities, but the number of permitted facilities is a good indicator of the relative significance of

stationary sources in the adjacent counties. Data on the mass of pollutants emitted by each permitted facility is available, but compilation of the data was beyond the scope of this report.

Of the 20 permitted facilities in Orange County, only the University of North Carolina is listed in the Title V category, which requires an annual emissions inventory because the emissions are greater than 100 ton/yr. The University's power generation facility on Cameron Avenue is the largest permitted stationary source in the County. Thirteen of the facilities are in the small category (emissions greater than 5 ton/yr), which requires an emissions inventory once every 3 years. The locations of the permitted facilities in the County are as follows:

- g) Chapel Hill 4
- h) Carrboro 2
- i) Hillsborough 6
- j) Mebane 7
- k) Rougemont 1

The largest emissions of HAPs reported for 1997 were as follows:

- l) UNC at Chapel Hill (Cameron Ave.) 75.07 tons/yr
- m) General Electric Corp. (Mebane) 8.94 tons/yr
- n) AKG of America (Mebane) 4.48 tons/yr
- o) Nameplate (Hillsborough) 2.80 tons/yr

Other sources of air contaminants in the county are do not need permits to operate due to their small volume of emissions. The contributions of fugitive emissions from some sources, such as dust from agricultural operations and construction sites are difficult to estimate. There are no regulatory requirements in the State of North Carolina to address control of fugitive emissions, such as particulate matter, from agricultural, construction, or open burning activities. Emissions from these sources can be estimated, but it is difficult to quantitatively determine the impact of these sources on air quality in the County.

2.4.2 Mobile Sources

Mobile sources include on-road sources such as cars, trucks, and buses and off-road vehicles such as construction equipment (tractors, earth movers). Both sources are important. But the on-road sources have a substantially larger impact on air quality due to the large number of vehicles and vehicle miles traveled.

Shaping Orange County's Future (SOCF) performed analyses of various transportation issues for the County. Data from their work (available at on the Internet at www.co.orange.nc.us/shaping/profile1/transport.htm) demonstrates the increasing reliance on automobiles as a source of transportation for County residences. SOCF analyzed the following three measures, auto availability, modal choice, and vehicle miles traveled (VMT):

- p) Auto Availability - SOCF reported that in 1960 there were 12,933 vehicles registered in Orange County with a ratio of 3.32 persons per vehicle. By 1990, there were 65,900 vehicles with a ratio of 1.57 persons per vehicle.
- q) Modal Choice - SOCF reported that U.S. Census data for 1980 showed that approximately 60% of the County's working population drove to work alone, 23% carpooled and the other 17% used public transit, walked, motorcycled, or bicycled. But by 1990, 72% of the working population drove alone and only 14% carpooled.
- r) Vehicle Miles Traveled - SOCF also reported that the total number of vehicle miles traveled (VMT) on Orange County roads increased by 80% from 1,727,000 in 1987 to 3,114,000 in 1997. When SOCF accounted for population growth during the period, the actual percent increase in average daily VMT was estimated to be 43%. In 1997, per capita VMT averaged 28 miles per person per day compared to 20 miles per person per day in 1987.

The importance of mobile sources in the County was demonstrated in the Air Quality summary that was prepared by the SOCF (available on the Internet at www.co.orange.nc.us/shaping/profile1/airqual.htm). Data from the NC Division of Air Quality, source data from 1990, 1994, and 1995, and EPA mobile source models were used to estimate and break down sources of emissions of nitrogen oxides in Orange County. The SOCF results are reproduced in Figures 2-1 and 2-2. They demonstrate that on-road mobile sources are the most significant source of emissions of nitrogen oxides in the County. This is significant because NO_x is an ozone precursor.

Relative to stationary sources, mobile sources are likely to continue to be much more important when addressing air quality concerns in the County. The data suggest that the County can have the greatest impact on air quality by addressing transportation issues in the County and Triangle Region.

2.5 Regional Air Quality

It is well recognized that air pollution does not recognize government boundaries. Pollutants such as SO₂, particulate matter, and nitrogen oxides may travel great distances from the sources. Ground level ozone formation may result from nitrogen oxides and volatile organic compounds (VOCs) generated from upwind mobile or stationary sources. It is, therefore, essential that air quality be addressed at a regional level. Even if ozone levels in Orange County were to remain below the primary national ambient air quality standards, pollutants generated in the County may contribute to ozone formation in adjacent counties. It is imperative that Orange County citizens and government address air quality issues that affect the Raleigh/Durham/Chapel Hill MSA and rest of the state.

Figure 2-1. Sources of NOx Emissions in Orange County

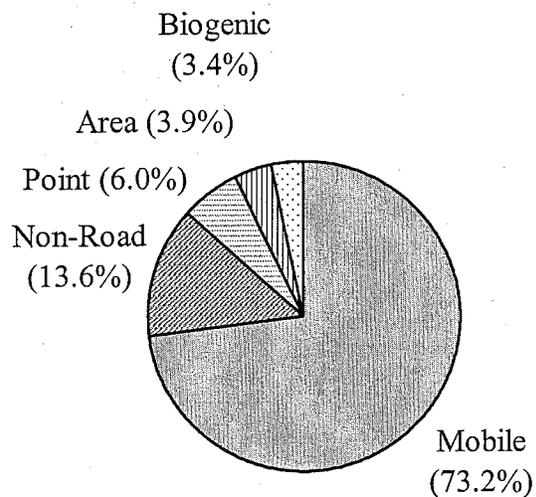
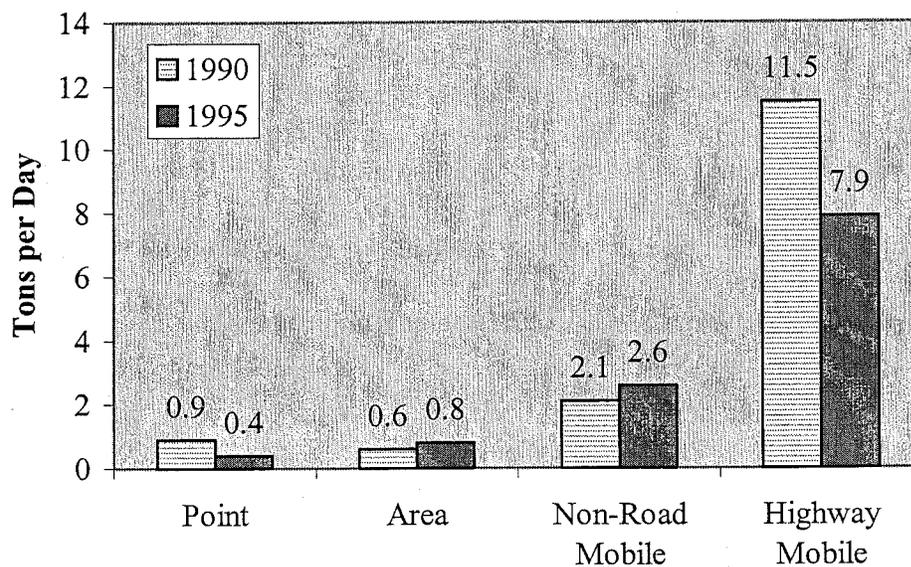


Figure 2-2. Orange County NOx Emissions



3.0 RECOMMENDED GOALS TO ADDRESS AIR QUALITY IN THE COUNTY

In the *Report of the Shaping Orange County's Future*, the Environment and Resources Protection Committee set the following goals:

- s) Protect the respiratory health of all people; Orange County should achieve and surpass ambient air quality standards.
- t) Create a community less dependent on the private auto.
- u) Discourage further highway construction in Orange County.
- v) Promote less polluting traffic patterns.
- w) Lobby for state inspection of heavy-duty trucks.
- x) Promote ownership of low emission motor vehicles.

These are admirable goals that the County should address over the long term. We suggest that there are four primary goals that should be addressed in the short-term that will help meet the long-term goals, and may ultimately have significant impact air quality in the County. Those goals are the following:

- y) Gain a better *quantitative* understanding of the sources of air pollution in the County and the relationship between air quality and mobile sources within and outside the County,
- z) Gain a better understanding of transportation issues within the County and the region,
- aa) Identify and define the role of Orange County in regional transportation issues and planning, and
- bb) Reduce the impact of the County fleet on air quality.

4.0 NEEDS AND RECOMMENDED ACTIONS TO ADDRESS AIR QUALITY ISSUES IN THE COUNTY

To address the goals identified by the CfE and *Shaping Orange County's Future*, there are a number of actions that that can be taken, including the following:

- a) The County should commit matching funds for a Mobile Source Emissions Reduction Grant. A grant application should be submitted to the State of North Carolina Department of Environment and Natural Resources (DENR) in the next cycle (December 2000). One potential proposal is for the County to purchase alternative fuel vehicles for use by selected County agencies or Departments. The County's portion of funds would be for vehicles and refueling stations. The grant money from DENR would offset differences in costs between conventional vehicles and low-pollution alternative vehicles. Based on recent successful applications, the County should commit approximately \$80,000 to \$120,000 for a project to reduce mobile source emissions in the County. The scope of the project should be determined by County agencies and departments with the assistance of the County Transportation Planner and the CfE.
- b) The County should commit staff support to work on issues related to air quality and transportation in the County. We recommend that at least 5 to 10% of the time of one staff member in the Environment and Resources Conservation Department be devoted to

research and data collection on air quality issues. We recommend that the County Transportation Planner in the Planning Department should spend at least 5 to 10% of his/her time in support of research and data collection on transportation issues as they impact air quality. Issues requiring staff support include the following:

Air Quality Issues and Recommendations:

- a. The County should evaluate its role in managing air quality in the County,
- b. The County should identify its role in management of regional air quality,
- c. The County should actively participate in management of regional air quality,
- d. The County should pursue actions to reduce air pollutant emissions from the County's fleet of vehicles by use of alternative vehicles, improved vehicle maintenance, and reduction in vehicle miles traveled, and
- e. The ERCDC, with the assistance of the CFE, should develop initiatives that the County can implement to improve air quality in the County.

Transportation Issues and Recommendations:

- a) The County should collect information to better understand regional transportation issues,
 - b) The County should determine what role it will take in addressing County and regional transportation issues,
 - c) The County should take an active role in planning main travel corridors within the County and between regional jurisdictions,
 - d) The County should aggressively participate in the planning and implementation of alternatives to traditional transportation systems in the region, including light rail systems, bicycle paths, tele-working, etc.
3. The County should intensively lobby State and Federal Agencies to obtain more air quality data in and near the County in order to identify and control the major airborne sources that affect human health, environmental damage, and the quality of life in the County. Of particular concern is the lack of ozone air monitoring data in the County.

The State of Biological Diversity and Resources in Orange County, North Carolina

a report of the
Biological Resources Committee
Orange County Commission for the Environment

Prepared for

The Board of County Commissioners
Orange County, North Carolina

December 14, 1999

Contributors: Loraine Kohorn, Annette Jurgelski, Rosalinda Lidh

Executive Summary

Substantial gains have been made in Orange County in the last decade in the amount of land area placed under some sort of protection. At the same time, however, the rates of forest loss and fragmentation have likewise increased, primarily as a result of residential development. To slow, to halt, or even to reverse the losses of our most significant resources and natural areas, we recommend to the County Commissioners that the County take the following steps:

- Increase the total area of protected natural areas, with highest priority given to the most significant areas facing the most imminent threat. This requires allocation of County funds towards land acquisition, as well as seeking matching funds from outside sources. The County should also play a more important role in working with other land preservation groups, and in helping to coordinate the efforts of all partners involved in land preservation in the County, to work towards a planned County conservation landscape.
- Make appropriate changes to the Environmental Impact Ordinance, to the County Comprehensive Land Use Plan, and to zoning regulations, to offer full and complete protection to the most biologically significant sites, and to encourage restricted use buffer zones surrounding important core areas.
- Establish a means by which the County's Biological Inventory can be continually reviewed and updated.
- Improve coordination of conservation effort with neighboring counties, particularly for those natural features which cross jurisdictional boundaries.
- Assure that the Environment and Resource Conservation Department performs a GIS assessment from the most recent aerial photographs (1998) documenting forest area changes since 1988.

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I. Introduction

Orange County represents 0.5 % of the Southern Appalachian Piedmont, an ecoregion lying between the mountains and the Atlantic coastal plain, and extending from Maryland to Alabama. The Piedmont forest is comprised primarily of mixed hardwood tree species, dominated by oaks and hickories, but containing a rich diversity of tree species and a very diverse understory plant community. This plant diversity supports a rich assemblage of animal species. Orange County is home to at least 1500 non-human species, though the exact number is not known.

The dense habitation of the Piedmont region since European settlement, and to some extent prior to that, has led to a heterogeneous landscape of forests of many ages and types-- the result of considerable human disturbance. As the stewards of this piece of the Piedmont, it is our task to offer what protection is feasible to the least disturbed elements found in the County, and to provide secure habitat over the long term for the plants and animals currently residing on the land.

II. Current Status of Biological Resources in Orange County

Our current understanding of the biological state of the County derives from three principal documents: the 1988 biological inventory by Sather and Hall and two Landscape with Wildlife reports by Ludington, Hall and Wiley for the Triangle Land Conservancy (LWW-I, 1997, and LWW-II, 1999). In addition, the Environment and Resource Conservation Department (ERCD) has data from the NC Natural Heritage Program on the occurrences of important biological elements in the County, both of species and of biological communities.

LWW-II identifies large, older hardwood forests as the most important sites for wildlife preservation in the County. While the report accomplishes this admirably, it is also important to recognize that not all old forests are alike, and that the prime forests identified in the TLC reports represent a diverse matrix of different ecological community types, each with distinct associated species. Sather and Hall document 16 different natural communities in the County, some of which are large enough to show on the prime forest maps, and some of which are not. Thus it is important to note that while LWW-II is intended to be viewed as an important supplement to Sather and Hall, it does not function as an update to it.

State of our Forests

Declining in area?

Ten percent of Orange County's forests are estimated to have been lost or impacted over the past decade, primarily as a result of residential building (TLC, Landscape with Wildlife, Parts I and II). However this is only an estimate based on building permits issued. This percentage does not account for forest clearing that occurred independently of the building permitting process in this same time interval, nor does it reflect the net change in forest cover, as it does not take into account simultaneous forest development. There is a significant need to document

actual changes in land use, using aerial photographs and site surveys.

Changes to 1988 Inventoried Sites

Of the 77 sites currently included in the County's database, 49, or 63 % are considered to be intact and in much the same condition as they were in 1988, except for some trees downed by Hurricane Fran. Two sites were substantially impacted by Fran (M06 and N01). For 18 of the sites, or 23%, comprising some 1,735 acres of land, the status in 1999 is unknown and is in need of investigation. Two sites are considered to be gone, or substantially modified by adjacent residential development (Vernal Pool section of Laurel Hill Ridge and Vernal Pool [M13] and Currie Hill [N07]. The irreversible loss of these areas provide sorry testimony to the inability of the current "planning" process to provide for protection of documented biologically significant sites. The remaining six sites are believed to be intact, but their status has yet to be verified.

Protected Area

About 5.3% of the County's land could be considered to be under some form of protection, however only 1% is truly protected for ecosystem conservation (Table 1/Map 1). The remainder consists of land managed for multiple uses, including limited timber extraction (Table 2/Map 2).

Table 1. Acreage in full protection in the county:

Eno River State Park	1,897 ac.
Triangle Land Conservancy	436 ac.
NC Botanical Garden Fdn.	92 ac.
The Nature Conservancy	10 ac.
Eno River Association	17 ac.
Total	2,452 acres

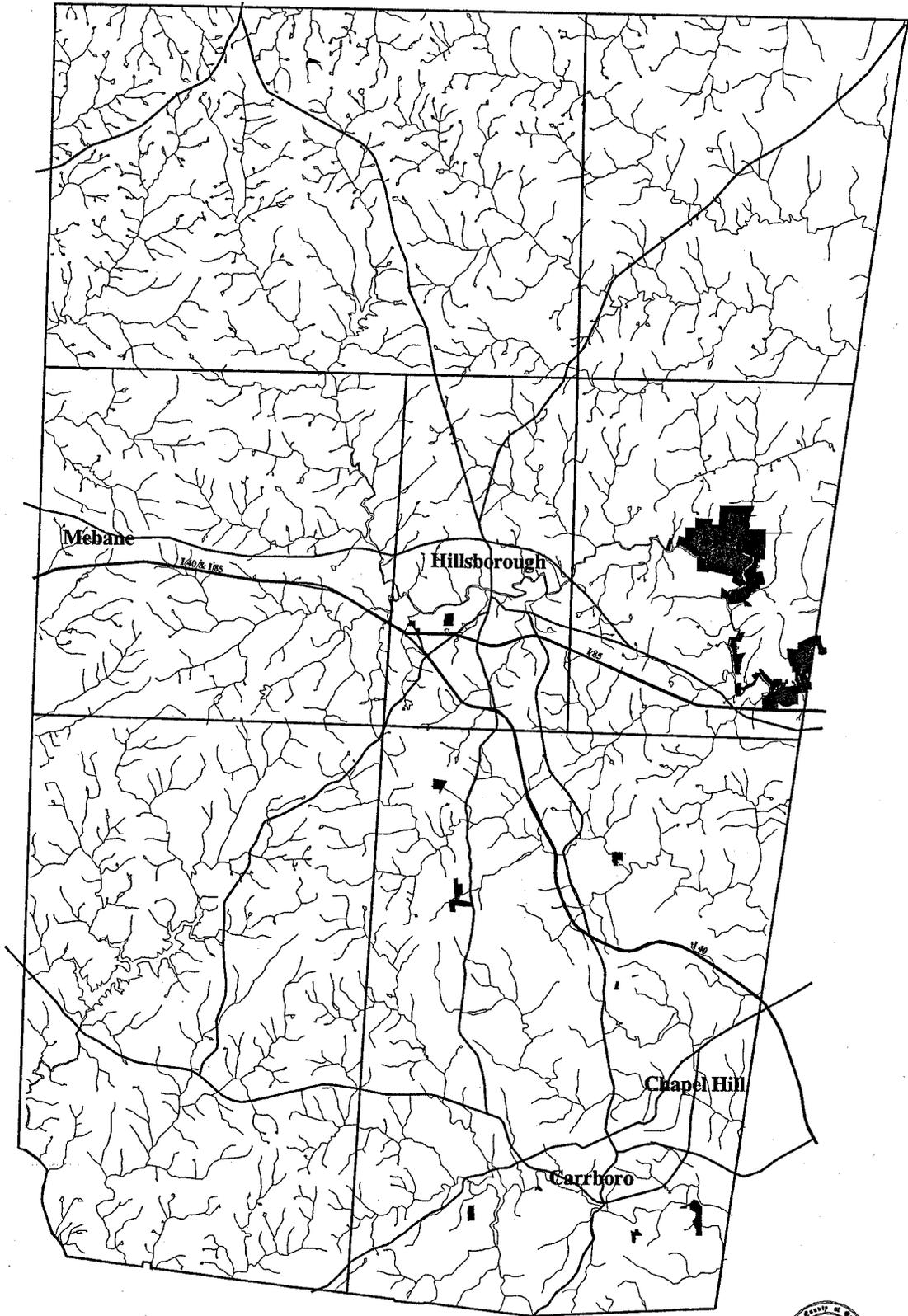
In addition, 388 acres in the county are protected through conservation easements (317 acres held by the Triangle Land Conservancy, 48 acres held by the US Fish and Wildlife Service, and 23 acres by the NC Botanical Garden Foundation).

Table 2. Acreage with some level of protection, though this may be combined with extractive uses, which are not fully compatible with protection of significant species and communities (excludes lakes and active parklands):

Duke Forest	4,933 ac.	Orange Co. (Seven-Mile Creek)	160 ac.
OWASA	3,091 ac.	Town of Hillsborough	28 ac.
UNC (includes campus, Bot Garden, Mason Farm, H. Williams)	2,585 ac.	Town of Carrboro	10 ac.
Town of Chapel Hill	437 ac.	Total	11,244 acres

Map 1

Orange County Protected Lands



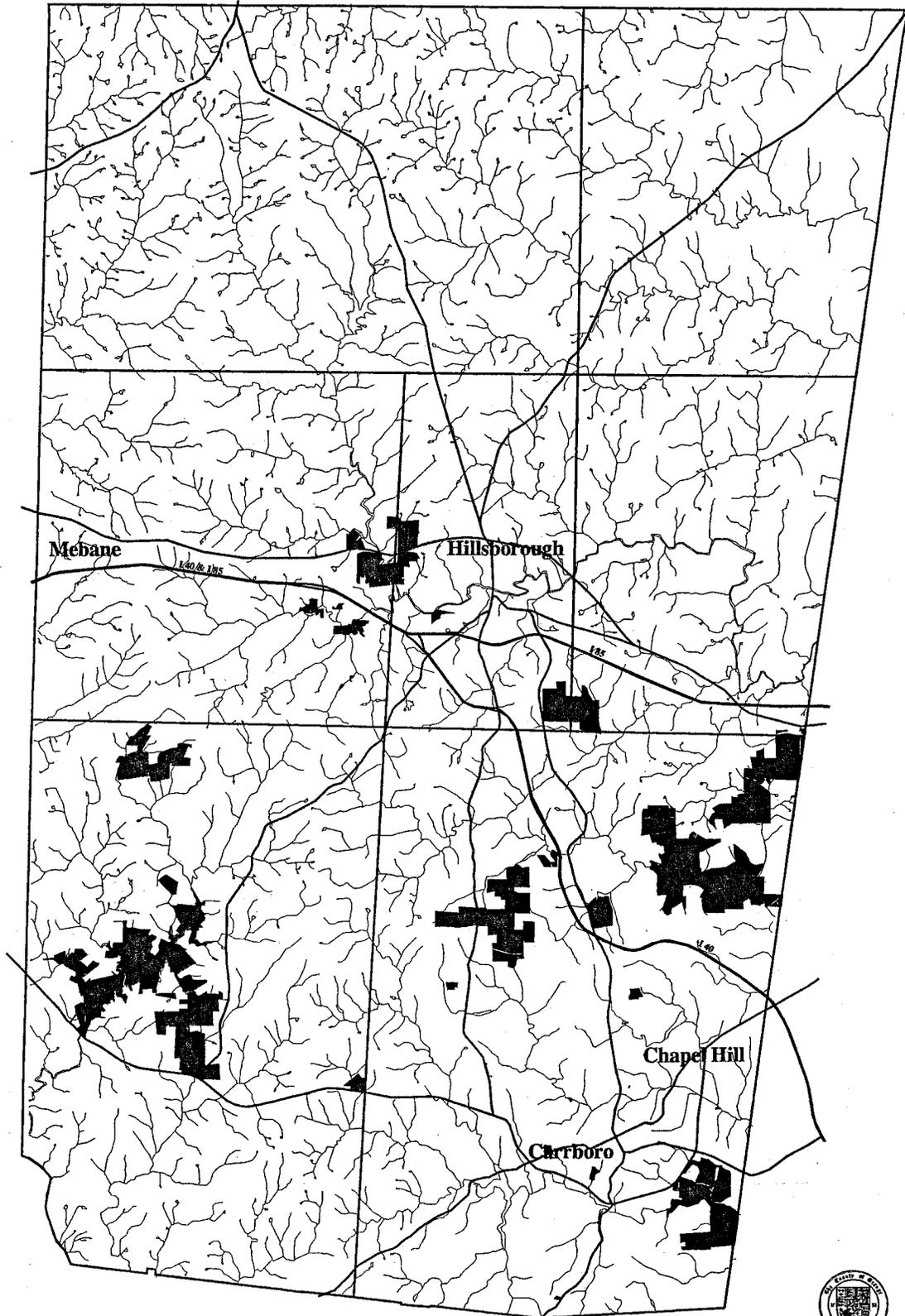
Legend

■ Protected Lands



Map 2

Orange County Partially Protected Lands



Legend

 Partially Protected Lands

Note: Specific locations of Chapel Hill and Carrboro areas not available at this time.



Orange County
Environment and Resource
Conservation Department
Beth Young
01-07-00

Change in acres under protection 1989-1999

The current protected acreage reflects important advances made in the past decade in the realm of protection, through purchases by the Triangle Land Conservancy, through conservation easements, through acquisition by Duke University, and through expansion of the Eno River State Park to include Occoneechee Mountain. However, during this same time interval, the threat to the remainder of the County's forest has increased substantially due to residential development and suburban sprawl.

We feel the County should aim for a goal of having at least 10% of its land, or 25,600 acres, in some form of protected status within the next 10 years. Although an ambitious goal, the CfE feels it is reasonable and achievable if the proposed increases in state and federal funds for open space acquisition become available to supplement local government funds dedicated for this purpose. (Without an increase in state and federal funds, a goal of 10% in 15 years would still be achievable.) Also, it is important that the ERCD document changes in land status, in order to provide a metric of progress towards obtaining this conservation goal.

State of our watersheds

The watersheds of Orange County have received increasing conservation attention over the past two decades and generally have maintained or improved many aspects of water quality over this time interval. The presence of rare or uncommon freshwater mussels in many of our streams are evidence of the clean water found in these waterways.

Eno River: The Eno River Association, in conjunction with the Eno River State Park, has increased the area under protection along the lower Eno River. The addition of Occoneechee Mountain to the park was a substantial gain for Eno protection. In addition, the Eno River Association is currently developing a plan for the Upper Eno.

Little River: Durham County is presently developing a protection plan for the Little River Corridor in Durham County. Durham's inventory indicates the presence of three rare freshwater mussel species in the Little River, at least one of which is a candidate for federal listing, and the presence of these species in Orange County is corroborated by data from the NC Natural Heritage Program. This is biological evidence of the fine quality of water in the Little River and testimony to the need to maintain this quality.

New Hope Creek: The New Hope Corridor Master Plan has led to increased security of maintaining water quality in New Hope Creek, in large part due to the efforts of the Triangle Land Conservancy and Duke Forest. This plan could serve as a model for a plan for other river systems in the County, such as the Little River.

Cane Creek, University Lake and other municipal water sources: As public water supply sources, Cane Creek and University Lake receive some protection from OWASA's efforts. OWASA's plans for considerable increased land acquisition for watershed protection should be

coordinated with conservation efforts if feasible, and acquired lands assessed from a biological standpoint. In addition, in the interest of monitoring the status of our biological resources, the biological changes that have come about as a result of Cane Creek reservoir should be assessed, relative to the 1988 inventory. Similarly, lands acquired for watershed protection by the Town of Hillsborough should be surveyed by the County, though this would not be a high priority action.

Hyco Creek, Back Creek, and the Flat River: These watersheds have not received substantial attention to date, and would all benefit from biological survey. Flat River water quality was assessed in 1988, however that of Hyco and Back Creeks should be assessed at their headwaters in Orange County.

III. Goals for the Coming Year

A review of the current state of biological resources in Orange County reminds us of the many assets we enjoy, but it also highlights areas in which we need more and better information in order to make informed decisions. A review aids us in prioritizing those natural areas for which we should be concerned, and points to the need for more effective conservation policy in the County.

A. More and Better Information

There are several valuable tools not currently in use, which would give us a better indication of the state of the environment in the county.

- An improved inventory of biological resources in the northern half of county, including a ground-based investigation of large forest tracts identified in LWW-II. Private lands should be included where site review is permitted.
- A dynamic, periodically reviewed biological inventory.
- A methodological approach to periodically assess change in the area of forest annually, or at least every five to ten years. This might be based on building permit information, field observations, and GIS analysis from aerial photos (to compare with 1988 photos). The interest would be to document forest losses from building, timber extraction, and road building, to document fragmentation from road building and other causes, and also to document forest growth (changes from field to pine, pine to hardwood and other trends). Findings could also serve as a map documenting progress toward County conservation goals.

B. Increased Protection for Areas of Concern

Some natural areas in the County, those with unique value or lack of accessibility, require ongoing surveillance to prevent future negative impacts.

- The Little River Corridors: While the County's proposed acquisition of the 135-acre Newton/TCF property makes a beginning to protection of this clean water body, we would like to encourage the County to take steps to offer greater watershed protection in the Little River Basin, and to work in conjunction with Durham County as they develop a plan for the Little River.
- Highly ranked sites on private lands: Because County government has little direct control of these lands, there needs to be strong incentives for developers to respect and to contribute to the protection of our critical, inventoried, and important biological sites. If incentives are inadequate, the County needs to consider imposing restrictions on development, land clearing, or ecosystem disturbance on or near these sites.

In addition, methods and means to acquire such sites when they become available need to be fully available to the ERCD, to permit the ability to respond to conservation opportunities in a timely fashion.

C. More Effective Conservation Policy

While the state of biological resources in Orange County is better than in many counties throughout the state and the nation, some adjustments in the policy arena will help these resources to maintain their integrity through the human population increase foreseen for the future.

- Orange County does have existing policy aimed at protecting the environment; however, enforcement is limited and, in some cases, ineffective. A list of current policy with a side-by-side listing of available remedies would inform both county employees and citizens of what recourse we have when an area is in danger and what policies need better means of enforcement.
- The existing Environmental Impact Ordinance lacks the instruments to offer full protection to inventoried natural area sites. We strongly encourage amendment of this ordinance to provide for effective protection of significant biological resources.
- Clear-cutting and the damage it inflicts on wildlife habitats, biological diversity, water quality and quality of life is a significant problem faced throughout the county. The county's current ability to regulate clear-cutting is limited, and the role of timber harvest in the local rural economy cannot be overlooked. However, a balance needs to be established between the rights of private property owners and the needs of the community as a whole. Finding such a balance needs to be addressed sooner rather than later, as this method of harvest both exacerbates the biological impact of forest loss from clearing for residential development and contributes to conflict between rural and suburban populations. This problem has been

exacerbated in recent years, and will continue to be in the near future, as a result of the 1994 opening of a Louisiana Pacific plant in Roxboro.

- Finally, there is a significant lack of coordination of protection efforts with surrounding counties. Forests, watersheds, wildlife corridors and development projects do not abruptly stop at county borders. Efforts in one location may be impeded by lack of effort in a neighboring county or vice versa. Effective protection of resources must include coordinated effort among all the affected jurisdictions.

IV. Needs and Recommended Actions to Protect Biological Diversity in Orange County:

A. Highest Priority Areas for Conservation Effort.

Overall, we feel the County should aim to ensure that at least 10% of its land, or 25,600 acres, is in some form of designated protected status within the next 10 years. This goal is reasonable and achievable, especially if the proposed increases in state and federal funds for open space acquisition become available to supplement local government funds dedicated for this purpose. If state and federal funds are not increased, a 15-year goal would be recommended.

Based on currently available information (biological inventory, Natural Heritage data and both TLC reports), we present the following areas as a first approximation of those highest conservation priority areas for the County, in order of importance, and subject to further review and change by the BRC and the ERCDC (Table 3). Primary criteria used in arriving at this list include size, composition, biological distinctness, degree of threat, and connectivity to other areas.

Table 3: Highest priority areas for conservation action in Orange County: A First Approximation

1.	Lands surrounding Eno River State Park
2.	Occoneechee Mountain buffer
3.	Sevenmile Creek Bottoms
4.	Lands along Morgan Creek and those surrounding Mason Farm
5.	Central County Forest, Hills, and Corridor: Blackwood Mountain/Duke Forest Blackwood Division/ Meadow Flats/Bald Mountain/Pegg Hill, and connecting lands
6.	New Hope Creek Corridor, including upper section which connects to the Central County Forest, Hills, and Corridor (see #5, above)
7.	Chestnut Ridge
8.	River corridors: Upper Eno River, N and S forks of the Little River
9.	Forest southwest of Cedar Grove
10.	Pickard's Mountain

Justifications:

1. Lands surrounding Eno River State Park (ERSP): This area is identified in LWW-I and -II as the

most important intact prime forest in the County, by virtue of its area, the presence of the River, the undisturbed forest within the Park, as well as numerous Natural Heritage records for regionally important species. However there is no guarantee that this area will retain this high biological value, as the State Park lands comprise less than half of the total forested area in which it is embedded. Residential development in this area is rapidly fragmenting the surrounding forest. If this cutting and building is left unchecked, it is sure to lead to degradation of the core forest area of the Park. This area needs to be designated as buffer area, and tools developed that will restrict land uses to those compatible with the aims of the Park, and protect this land as wildlife habitat.

2. Occoneechee Mountain: The inclusion of much of Occoneechee Mountain within the ERSP has been an important step forward. However, adjacent lands remain in private hands. While private ownership may be the best, most secure solution, the County should work with landowners to assure that this most significant of the County's sites remains securely protected and buffered.
3. Sevenmile Creek Bottoms: This inventoried bottomland forest is of regional biological significance for the species found there, and is also identified in LWW-II as a forest of high wildlife value, by virtue of its size, and forms part of the County's designated corridor system. We recommend that the County work to acquire parcels to connect the pieces it already holds in this area, and/or that they work with landowners to negotiate conservation easements or practices to keep this site in a natural, unfragmented state.
4. Lands along Morgan Creek and those surrounding Mason Farm: Because of the biological significance of Mason Farm and adjacent Botanical Garden Lands and the high degree of threat to their integrity, the County should take what steps it can to help keep further losses and fragmentation from occurring. Without some secure buffers, the integrity of some of the County's most unique forests and associated vertebrate communities could be compromised.
5. Central County Forests, Hills, and Corridor: Blackwood Mountain/Duke Forest Blackwood Division/ Meadow Flats/ Bald Mountain/ Pegg Hill, and connecting lands. From LWW-II it is evident that one of the key core forest areas of the county extends in a band through the central County, from Blackwood Mountain to Bald Mountain. Of strategic importance here is maintaining connectivity in a fragmented system of uplands and stream corridors. If connectivity to the New Hope Creek Corridor (See #6, below) can be maintained and/or developed, this enlarges the natural area substantially. Acquisitions or easements which help to preserve forest integrity in this region are to be fostered by the County.
6. New Hope Creek Corridor, including the upper section which connects to the Central County Forest (See #5, above). The New Hope Creek Corridor east of NC 86, currently of relatively secure conservation status, is another key core natural area in the County. While it is generally isolated from the Blackwood-Bald Mountain core, New Hope Creek could conceivably be serving as a conduit for animal and plant movement. Anything that can be done to maintain or restore connectivity between the New Hope Creek basin and area #5 is to be encouraged. Protection of surrounding land from conflicting uses by designating it as buffer zone would enhance protection of New Hope Creek.
7. Chestnut Ridge: This xeric forest (E01 AND EO2) is an important upland forest, comprised largely of chestnut oak. It is a relatively large tract of forest, and also is an important upland area for landscape connectivity. Due to its present status as privately-owned land, its long-term status may be insecure. Allegedly there has been some fragmentation from residential development. The extent of this fragmentation needs to be assessed, and the current biological value of the site determined. Conservation strategy would then be based on current integrity.
8. River corridors: Eno River, N and S forks of the Little River (See III.B above): Conservation

efforts should focus on protection of the Upper Eno River basin, and along both the North and South Forks of the Little River, for water quality protection, rare species protection, and for the maintenance of wildlife corridors.

9. Forest southwest of Cedar Grove: a large tract of forest was identified southwest of Cedar Grove by LWW-I and -II. This forest was identified from aerial photographs solely based on its size. It should be surveyed for biological importance. Its current status is not known. Conservation effort would then reflect results of such on-site survey.
10. Pickard's Mountain: While Pickard's Mountain is now relatively secure, in environmentally responsible private hands, it remains an area of biological importance, primarily by virtue of its size and its unfragmented status. The County should be kept apprised of the status of this land and perhaps work with the landowner to encourage putting the tract, or parts of it, under conservation easement. Also, the County should work to encourage habitat connectivity between Pickard's Mountain and Bald Mountain, through easements and/or acquisition.

B. A Dynamic Biological Inventory

Biological systems are dynamic entities, changing over time and shifting spatially on the landscape. What we see today is merely one point in the history of the landscape, and not a static reflection of the "Balance of Nature". In addition, new sites are identified through increased exploration of the landscape, acquisition of new knowledge, and temporal changes in biotic communities. County protection efforts need to take this spatial and temporal dynamism into account.

To keep its biological information current, Orange County needs to develop a dynamic biological inventory that builds the 1988 inventory by Sather and Hall and the two recent Landscape with Wildlife reports from TLC. This dynamic inventory will respond to changes that occur as new sites are described and as documented sites are lost through land use changes. Updating the inventory could be the joint responsibility of an Inventory Review Committee comprised of biologists and conservation workers, and the Land Resources Conservation Manager. The updated inventory could both be made available as a resource to entities working to protect natural areas within the county, and could serve as the repository for biological data gathered by these groups. NC Natural Heritage Program has indicated that funding may be available for such an update (Rich Shaw, pers. comm.)

C. Improved Inventory of Resources in Northern Orange County

While the greater presence of agricultural activity, as well as the nature of the soils, makes it less likely that unusual species will be found in northern Orange County, there remains a need for greater biological exploration in the northern County. This area was not thoroughly investigated by Sather and Hall, for both biological and logistic reasons. But LWW-I and -II have pointed to several areas of prime forest that may warrant exploration.

D. Update GIS Data

There is a current need to update the GIS layers showing forest cover of different types, and document changes from 1988 photos. The goal would be to assess rate of deforestation, to document increases in forest fragmentation, to note intactness of inventoried sites, and to locate areas of increased or qualitatively changed forest cover.

E. Ground-truthing

Ground-level verification of the results from aerial surveys is important; observations on forest quality and species composition, where land is accessible, is also vital to maintaining an accurate picture of County biological resources. One way to obtain this information would be to work with local hiking groups, scout troops, and birding and butterfly groups, under the guidance of the ERCD Land Resources Conservation Manager.

F. Development of a county plan for biological resource protection and acquisition:

Although Orange County has an avowed commitment to environmental protection, there does not seem to be a comprehensive plan in place to prioritize and preserve biological resources as they are identified. The following actions are recommended:

1. Complete a Natural Areas element of the Comprehensive Land Use Plan
2. Refine the enclosed prioritization of natural areas that are candidates for protection using the criteria developed by the BRC for the Lands Legacy Program.
3. Re-examine and fortify County policy tools for land protection. These include zoning (or overlay zoning), fee-simple purchase by the county or purchase by a conservancy working with the county. Other alternatives that have been used elsewhere and could be explored are purchase of development rights, conservation easements, and independent arrangements with landowners.
4. Compile information on existing outside funding sources for land acquisition, beyond such sources as the Clean Water Management Trust Fund, the Farmland Preservation Trust Fund, and the Natural Heritage Trust Fund. Mobilizing the ERCD to have full knowledge of available outside funding sources can allow increased land protection with less direct County funding. As many of these funds are matching funds, we encourage the Board of Commissioners to allocate adequate funds for land acquisition, particularly over the next decade as land development accelerates.
5. Allocate County funding for land acquisition. An initial step should be to define what funds are available for natural area acquisition from the Parks and Recreation Bond Funds and to make explicit which natural areas acquired with these funds would be used for recreational purposes. Another possible step could be to raise funds through a bond issue specifically earmarked for acquisition of biological resources. If voter

approval is solicited for this type of bond issue in the next election, a voter education program should be launched soon to avoid rejection, particularly in northern Orange County.

6. If the County is successful in raising funds for land acquisition, consider establishing a matching grant program to facilitate land acquisition by local conservancies and appropriate citizen groups.

G. Cooperative Conservation Programs with Adjacent Counties

County boundaries are often established without consideration for preserving the integrity of natural areas that happen to span county borders. As a result, an area that one county has elected to preserve may be compromised by actions on the other side of the county line. Rivers that flow without respect to political boundaries are in particular jeopardy. The following recommendations are preliminary to establishing a formal mechanism for regional environmental planning:

1. Continue sending County representative to the New Hope Creek Corridor Advisory Committee.
2. Authorize the Commission for the Environment to establish a liaison with citizens' environmental planning groups in Durham, Chatham, Alamance(?), and Person(?) counties.

H. More Vigorous Enforcement of County Resource Protection Ordinances

Some existing County ordinances and regulations could be rendered more effective if amplified or more vigorously enforced. We make the following recommendations:

1. Upgrade the County's Environmental Impact Ordinance to provide more explicit requirements for protection of the current evaluation of biologically important areas, and to specify clarified mechanisms for enforcement.
2. Take measures to more effectively monitor activities leading to substantial soil erosion, and to enforce existing soil erosion ordinances.
3. Increase the area required for riparian buffers, if permitted by State laws, to maximize land protection along stream corridors, which serve as important wildlife corridors.

**REPORT FROM THE ENVIRONMENTAL INDICATORS
AND EDUCATION COMMITTEE**

ORANGE COUNTY COMMISSION FOR THE ENVIRONMENT

The Environmental Indicators and Education (EIE) Committee of the Commission for the Environment was created to address current and emerging environmental trends and issues in the county. Of particular concern is rapid growth in the county and the need to plan development more precisely and preserve natural and cultural resources in order to ensure a high quality of life into the future. This committee has identified several critical issues that need to be addressed as the county enters the 21st century. This report includes an overview of some environmental indicators, which point to significant trends now shaping the future of the county. Based on these trends, the report also outlines recommendations for action and proposes specific recommendations for the Orange County Board of Commissioners to take into consideration.

State of the Environment in Orange County

Recent studies by different committees for the county have resulted in findings, which taken together, reveal the effects of rapid development on county resources.

- A study by the Joint Master Recreation and Parks Work Group identified a deficit of 645 acres of parkland based on population standards.
- A Report to the Shaping Orange County's Future Task Force by the Orange County Environment and Resource Conservation Department indicates that farmland in the County declined 76% from 1967 to 1996, from 183,263 acres to 44,500 acres.
- The Triangle Land Conservancy has estimated that 10% of the county's prime hardwood forest has been lost in the past decade, due to development and clear-cutting.

These changes are due in part to the county's population increase of 67,000 from 1960-1998. When taken with the county's expected population growth of another 64,000 from 2000-2030 (an increase larger than the population of Chapel Hill today), these alarming declines in open space and land resources merit immediate attention.

Year	Orange County Population
1960	42,970
1970	57,707
1980	77,055
1990	93,851
2000 (proj)	114,000
2010	134,400
2020	157,820
2030	178,740

Other data shows increases in undesirable activities.

- Vehicle miles traveled has increased by 43% between 1987 and 1997, over and above increase in traffic due to population growth. This averages 28 miles per person per day versus 20 miles per person per day in 1987. This figure will go up, with attendant increases in air pollution and the further development of roads and other impermeable surfaces unless aggressive steps are taken to reduce it.
- Aggravating this trend is the fact that the county has very little roadway that is safe and adequate for bicycle transportation. The lack of infrastructure that would promote bicycling as a viable transportation option has contributed to the increase in vehicle miles traveled and the deterioration of air quality.

Priorities

If Orange County's current development trends continue for the next thirty years, the result will be a county largely subdivided into two-acre lots and suburban developments, with little or no productive farmland and only a few fragmented parcels of habitat for the county's unique species. The county needs to plan aggressively for its future and guide development in a way that preserves rural character, productive farms, critical habitat, and open space. This is best done through guiding development away from:

- biologically or ecologically sensitive areas, such as wetlands;
- critical habitat for the county's unique species;
- those areas most productive for other uses, such as farming; and
- encouraging clustered development in rural villages, activity nodes, and other areas most suitable for human habitation.

Such planning, which sites each use in its most appropriate area within the county, creates a richly diverse and productive landscape.

Recommendations

In addition to the studies mentioned above, the various committees working for the county have proposed strategies to address their particular area of concern. These groups should be encouraged to continue their work and to develop their studies into long-term policy recommendations. The BOCC should also see that the groups coordinate their planning and recommendations so that multiple solutions may be achieved within single proposals. In particular, the EIE Committee recommends that the Joint Master Recreation and Parks Work Group coordinate with the Bicycle Task Force and the Land Resources Conservation manager to examine ways in which open space might jointly or complementarily meet the needs of recreation, bikeways and critical habitat.

The EIE Committee makes the following recommendations to address the rapid growth currently being experienced by the county:

1. Immediately adopt and implement a farmland preservation plan, through the proposed Lands Legacy program. The EIE Committee recommends implementing both Transfer of Development Rights (TDR) and Purchase of Development Rights (PDR) for maximum flexibility in acquisition methods.

2. Update and maintain the Natural Areas Inventory as one of the county's core tools for planning and guiding development.
3. Develop bikeways according to the Bicycle Plan of the Bicycle Plan Task Force.
4. Complete a report on Sustainability Indicators.
5. Commit funds to public outreach, for educating the public on the need to plan for the county's environmental future and for building support for the various tools and methods proposed. This would also include funding to disseminate the Sustainability Indicators report, and to maintain and expand the county's environmental education web site as developed by this committee and to promote it to the public.

This committee also recommends that the County develop a cohesive plan for the protection of open space and that the Environment and Resource Conservation Department work closely with the Planning Department to revise and enhance existing tools and implement new tools for such protection. This committee recommends the county adopt a resolution forthcoming from the Commission for the Environment regarding specific actions for the preservation of open space.

Orange County Commission for the Environment

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