

Environmental Quality



In 2015, our clean air and water is a major asset for economic development, the health of our citizens and the scenic beauty of our community.

Environmental quality and economic development are sometimes viewed as mutually exclusive goals. The result has been either development that degrades the natural environment upon which it depends or environmental preservation and protection that ignores the need for economic opportunity. Too often, it has been either jobs or conservation. Local government in Forsyth County, for its part, has generally supported economic development while relying on environmental regulations to ensure some measure of environmental quality.

Fortunately, everyone involved is increasingly recognizing the need to balance and integrate these two equally important goals. The idea of promoting economic opportunity while at the same time protecting and restoring the natural environment upon which community well-being and quality of life depends, is a national movement that is called “sustainable development.” The Economic Vitality and Environmental Quality Focus Group developed the *Legacy* vision statement on the local economy and environment. The Focus Group was composed of both business and environmental interests that met as a single group to help integrate community goals on these two important topics.

Our country has achieved remarkable environmental progress in the past 25 years mainly through federal legislation like the *Clean Air Act* and the *Clean Water Act*. This progress has coincided with unprecedented economic growth. In the future, Forsyth County will encourage the enhancement of environmental quality through increased education, personal responsibility, vol-

untary actions, market incentives, partnerships and consensus building. If successful, the need for environmental regulations may be lessened or even eliminated.

This chapter identifies the sensitive and critical features of the natural environment in our community and assesses the extent to which we have succeeded in addressing local environmental issues. The chapter sets goals and recommends policies and an action agenda to further conserve, protect, enhance and manage our water, air and sensitive environmental lands that all contribute to a high quality of life for residents of our community.

Our Vision

The *Legacy* Focus Groups have envisioned a future in which concern for the environment is balanced with economic development to produce quality growth.

In the year 2015 we envision that . . .

- ☞ We have clean, high quality water to meet our domestic, economic and recreational needs.
- ☞ Our clean air is a major asset for economic development, the health of our citizens and the scenic beauty of our community.
- ☞ Significant natural areas have been identified and protected.
- ☞ Our developments are designed and built in

an environmentally sensitive manner.

- ☞ Business, industry and residents use resources efficiently and they reuse and recycle thereby conserving landfill space and natural resources.
- ☞ Citizens have a greater scientific understanding of and sensitivity to the community's air, water and land resources.
- ☞ State and local governments are responsive and responsible partners in promoting environmental quality.
- ☞ Environmental regulations are cost-effective and based on sound scientific principles.
- ☞ There is balance and integration in economic growth and expansion and the preservation of our environmental assets.

Goals, Objectives, Policies and Action Agenda

Goal:

The preservation and enhancement of our environmental resources resulting in a high quality of life for Forsyth County residents.

Objective 1: Natural Heritage Inventory

Protect high quality natural areas and sites with rare plants and animals listed in the Forsyth County Natural Heritage Inventory.

Our native wildlife, streams, woodlands, and natural areas contribute to the character and quality of life of our community. These assets have been dwindling as Forsyth County becomes increasingly urban. It is important to act now to identify these assets and take actions to ensure that our County retains its natural character by protecting and managing the most significant of these resources.

The State of North Carolina's Natural Heritage Program assists communities in inventorying, studying and protecting the rarest and most outstanding elements of the natural diversity of the State. The Piedmont Land Conservancy completed a *Natural Heritage Inventory for Forsyth County* in 1997. The purpose of the inventory was to identify the occurrence and distribution of the rarest and most significant plant and animal communities, geologic features, historic resources and stream corridors in the County. From a list of potential sites, only lands where the landowner's permission was given were inventoried.

Although much of Forsyth County's natural landscape has been lost due to urbanization, 23 sites totaling 3022 acres (a little over 1 percent of the County) were identified in the study. Site locations are shown on the Open Space System Map, Map 8.1 of Chapter 8, "Open Space, Parks

and Greenways.” Nineteen of the sites are in the northern half of the County with eleven of these located in the northeast quadrant. The sites range in size from several hundred acres for some of the forested tracts to less than an acre for some of the smaller wetlands. Five of the sites are on public lands and the remaining sites are privately owned. Seven sites contain a significant wetland component, seventeen significant forests, five special habitats of plants and animals, eight rare species occurrences and two significant rock outcrops. At least three of the sites have historic areas or significant features. Three of the sites are regionally significant and twenty are of county-wide significance.

The main purpose of this inventory is to facilitate protection of these natural resources when making land use decisions, siting developments and building roads, sewer, waterlines and other infrastructure. The information provides land owners with information that may encourage them to permanently protect their property. It allows informed evaluations of the trade-offs associated with biological diversity and development projects before plans have been finalized. The inventory will also be used to provide information to residents, particularly students, about the significant natural resources in

our County and provide data for researchers. Our community needs to develop policies and strategies to purchase the most significant of these sites or secure protection for their unique resources. Sites identified in the *Natural Heritage Inventory for Forsyth County* are included in our proposed open space system. (See Chapter 8, “Open Space, Parks and Greenways.”)



The bog turtle is a State-threatened species identified in Forsyth County as part of the Natural Heritage Inventory. Preferring mountain bog habitat and weighing only 4 ounces, these turtles are rare in the Piedmont because most bogs have been drained for agricultural use.

Policies

- Utilize information from the Natural Heritage Inventory to monitor environmentally sensitive areas and to protect and preserve them when preparing area plans, approving development proposals and implementing publicly funded projects.
- Develop partnerships with non-profit environmental

groups such as the Piedmont Land Conservancy, Sierra Club, the North Carolina branch of the Nature Conservancy, the Trust for Public Lands and other environmental agencies to protect these environmentally sensitive areas.

Action Agenda

- Identify sources of funding for purchase of conservation easements and acquisition of Natural Heritage Inventory sites.

Objective 2: Water Quality

Protected watersheds, wetlands and streams result in reduced pollution runoff, soil erosion and flooding and clean, high quality water to meet the domestic, economic and recreational needs of the community.

Our community’s rivers, streams, lakes and wetlands are among our most precious resources. Their purity affects the quality of our community’s water supply, wildlife, vegetation and recreational opportunities. Increasing growth and development threaten the health of these resources. The discharge of sediment, chemicals and other wastes into these water bodies deteriorates their quality, placing restrictions on downstream water uses and negatively impacting wildlife. Vigilance in protecting these resources is required to enable them to meet the future domestic, economic and recreational needs of the community and provide habitats for wildlife. There is also a responsibility to protect local watersheds that drain to the water supplies of municipalities located downstream of the three river basins draining Forsyth County, the largest being the Yadkin-Pee Dee River Basin.

The federal Environmental Protection Agency (EPA), in partnership with state and local governments, is responsible for restoring and maintaining the chemical, physical and biological integrity of the nation’s waters. Water supply watersheds, wetlands, flood prone areas, stormwater runoff, erosion and sedimentation are regulated

by various federal, State and local laws aimed at achieving this purpose.

Water Supply Watersheds

The main sources of drinking water for Forsyth County residents are the Yadkin River, which provides 65 to 70 percent of our supply and Salem Lake which supplies our remaining fresh water. Winston-Salem, Forsyth County, Kernersville, Lewisville and Clemmons have adopted local watershed protection regulations for seven watershed areas that drain to these drinking water supplies and to others in adjoining counties. These watershed protection measures are required by the State to protect the quality of our drinking water supplies and those of our neighbors. The approach of the watershed regulations is to limit development, which is a source of pollution, and maintain the stormwater filtration ability of natural vegetation and open space. Protection measures include density restrictions, land coverage limitations, vegetated stream buffers, use prohibitions, critical areas or protected areas, and stormwater controls. Density and land coverage limits are most common, based on the concept of limiting stormwater runoff and maximizing infiltration. Stream buffers are one of the most important protection measures, since they are the last line of defense before pollutants can enter a stream.

Wetlands

In the past, wetlands have been regarded as wasteland. Many of our wetlands have been



Watershed

A watershed, sometimes called a water basin, is the land area that drains into a body of water, such as a lake, stream or river. A water supply watershed is the area that drains to a water body used to provide public drinking water.

Wetlands

Wetlands is the collective term for marshes, swamps, bogs and similar poorly drained areas where soils are saturated with water for parts of the year.

destroyed by being drained for farmland, filled for developments, or used as waste receptacles. Increasingly we are realizing that wetlands are some of our most valuable natural resources. Among other things, they provide important habitat for fish, wildlife and vegetation, act as a filter for sediment and other pollutants and help improve water quality, store stormwater runoff and help reduce flooding, control sediment and provide water storage that helps recharge the groundwater system. Wetlands also have aesthetic, open space, educational and recreational value.

Federal and State regulations now require land developers to show that they are avoiding and minimizing impacts on wetlands whenever possible. When there will be significant impacts, mitigation measures to reduce the effects of those impacts must be developed. Mitigation can include requiring wetlands to be restored on-site

or elsewhere, payments to a general fund for wetlands protection, requiring preservation or conservation easements on environmentally sensitive property, or a combination of the above.

Forsyth County does not have the extensive tidal wetlands of some coastal counties in North Carolina and many of our upland wetlands have been lost due to past farming and development practices. The U.S. Army Corps of Engineers and the State of North Carolina regulate our remaining wetlands but have limited staff for enforcement. Locally, we do not ensure that land developers obtain

approvals and permits from these State and federal agencies before we give approval for land development. Many municipalities do require a check off of compliance with State and federal requirements during the local permitting process.

Streams

Monitoring and protection of the County's rivers, streams and lakes are important to ensure high water quality. The N.C. Division of Water Quality has recently completed the water quality management plan for the Yadkin-Pee Dee River Basin. The study area includes the Yadkin River and its tributaries in Forsyth County. The purpose of the plan is to share information and to recommend actions that may be needed to maintain the health of streams and rivers in the basin.

The plan identified the Muddy Creek and High Rock Lake watershed subbasins, in which

Winston-Salem is located, as among those with the highest number of impaired stream miles. The source of the pollution is urban runoff from parking lots and other development. The Salem Creek and Middle Fork streams are classified as impaired and action by Forsyth County and the City of Winston-Salem to improve water quality is recommended. Muddy Creek and the Abbotts Creek Watershed are identified as having known water quality problems though not classified as impaired.

Increased development will not only demand more water but generate more wastewater, increase impervious surfaces, produce higher than natural streamflows and cause erosion of stream banks of the Yadkin River. The plan therefore recommends the need for long-range water supply planning, growth management and urban stormwater planning.

Forsyth County has created the Yadkin River Conservation District to help protect the Yadkin River, our main drinking water supply. This zoning district has large lot sizes and other protective requirements on development.

Stream naturalization (maintaining streams in a natural state) is one of the most efficient methods of minimizing soil erosion and flooding and improving water quality. Trees and other vegetation prevent stream banks from eroding and provide shade for water. Shade lowers water temperature and allows natural organisms to thrive and cleanse the water. Healthy water increases bird and fish populations. A stream naturalization program based on sound science, with emphasis on water quality, flood management and aesthetics

should be an element in a comprehensive approach to improving environmental quality.

The City of Winston-Salem has begun some work in restoring urban streams that have been degraded including the Church Creek Stream, Bethabara and the Tanners Run and Town Creek restoration projects, Old Salem. We need to identify other streams where restoration work needs to be done and develop a program to do so over time. We must also take a more proactive approach in stream protection thereby reducing the incidents of stream degradation.

Stormwater Runoff

In 1996, the City of Winston-Salem began a stormwater management program. The objective of this program, a response to federal requirements of the Clean Water Act for larger urban areas, is to ensure that stormwater is controlled

and stormwater pollution is reduced. In the past, the City's stormwater policy focused on controlling the runoff rate of developments by requiring developers to submit to the Public Works Department stormwater plans for all projects requiring site plan review. The program is expected to adopt a more comprehensive approach to stormwater management. Drainage basin studies being done will identify and map the public stormwater collection system, study flow patterns, assess the effectiveness of the system and the effects of existing impervious surfaces on runoff and recommend ways to more effectively control the quantity and quality of stormwater runoff. It is expected that the City will complete basin studies and master plans for its fifteen drainage basins by the year 2000.

Other components of the program are public education, pollution prevention audits of business and industry, illegal stream discharge discovery, and water quality and storm event monitoring. These studies will be used as a basis for the development of more comprehensive stormwater management regulations. Forsyth County and the smaller municipalities are expected to be required by the federal government to develop stormwater management programs in the near future.

There has been some ongoing water quality monitoring. Monitoring of the base and storm flows of the Muddy Creek and its major tributaries since 1988 by the Forsyth County Environmental Affairs Department



Stormwater Runoff

When the soils and vegetation in a watershed are unable to absorb additional rainfall, the water runs across the land and is called stormwater runoff. Excessive stormwater runoff can cause drainage and flooding problems and is a major source of pollution. It degrades water quality by transporting sediment, petroleum, metals and other pollutants from impervious areas such as parking lots, streets, sidewalks and buildings into water supplies. Stormwater runoff is the primary nonpoint source of contamination of surface water and groundwater.

revealed that sedimentation due to erosion has had a major negative impact on the basin. Sediment caused by soil erosion and stream bank destabilization is the primary source of nonpoint source pollution (pollution of diffuse origin) that degrades water quality. It reduces fish and wildlife populations, carries toxic materials, and reduces the quality and volume of public water supplies and recreational reservoirs thereby having environmental, economic, and aesthetic impacts.

While soil erosion and sedimentation are to some degree caused by natural factors such as rain and wind, they are accelerated by land use practices such as intensive agricultural production, construction, and other development activities. The North Carolina Sedimentation Pollution Control Act of 1973 is designed to protect the State's streams and lands from being polluted by soil eroded from construction sites. Winston-Salem and Forsyth County have taken over from the State local responsibility for administering the Sedimentation Pollution Control Act. The *Unified Development Ordinances* (UDO) adopted by Winston-Salem, Forsyth County and other municipalities in the County contain regulations regarding erosion control and establish guidelines for new development. The Erosion Control Section of the



Inspections Division is responsible for enforcement of these regulations.

Flood-Prone Areas

A vital part of our community's strategy to manage increased stormwater runoff is protecting floodplains from filling and development. Floodplains are also inherently hazardous and costly locations in which to build. For these reasons federal, state and local agencies have established various legal requirements, public policies and guidelines to manage activities in flood-prone areas. One of the main benefits of these restrictions on development in floodplains is to help maintain the capacity of floodplains to temporarily store floodwaters during major storm events.

Mapped floodplains in Forsyth County comprise over 12,000 acres of land and represent more than 5% of the total land area. The local

Floodplains

Floodplains are geographic features that have formed through natural stream processes. During prolonged or intense rainfall, surface water runoff sometimes exceeds a given stream channel's capacity to carry it. The stormwater overflows the stream channel and floods onto the broad, flat adjacent lands called floodplains. Floodplains temporarily store excess surface water runoff until stream flow subsides and the stream channel can again carry all the flow.

Unified Development Ordinances (UDO) regulate activities in floodplains beyond the minimum requirements of the federal government by further limiting the nature and extent of development in flood-prone areas.

Policies

- Continue to monitor water quality and conditions in water supply watersheds to determine the effectiveness of regulations and recommend changes as needed.
- Promote the utilization of building methods that emphasize reducing the amount of impervious surface.
- Promote more environmentally sensitive and aesthetically pleasing stormwater management systems including constructed wetlands, bio-retention (constructed woodlands) and stream naturalization.
- Educate land owners and businesses about the benefits of Best Management Practices for stormwater protection.
- Enforce floodplain regulations more effectively.

Action Agenda

- Identify and consider restoration of degraded urban streams.
- Promote a system of vegetative buffers along streams to filter pollutants.

- Implement a county-wide stormwater management program that addresses the quality and quantity of stormwater runoff including the consideration of on-site and regional detention ponds.
- Review and amend, as necessary, the erosion control ordinance.

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**Objective 3:
Environmentally Sensitive Development**

Environmentally sensitive development which respects natural areas and enhances the quality of our built environment.

In assessing development projects it is important to consider the impact of proposed developments on the environmental resources on site, as well as the cumulative impacts beyond the development sites. This chapter has identified a number of existing federal, state and local regulations to which developments in Forsyth County must conform when applicable. These regulations do not address all the environmental concerns that need to be considered together when assessing a development proposal. There is no procedure, for example, to identify and assess the impact of development proposals on rare plants, wildlife and geological features located on a development site.

Existing regulations are administered by a number of different federal, State and local agencies and there is no one local agency that has the responsibility of ensuring that development proposals meet all requirements and obtain all necessary permits and approvals. A more comprehen-

sive approach to environmental assessment of projects is therefore needed. Such an approach requires more mapped and detailed knowledge of the environmentally sensitive resources of our community, explicit policies and standards to ensure protection of these resources and generally more environmentally sensitive development. The *Natural Heritage Inventory* provides us with information that facilitates protection of our most significant resources. Provision for protecting these and other environmental resources should be included in development plans and ordinances as needed.

Additionally, a framework for environmental review of development proposals is needed to ensure compliance with all requirements and to increase the likelihood of environmentally sensitive designs. An environmental checklist at the initial stage of development applications would provide a strategy to link environmental principles to development design and approval. Early identification of possible adverse impacts or opportunities for environmental enhancement would avoid costly redesign of the project at a later stage and result in more environmentally friendly projects.

An environmental review procedure could consist of an environmental checklist which will flag environmental concerns that need to be addressed either by existing regulations, sensitive design or a mitigation plan. Where there are no existing regulations the Planning Department will work with developers to minimize adverse effects on the environment.

Policies

- Consider the adoption of guidelines and/or regulations, as necessary, to manage development in environmentally sensitive areas.
- Integrate natural areas (streams, wetlands, natural vegetation, etc.) into the site design of development projects and ensure that these areas are protected during construction.

Action Agenda

- Develop an environmental checklist for ensuring compliance with existing regulations.
- Consider an environmental review procedure which includes assessing the environmental effects of larger and more intense development proposals.
- Study existing environmental protection practices for effectiveness.

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**Objective 4:
Air Quality**

Improved air quality, which protects the health of our citizens and enhances the economic development potential of our community.

Clean air is important to the good health of our citizens, especially children and the elderly. It also contributes to the overall quality of life in our community, an important asset in attracting

new businesses and visitors. Air quality standards are established by the U.S. Environmental Protection Agency (EPA) which sets acceptable levels for six air pollutants—ground-level ozone, carbon monoxide, particulate matter, sulfur dioxide, nitrogen dioxide, and lead. These pollutants are regulated because they affect people’s health.

The Forsyth County Department of Environmental Affairs monitors local air quality to determine whether our area is meeting current EPA standards. We have been a “nonattainment area” for ozone in the past (1987-1989). After three years of good air quality in the early 1990s we became a “maintenance” area. The maintenance area designation meant that we were required to prepare a plan and take steps to improve air quality. The local vehicle inspection and maintenance program which assures that automobile exhaust emissions are within acceptable standards was put in place as part of the County’s plan to reduce emissions.

The major source of dirty air is the automobile. Electric utilities and factories also contribute to air pollution. Emissions controls on automobiles, like the catalytic converter, have substantially reduced tailpipe pollution in the last twenty years. However, during that same time period, the number of miles we drive has gone up at a high rate, offsetting the air quality gains from cleaner automobiles. In Forsyth County, vehicle-miles traveled are projected to almost double by the year 2025 according to the *Piedmont Triad Regional Transportation Study*. This increased fuel use, together with tougher EPA standards for ozone, place us in danger of becoming a “nonattainment area” for ozone again.

Sanctions for nonattainment can be severe. In 1996 funding for road building projects in Forsyth County was frozen for several months when computer models indicated air quality problems would result from planned transportation improvements. We can be forced to pay more for reformulated gasoline and face tougher auto inspections for emissions. Electricity rates could also increase as Duke Power has to meet tougher standards at its Belews Creek plant. Some factories interested in locating in our area may have to look elsewhere for a new site.

Maintaining good air quality is therefore in the best interest of Forsyth County both for the health of its citizens and to ensure continued economic growth and prosperity. The keys to cleaner air include reducing automobile use by promoting compact mixed use land development patterns, creating viable transportation alternatives including mass transit, carpooling, walking and cycling and encouraging proper maintenance of older vehicles. The less the automobile is used, the fewer air pollutants it will put into the air we breathe. Emissions from electric utilities and factories must also be minimized.

Policies

- Create land use patterns (such as infill, compact and mixed use development) that reduce vehicle miles traveled.
- Promote transit use including rail, buses, van-pooling and carpooling.
- Recruit clean industries.

**Objective 5:
Solid Waste Management**

A comprehensive and cost-effective solid waste management program which protects public health and the environment, promotes recycling, reduces the amount of solid waste, and successfully manages and reclaims landfill sites.

Growth and development in any community brings with it a corresponding increase in the amount of solid waste produced and a growing difficulty in disposing of the waste generated by residents, businesses and industry. Waste reduction is therefore central to a successful waste management program. It reduces the number of landfill sites that must be developed and contributes to a cleaner environment.

The objectives of the *10 Year Solid Waste Management Plan* prepared in 1997 by the Solid Waste Management Department of the Winston-Salem/Forsyth County Utility Commission are to: provide for cost-efficient long term disposal of the county’s solid waste; protect public health and the environment; provide waste collection services where practical; provide education and support for waste reduction activities; and, meet waste reduction goals. These objectives can be realized by landfilling, recycling, source reduction and waste combustion. Of these methods, landfilling and recycling are currently the most emphasized in Forsyth County.

Landfills

The Hanes Mill Road Landfill is our public sanitary landfill that will eventually cover 325 acres of the 375 acre site owned by the Utility Commission. It currently receives 330 tons of trash a year and has a life expectancy of 20 to 30 years. Reduced disposal since 1980 is due in part to recycling efforts which divert 40,000 to 50,000 tons of trash each year. The Hanes Mill Road Landfill currently serves Forsyth, Stokes and Davie Counties. Surry and Yadkin Counties have permits to use the facility but currently do not do so. Clemmons, Kernersville and Lewisville are served by the other major waste hauler in the County, Waste Management, Inc., a private company. They haul to the privately owned 100-acre Piedmont Landfill located north of Kernersville. Waste Management, Inc.'s recent request to expand their landfill by 270 acres into Guildford County was not approved due to citizen opposition indicating the difficulty of locating and expanding this land use.

All new sanitary landfills and expansions of existing landfills are required to have measures to protect the environment including a liner and a leachate collection system to prevent liquid from the landfill from escaping and entering the

Landfills

There are several types of landfills: sanitary landfills which receive household waste; land clearing and inert debris landfills for trees, grass and other waste generated from yard work; construction and demolition landfills which accept solid waste from the construction, remodeling, repair or demolition of buildings and roads; and, hazardous waste landfills which accommodate substances labeled as hazardous.



groundwater system. A network of monitoring wells is also required around the landfill to monitor the groundwater. As a result, it is expensive to construct and operate a sanitary landfill. Many smaller communities are finding it more economical to close their existing landfills and haul their waste to a large regional facility.

The new Old Salisbury Road construction and demolition landfill which began operation in September 1996 on a site near the Davidson County line has a lifespan of 20-30 years. The purpose of this landfill is to divert inert waste from the Hanes Mill Landfill. The Overdale Yard waste site handles tree limbs and other wood materials which are ground into chips and then sold as boiler fuel or mulch.

Oil, tires and batteries are not allowed in landfills. Instead, recycling of scrap tires is subsidized by a one dollar disposal fee on each new tire purchased. A permanent facility to accommodate oil and batteries as well as pesticides and other substances labeled as hazardous was opened in 1999.

Waste Reduction/Recycling

In 1996, the General Assembly of North Carolina set a state-wide per capita waste reduction goal of 40 percent by the year 2001 using 1991 as the base year. However, local governments have the flexibility to set their own goals based on local conditions. The Winston-Salem/Forsyth County Utility Commission has set a goal by 2005 to decrease tons per capita waste generated from + 9% to + 5% of the 1991 base year level.

The State's 1997-1998 *Solid Waste Annual Report* concludes that North Carolina will not achieve its goal for waste reduction and that waste reduction activities must be accelerated considerably if North Carolina is to reduce its solid waste disposal burden. It attributes the State's high waste disposal rate mainly to the strong economy, relatively low costs of disposing waste by landfill and the lack of reduction incentives.

The Utilities Commission operates curbside recycling programs in the City of Winston-Salem, has drop-off recycling locations in the County and encourages business recycling. Recent data, however, suggests that these initiatives appear inadequate to meet either the Commission's or the State's goals. In 1998, Forsyth County's waste disposal rate of 1.53 tons per capita was higher than the overall state-wide rate of 1.15 tons per capita, though the second best of the five largest urban counties. The County's disposal rate, like the state-wide rate has increased from the base year 1991/92.

In Winston-Salem, the recycling program is for both single family and multifamily homes. The participation rate for single family house-

holds has increased from 55 percent in 1991/92 to 68.6 percent for 1998/99. This exceeds the State average of 44 percent. The participation of multifamily complexes has also grown but there is room for significant improvement in their participation.

The towns of Bethania, Clemmons, Kernersville, Lewisville, Rural Hall, Tobaccoville and Walkertown have curbside recycling programs.

Residents of unincorporated areas do not have access to curbside recycling services, but two drop-off centers serving the eastern and western parts of the County were opened in 1998. There is also a drop-off recycling area at the Hanes Mill Road Landfill. Additional County drop-off centers should increase recycling in rural areas. The recycling program is funded by tipping fees from the landfill operations.

Maximizing residential recycling will involve increasing participation and increasing the types of materials collected. However, commercial and industrial uses contribute the majority of the waste going into our landfills. There is no data on how much recycling of materials is being done by industries and commercial businesses. A comprehensive survey needs to be done to determine the amount of waste generated by businesses and the proportion of this waste that is recycled. It is clear that any significant reduction of the waste stream going to landfills would require aggressive recycling by commercial users as well as waste reduction at the source. One of the goals of the *10 Year Solid Waste Management Plan* is to reduce waste significantly through new nonresidential recycling efforts. The main recommenda-

tions of the Utilities Commission to improve waste reduction and recycling are:

- reemphasize education and awareness;
- work with businesses. A priority is conducting a comprehensive survey of businesses;
- provide additional County drop-off sites;
- increase multifamily participation.

Pay-as-you-throw

Pay-as-you-throw is a system of unit pricing in which residents pay for each unit of waste that they dispose of. This system is similar to fees assessed on other essential services such as water and electricity where charges to residents is based on usage. Studies have shown that pay-as-you-throw has been effective in reducing the amount of solid waste disposed of in a wide range of communities across the country. Communities using it in tandem with recycling and composting programs have found that these programs increase each other's effectiveness. The City/County Utilities Commission should therefore explore the pay-as-you-throw system as a means to promote recycling in the community.

Policies

- Provide landfill sites for waste generated and use new solid waste disposal technologies to reduce the amount of landfilling required.
- Expand existing recycling programs to include new users and collection of additional types of materials.
- Target recycling efforts particularly at private

commercial and industrial businesses.

- Promote use of recycled or recyclable products among citizens and businesses.

Action Agenda

- Develop and implement strategies to further reduce the amount of waste going to landfills.
- Develop reclamation plans for reuse of all existing public and private landfills.
- Explore "pay as you throw" as a method to promote recycling.

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**Objective 6:
Environmental Regulations**

Scientifically based and cost effective environmental regulations that are enforced.

The purpose of existing federal, state and local environmental regulations is to ensure a clean, safe and healthy environment in our communities. It is important that these regulations be scientifically sound, relevant to the needs of the community, and that they be enforced and their impacts monitored. The agencies charged with enforcing these regulations and monitoring their impact on the environment could improve enforcement and monitoring with additional funding.

Forsyth County's Environmental Affairs Department (EAD) is one of the main environmental monitoring agencies in Forsyth County. It operates a comprehensive air sampling network to monitor the effectiveness of the local air quality regulatory program. It issues a Daily Air Quality Report during the summer months and a Daily Pollen Report during the pollen season (February-October). The EAD also began routinely monitoring the water quality of Muddy Creek and its major tributaries in 1988. It also conducts investigations into water quality complaints by residents.

Other monitoring and enforcement agencies include the Building Inspections Division, the City's Public Works Division, the Natural Resource Conservation Service, the N.C. Division of Water Quality and other divisions of the N.C. Department of Environment and Natural Resources.

Policies

- Review existing and proposed environmental regulations for efficiency and effectiveness.
- Encourage local input in the development of environmental plans and regulations at the State level.
- Appropriately staff the City and County departments that administer and enforce environmental regulations.
- Fund and support scientific studies and monitoring activities of environmental resources.
- Coordinate with the state and federal Agencies.

**Objective 7:
Environmental Awareness**

Increased community understanding of and sensitivity to the area's natural systems and related environmental issues.

All government agencies and other environmental organizations involved with environmental issues make attempts to increase environmental awareness among citizens. There is a range of programs which includes public communication programs and those in which residents actively participate in improving the community's environment. Some organizations limit their public communications to the distribution of brochures while others have more comprehensive long term public information plans.

"Stream Watch" is a state program that actively involves citizens in improving their environment. The program is based on the premise that those in the best position to notice signs of a stream's distress are its neighbors, the people who live along its banks or use its waters. Citizen groups "adopt" a waterway or a portion of one and act on its behalf. The Stormwater Division of the City of Winston-Salem has been administering this pro-



At events like Big Sweep, volunteers work together to clean up local streams.

gram within the City for about one year. It has a list of volunteers for the program.

In order to involve more citizens in the program, it invites all residents who live along streams and all businesses located on streams to become stream watchers, and report unusual stream conditions like discoloration, severe erosion, flooding or excessive debris or litter. Stream watchers are encouraged to become the local experts on "their" stream's dimensions, history and wildlife. They are encouraged to take an active role in promoting the health of the stream, taking part in activities such as stream and river-bank cleanups, wildlife identification and inven-

tories, water quality testing and nature walks. It is anticipated that when the program becomes more established, some public recognition will be given to participants. In the future, the Stream Watch program could be expanded to all of Forsyth County.

The Stormwater Division of the City of Winston-Salem has a 5-year (1997-2001) public education and information

plan to educate residents about the importance of stormwater management and involve them in improving stormwater quality. This includes, for example, brochures distributed at schools, garden centers and other venues; public education videos; information segments on stormwater

issues; public service announcements on the City television station; articles for construction industry newsletters; inserts in water bills; and, a hotline.

The Forsyth County Soil and Conservation District has the responsibility of developing and carrying out a sound soil and water conservation program. It works with other agencies such as the Natural Resource Conservation Service to provide information and technical assistance to farmers and other landowners about the proper use of land. It also administers the Farmland Preservation Program.

Sciworks, The Science Center and Environmental Park of Forsyth County, is a main center of science education for children. It consists of science exhibits, a 15-acre Environmental Park, a planetarium, nature trails and guided walks and a Science Shop. It has interactive, hands-on exhibits, special demonstrations, events and programs in a wide range of science fields.

The Office of Environmental Education of the N.C. Department of Environment and Natural Resources serves a coordinating role in promoting environmental education and natural resource stewardship throughout the state and can assist local communities in their education efforts.

Policies

Use the media, the Internet and other forms of public communications to increase the environmental awareness of citizens, officials, and the business and development community.

Support citizen involvement programs such as

“stream watch” and develop new programs that involve citizens in environmental monitoring and protection.

Continue to support organizations and programs which educate residents about environmental issues.

Conclusions

Forsyth County in Piedmont North Carolina is a beautiful area with many natural assets. There is no reason we should tolerate the degradation of our air, water and environmentally sensitive lands. Indeed, an increasingly competitive economy compels us to protect and enhance our natural environment as a quality of life factor that attracts new industry and skilled workers. Moreover, we should be good stewards of the environment not only to assure our economic growth but as our legacy to future generations.