The Fiscal Impact of Alternative Land Uses in Macon County

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Abstract: This report uses the hedonic method to analyze the effect of land use change on local government property tax revenues and costs of property tax-supported services. A statistical model that estimates the property value for alternative land uses is developed. Using the estimated property value and the current property tax rate, tax revenue is estimated for a typical parcel in each of three land use categories: residential, commercial, and agriculture/open-space. The per parcel average cost of tax supported services is estimated from county expenditures. Using these estimated values a revenue to cost ratio is calculated for each land use. In addition, this study analyzed a sub sample of properties to observe the changes in the ratio between 1996 and 2000. The paper also briefly considers additional costs from land use change such as changes in the county s water quality and rural character.

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Executive Summary
Prepared by Susan B. Kask

- Using the total of 1592 parcels with 824 residential, 40 commercial and 728 Agriculture/open space, we estimate three property value models. Using these models we can predict the property value and thus the tax revenues from different types of properties in Macon County.

- Using county budget reports we allocated costs across the three broad classes of land use (Residential, Commercial, and Ag/open Space) to calculate a per parcel average cost of property tax supported county services.

- Combining the estimated tax revenue from a typical parcel in each land use category with the average cost for each category we generate the following table.

	Residential	Commercial	Ag/Open Space
Per Parcel Cost Allocation	676.11	1026.16	141.24
Tax Estimate	388.78	480.21	160.88
Lower Bound	78.56	0	0
Upper Bound	699.00	1294.96	562.47
Rev/Cost Ratio-Average Tax Estimate	0.58	0.47	1.14
Ratio-Lower Bound	0.12	0	0
Ratio-Upper Bound	1.03	1.26	3.98

- The results suggest that the tax revenues expected from the **typical** reference parcel of residential or commercial properties will not cover the costs these properties impose on tax supported county services. Generally the results show that in cases when tax revenues from particular residential parcels are greater that $676.00 per year then costs are covered. Based on the sample data only 24% of the sample falls in this range.

- A scenario analysis of a 30 acre parcel that could either remain in Ag/open space or be converted to ten 3 acre residential lots with homes shows that the county would lose $532.00 from county coffers on the residential conversion, but would gain $290.00 into county coffers if the land remains in ag/open space use. Although this is a stylized example, it illustrates the application of the models and the potential cost of development to the county in services needed by the population residing in developed areas. Larger homes generating higher property values would likely generate sufficient revenues to cover costs of county tax supported services.

- The results of the study demonstrate the benefits to the county in cost savings of maintaining some properties as farmland, or open space. These benefits are increased when we consider the role of farmland in maintaining the rural character of the community that fuels the tourism industry and thus generates income, jobs, and sales revenue for the county.

- A land use change from ag/open space to residential, or commercial, also has an added negative impact on the environment that is not calculated into the costs of this study. Thus, the cost estimates here are lower bounds. The environmental impacts are two fold: they come from the construction phase of land use change and from the new land uses themselves. A shift to residential land use yields erosion and increased sedimentation to county waters from construction activities and new roads. In addition the new residential land use will increase pollutants to county waters from use of lawn and garden pesticides and herbicides, as well as, a continuation of increased sedimentation from the new roads and driveways and from new septic systems. This study does not capture these costs, thus the costs found in this study from land use change are only lower bounds.

- Finally, the results of this study DO NOT suggest that all land use change is bad and should not occur. Instead this study points out that we should not assume that an increase in the tax base results in a net increase in funds to the county. Although changed land use can increase the tax revenues received to the county, the costs of tax supported services to the population associated with the new land use may out weigh the revenue gain. Therefore when land use changes are considered, the community may want to consider what added costs they are willing to accept for the land use change. This study explicitly states what those costs may be, and provides a statistical tool that the county can use to estimate the net costs/gains from land use change.

*Scenarios: 30 acres of land, two alternative land uses**

Ten 3-acre lots with homes		30 acres of open space	
Property Description	**Property value**	**Property Description**	Property value
Typical home in development			
Brick	$5401		
Location #8	$7994	Location #8	-$164
Built in 2000	0		
4 bedrooms	$10780		
3 acre	$11196	30 acres	$73320
Constant term	$1982	Constant term	$27099
2500 sq. feet	$107500		
Property value	$144,853.00		$100,255.00
Tax base for development	$1448530.00		$100,255.00
Tax Revenue from whole development	$6228.00		$431.00
Cost of tax supported services	$-6761.00		$141.00
Net gain/loss to county	$-532.00		$290.00

* Values in this table represent the contribution (+ or -) of each property characteristic to total property value.

1. Introduction

This report is an update of a 1996 study of the fiscal impact of land use change in Macon County. Rural areas in the U.S. are continuing to change rapidly as population and economic growth continue. With this rapid growth comes changing land uses and new populations in rural communities pressuring local governments to provide new services. However, sufficient revenues may not be available to support the services needed or wanted. Therefore, an important element in the planning process for local government is to monitor the fiscal vitality of a community with respect to the revenues needed and the services required. This study provides a hedonic model that can help a community understand the fiscal impact of alternative land uses.

Fiscal impact studies have been conducted in communities for many years (Margolis 1956, Burchell and Listokin, 1995). Studies have often found that residential development imposes greater costs to a community than the tax revenues they generate (Brabec, 1992, Miller 1992, Burchell and Listokin, 1995). Furthermore, studies have found that a community can potentially maintain current tax rates, or minimize tax increases, by maintaining land as open space rather than promoting development. As communities become more computerized and the need for understanding how they are changing increases, fiscal studies are becoming an increasingly important tool for community planning. (Fausold and Lilieholm, 1996)

One of the most common concerns investigated with fiscal impact studies is the tax rate. Fiscal impact studies can demonstrate whether tax revenues will shift uniformly with government expenditures as land usage changes. When more taxes are necessary, but the campaign promise of No new taxes looms over officials heads, the logical alternative often seems to be more development to increase the tax base. Common sense would seem to dictate that more businesses and more residents would constitute more tax revenues. However, time

after time, fiscal impact studies have shown that while more commercial and residential development does increase the tax base, it also increases the demand for schools, public works, road maintenance, emergency services, and local government.

Results from these fiscal impact studies do not suggest that development is bad. Development certainly has its advantages such as spurring higher wages, providing jobs, and more and improved public services. Instead these studies simply disprove the myth that a larger tax base will ease the tax burden for the individual taxpayer. If development is to be pursued as a local government policy, it should not be done to solve a tax crisis.

Typically, fiscal impact studies analyze the impact of a particular project or change in a particular land parcel (Oakland and Testa, 1995). Some studies use a municipal approach for analyzing revenues and expenditures. This paper uses the hedonic method to estimate property values, and thus tax revenues. The models are applied to Macon County, North Carolina.

Section 2 below presents the discussions, interviews, and research used for updating the study. Section 3 discusses the hedonic method and the sample properties used for the study. Section 4 describes the model use for the analysis. Section 5 discusses the cost of services provided by the county. Section 6 provides the fiscal impact analysis. Section 7 compares the fiscal data collected in 1996 with the most current data. Rural character and water quality issues are considered in Section 8. The summary and conclusions are given in Section 9.

2. Revision Preparation

In response to reviewer comments, the 1996 study was altered in several ways. First, this study models property values instead of property tax revenue, since the latter is simply the former multiplied by the tax rate. Given that the county government sets the tax rate, the true variable is the property value. Current tax revenues can be estimated by multiplying the

estimated property value by the tax rate, in this case $0.43 per $100 valuation for the property. Second, this study compares the 1996 data with a sub sample of the 2000 data [1] to determine any trends that might be observable in the data.

Several comments could not be addressed due to characteristics of Macon County or their data. Reviewers suggested that other tax revenues such as sales or income tax be included in the analysis. Although it is true that as the population increases we would expect sales revenues and other revenue sources (state allocations etc.) to increase for the county, however, it is not possible to connect revenues received to a parcel of property or a type of land use. Therefore, this study subtracts the user fee based services, services funded by others sources of revenues such as grants and state allocations, and sales[2] tax revenues from the county budgets, focusing instead specifically on the county property tax supported services in the costs estimates. Using population density for land use type may provide an avenue for future studies to account for tax revenues sources other than property taxes for fiscal studies.

Reviewers also suggested the use of the marginal cost of a parcel change in each category to determine the fiscal impact rather than average per parcel cost. First, according the county officials, marginal costs are very small due to the high fixed (sunk) costs incurred by the county from serving part-time summer residents. County managers believe they are able to handle the current population growth when considering the major expenses of education and emergency services since they already have excess capacity due to the preparation levels required for the annual summer migration of 50,000 vacationers. The needed capacity already exists so the addition of new permanent residential or commercial parcels may have an insignificant marginal

[1] Although a time-series cross-sectional data set may provide better property values estimate this could not be done using the whole sample due to the fact that Macon County does not keep past property values on record. Instead a sub-sample is used to compare across years.
[2] Sales taxes are earmarked for specific services.

cost at this point in time. Using the average in this case then gives a better indication of actual costs facing the county.

In this study the unit of analysis is a parcel of land. Most of the county s costs depend on population levels and people own on parcels of land. As population increases, the number of parcels increases and the configuration of parcels changes. Since we are interested in land use change due to population change, using the parcel as the basis of measure for costs and revenues is appropriate.

In addition to incorporating the reviewers comments, this analysis also includes the discussion of new qualitative measures such as the differences in schools, emergency services, crime rates, police protection, and pollution within the county as related to the property value model.

Finally, an extended literature review was done in order to improve the report. As Deb Brighton discussed in her New York report and John Chazal found in his North Carolina paper, vacation homes and retirement homes are extremely tax positive since they pay the same tax rate, but do not require the most expensive service, education, and require very little of the other services during the months of low tourism. Macon County is located in the beautiful mountains of North Carolina so there are an extremely large number of vacation homes. One third of the parcels in the collected data had billing addresses outside of Macon County. The County is also a growing retirement area. From 1990 to 1996, there were 300 more deaths than births due to the growing elderly population.

Despite documented results that vacation and retirement homes are usually tax positive, Macon County officials felt that this was not representative of their county. True the vacation homes require only a seasonal demand of services, but the increase in population from a normal

30,000 to an estimated 80,000 during the peak vacation months more than negates the money surplus seen due to low demand during the rest of the year. Since two-thirds of the year's work occurs during the summer, County officials felt that preparation for the tourist season, the necessary extra man-hours, and the capital needed to provide for such a large increase in population cost the county too much to allow them to recognize vacation homes as tax positive. Concerning the large number of retirement homes in Macon County, the increase in demand for police and emergency medical services for the elderly nullifies the savings recognized from education services, according to county officials.

3. The Method, Pilot Site, and Sample

Two approaches are generally used for fiscal impact analysis: the Municipal Approach (hereafter MA) and the Single Property Approach (hereafter SPA)[3]. This study uses a variation of the SPA method for two reasons: the availability of data by parcels and the potential for this approach to better differentiate the impact for different types of development, e.g., cluster versus sprawl residential development. The SPA approach typically analyzes only a single property; however, this study uses a sample of single properties to develop a statistical model that estimates property value for a parcel using property characteristics. This hedonic approach is commonly used to analyze property values in the economic literature (e.g. Parsons, 1992, Kask and Maani, 1992) and is applied similarly in this paper. The approach provides results similar to the MA approach in that it evaluates an average property rather than a particular property. However, it does so capturing the complexities of particular properties, a feature lost in the MA approach. Using the hedonic approach, property values can be estimated for particular parcels thus capturing the benefits of the SPA approach. Cost of services in this study are allocated

across land uses and estimated on a per parcel basis. Revenues received are compared to cost of services per parcel indicating whether a type of land use imposes additional costs to a community over the tax revenues collected.

Macon County was originally chosen as the pilot site in 1996 because of its growth, it's similarity to other counties in the region, and the availability of data. The study is being reevaluated due to the request made by the Land Trust for the Little Tennessee. According to the North Carolina Department of Commerce, Macon County is the fastest growing County in western North Carolina, with a population growth rate of 15.1% between 1990 and 1996.

Given that the county lies between Atlanta and Cherokee (site of a growing gaming industry and gateway to the most visited national park in America), and a four-lane highway now exists between Macon County and Atlanta, the high rate of growth is expected to continue. Similar to other western counties, the mountain topography of Macon County increases the costs of providing services to residents. For example, the mountain terrain requires the county to maintain three bases for emergency medical services. The EMS bases are located across the county with one in the NW Nantahala region, one in the central Franklin area, and another in the SE Highlands district. Another similarity with other western counties is the large percentage of county lands owned by the State and/or Federal government. In Macon County, 46.2% of County land is owned by the U.S. Forest Service, which means that there are 258,000 acres on which no taxes are paid. The county does receive Payments In Lieu of Taxes (PILT) and a percentage of the timber sales, but this normally does not amount to more than one dollar per acre. An amount that is nowhere near what the county would receive if the land were taxed according to the current tax rate. Despite this tax status, the county still provides fire, police, and emergency

[3] Municipal Approach analyzes total expenditures and tax revenues by category of land use. The Single property Approach analyzes a particular property. (See Miller 1992)

medical services to these areas. Finally, Macon County is also similar to other counties in that it has a variety of income brackets with a median family income of $30,900 in 1996, and a mix of land uses, however, rural and conservation lands predominate.[4] (North Carolina)

Macon County has computerized its data records and published much of it on line at ***www.dnet.net/macondb***, making it more readily available for analysis. As more counties move in this direction, fiscal analysis using the hedonic method becomes more feasible. It is important to note, however, that computerized data is not necessary for the implementation of the method presented in this report.

Sample properties in three categories, residential, commercial/industrial, and open space/farmland[5] were selected randomly from identified areas in the County. Identified areas include the high-income areas of Highlands and Franklin, lower income residential areas of the extreme NW and SW corners of the county, and the average middle income areas. Properties were chosen to equally represent the areas around the EMS districts, the fire districts, and the high schools. A final sample of 824 residential properties was selected from County property maps. Given that there is only one area in the County with easily identifiable commercial developments,[6] as many properties from this group were selected as possible. This gave a final sample of 40 commercial properties in the county. Although this is a small number of commercial properties, the county manager agreed that it was representative of the county since residential property continues to develop more rapidly than commercial property. Finally, open space properties were selected for a variety of sizes (large and small tracts) and across locations

[4] See the 1992 Macon County Land Use Plan for more detail on land uses in Macon County. Rural land uses include agriculture, forestry, and mineral extraction. These lands are also considered low density and relatively undeveloped. The conservation category includes lands such as ridge tops, areas with excessive slope, flood plains, wetlands, and areas with high potential for wildlife.

[5] Open Space was defined as undeveloped or agricultural properties no more than a shed barn present on the property.

in the County with a sample of 728 finally selected. Descriptive statistics for each variable in each sample are given in Table 1.

Data on property characteristics and taxes paid in 2000 for each property were collected. In addition to capturing characteristics of each property, general location variables were used to capture neighborhood characteristics. Macon County has one school district. School Superintendent Lonnie Crawford stated that there might be dissimilarities in the structures of the different schools, but was quick to add that an identical high quality education is offered at every Macon County school. Emergency Service Administrator Warren Cade stated that the equipment and trained personnel were equivalent throughout the county. County manager Sam Greenwood felt that there was no difference within the county in regards to the crime rate. The sheriff s department, Franklin s police force, and the Highland s police department were considered indistinguishable when considering equipment, personnel, and response time. The three departments are believed to be more than enough to handle the low crime rate. According to county offices, the new $3 million jail was recently built to replace the old one and not because of a growing crime rate. Although we don t expect differences in these areas as stated by the various county representatives, we continue to use location variables to capture other potential neighborhood variation.

Qualitative characteristics such as whether a home is brick, frame, or log, or where a property is located are represented with binary variables. These variables indicate whether a characteristic occurs for a chosen property and then compares the sample to a reference case. For this study, the reference case for residential properties is a frame home, without a barn or

[6] Most of the commercial development in the County is in the Franklin city limits. This study looks specifically at county services and taxes and thus no observations from the city were considered.

basement, located in area one (Franklin township[7]). The open space reference property is also located in area one.

	Residential N=824			Commercial N=40			Ag/Open Space N=728		
Variables Names	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max
Acreage	3.12	0.04	198.	9.23	0.23	105	4.22	>1	268
Age	20.27	>1	130	8.25	>1	44			
No. Bedrooms	2.58	1	6						
Barn/Base	0.5			0.03			0.01		
Brick*	0.06								
Land and Building Value	108,971	4,230	1,310,170	124,042	100	1,436,330	35,732	100	838,800
Loc2* (Holly Springs)	0.13			0.03			0.23		
Loc5* (Highlands)	0.04						0.003		
Loc8* (Cartoogechaye)	0.17			0.13			0.15		
Log*	0.03								
No. Rooms	5.31	1	12	1	1	6			
Square Feet	1,752	350	10,405	1,202	288	11,408	1.98	0	864
Tax Amount ($)	552	55	5,376	367	0.47	1,691	150	0.45	3,659

* These are binary variables and thus the values given represent the percent of the sample that has this characteristic. For example, 6% of the residential sample is brick homes.

Table 1: Sample Descriptive Statistics[8]

4. Property Value Models

Three property value models were developed for a typical parcel of land in each land use category. In each case, the level of property value is the dependent variable with characteristics of the properties as the independent variables. The general form of the three models is given in equation 1 where vector Z represents the characteristics of a property.

$$\text{Property value} = f(z_1, z_2, .., z_n) \qquad (1)$$

[7] Although a property is in the Franklin Township it is not necessarily in the City of Franklin. None of our properties are located in the city, although many are in the township.

[8] All blank spaces in the table indicate that the variable was not collected for the sample.

Property characteristics might include acreage, location, building characteristics, etc. Results for each model using data for each land use category are given in Table 2. More detailed location variables were not used due to the belief of county officials that Macon County services were provided with equality across the county regardless of the specific area.

A goal of the analysis was to obtain a high degree of predictive power demonstrated by small confidence bands. Unfortunately, we were not able to obtain sufficiently small confidence bands to generate highly accurate estimates. However, the models are useful to indicate the trends occurring in Macon County and do provide estimates that illustrate issues county officials would be wise to consider.

In addition to predictive models, this study was also interested in the impact of each property characteristic on the potential property value estimate. Therefore, a high level of explanatory power was also desired. The models do provide acceptable levels of explanatory power and confidence in the individual coefficients. Various model forms were tested to determine if a better fit of the data was possible[9]. In the end the linear form was selected as it provided the best fit to the data. The model results are given below in Table 2.

Using the results from Table 2, we can estimate the property values from a typical reference parcel[10] in each land use category. Using mean values for the continuous variables in Table 1 and the reference case, we can describe the typical reference parcel. The typical reference residential parcel is a 20-year-old frame home with 1,752 square feet, 3 bedrooms, without a barn or basement, on 3.12 acres located in Franklin township (Location 1). The estimated property value for this residential home is $90,415. However, since this is an estimate and not the true value, we use the standard error of the estimate to determine the confidence

[9] Double log, log linear and quadratic forms were tested.

bands in which the true property value will fall with a 95% confidence level giving a low property value estimate of $18,271 and a high estimate of $162,559.

	Residential		Commercial		Ag/Open Space	
	Coefficient	t-stat	Coefficient	t-stat	Coefficient	t-stat
Intercept	1982.47	0.43	-17049.83	-0.81	27099.49*	12.00
Loc2	15799.41*	4.09	122357.10	1.26	-9516.47*	-2.25
Loc8	7994.49*	2.33	65826.76	1.43	-164.48	-0.03
Loc 5					-83697.93*	-2.52
Brick	5400.84	0.97				
Log	19955.84*	2.55				
Barn/Base	20725.18*	7.76	42967.61	0.44	57960.48*	3.89
Square Feet	43.39*	20.94	23.87*	3.50		
Age	-360.91*	-4.74	3,083.16*	2.17		
Acreage	3732.30*	20.96	8,082.31*	10.67	2444.43*	24.86
# Bedrooms	2694.63	1.56				
Adjusted R^2	63%		83%		48%	
F-statistic	154		32		134	
Standard error of the estimate	36072		94739		46,696	
No. of observations	824		40		728	

* Significant at the 95% confidence level or higher

Table 2: Models used to Estimate Property Values[11]

Using the typical reference open space property with 4.22 acres, we find an average property value estimate of $37415, with a low of $0[12] and a high estimate of $130,807. For the typical reference commercial property with 1,202 square feet on 9.23 acres and that is 8.25 years old we estimate the average property value at $111,678 with a low estimate of $0[13] and a high of $301,715.

[10] A typical reference parcel is defined as one with mean values for each of the continuous variable characteristics and with zero values for each of the binary variables (0 or 1 values).

[11] Since the primary purpose of the model is predictive power, the significance of the individual coefficients are not reported, and they should not be considered separately but instead only as a group.

[12] A zero property value is somewhat feasible since roadside easements are part of this data set and they have very low values, with the lowest in the sample at $100.

[13] In this case a zero appears less feasible, however, the commercial data set also includes a minimum property value of $100 in the sample.

Using the results above we can add or subtract from the estimated value in response to an alternative property characteristics. For example, for residential properties located in location 2 (Holly Springs) we would add $15,799.41 to the property value estimated getting $106,214. A barn/basement adds another $20,725 giving a property value of $126,939. A barn added to open space property increases the value by $57,960 to $95,375. Moving the open space property to location 2 decreases the property value by $9,516 to $85,859. A summary of the results is given in Table 3.

Using the property value estimates we calculate three revenue cost ratios for each land use category. The tax revenue estimate for any property can be estimated simply by multiplying the estimated property value by the given tax rate.

	Residential	Commercial	Ag/Open Space[14]
Estimate	90,415	111,678	37,415
Lower Bound	18,270	0	0
Upper Bound	162,559	301,156	138,807

Table 3: Property Value Estimates with Confidence Bands

Table 4 demonstrates how the tax revenue is calculated for the cost to revenue comparison. The property tax in fiscal year 2000 was $0.43 per $100 of value. The estimated value of the property is divided by 100 and then multiplied by 0.43. Note the zero values in two categories. The tax amounts reported in the descriptive statistics show zero taxes paid by some open space properties and some commercial properties. This can be for either of two reasons: they may be a road side easements which have negligible taxes or the tax payer may have paid taxes in advance and thus not paid this year, or there my be a tax deferment. In the former case, the result occurs because of a low property value, in the latter two cases it occurs due to tax

[14] The open space model for 1996 included both vacant lands and agricultural lands. In the 2000 data set all open/space is classified as agricultural lands. The vacant land category no longer exists in the county data and county staff was unable to explain what happened to this category. However, review of the data suggests that these properties were incorporated into the three land use categories (residential, commercial and ag/open-space).

policy. In this study the zero tax assessment is a result of lower bound property value estimate. This occurs because of the small sample size and large standard error of the estimate for this model.

°	Residential		Commercial		Ag/Open Space	
	Estimate	Sample*	Estimate	Sample*	Estimate	Sample*
Estimated Property Value	90,414.77	108,971	111,677.7	124,042	37,414.98	35732
Ave. Property value / 100	904.15	1089.71	1,116.78	1240.42	374.15	357.32
Property tax rate	0.43 per 100	0.43 per 100	0.43 per 100	0.43 per 100	0.43 per 100	0.43 per 100
Average Property tax	388.78	468.57	480.21	533.38	160.88	154
Low Property tax	78.56	18.18	0	0	0	0
High Property tax	699.00	5634.00	1294.96	6176.00	562.47	3606

* Sample values are given for the mean property value and for the minimum and maximum property values in the sample.

Table 4: Calculating Property Tax

How do different types of residential development affect the property value? For example, do we want to encourage development with large tracts and few small houses, or smaller tracts with larger houses? The results from the 1996 study suggested that clustered[15] housing was more likely to generate higher tax revenues than sprawl housing. In the new sample of data we see that the impact of an additional bedroom on property value is $2,695, where as an additional acre adds only $3,732 to the property value. This suggests that an additional acre adds $1037.00 more to the tax base than does a bedroom. However, when we translate this into tax revenues we have only a $4.00 difference in tax collected from an additional bedroom versus and additional acre. At this time, it appears that cluster housing and sprawl housing have similar impacts on revenues collected. However, given that often the cost of services to sprawl[16]

[15] Clustered housing occurs when homes are clustered together on smaller lots and may or may not be surrounded undeveloped property.

[16] A sprawl development is one where homes are spread out on larger lots or are separated by undeveloped properties.

development is often greater than the cost of services to clustered housing, it then still remains that from a fiscal standpoint, clustered housing probably remains a better option for most communities as well as for Macon County. These communities may want to encourage cluster housing which often impose lower costs for county services. However, if the demand for sprawl development is greater relative to cluster development, higher property values for the latter may result, yielding higher tax revenues. This study does not capture this effect.

5. Cost of Services

In order to determine the impact of alternative land uses on the County's fiscal status it is important to account for all revenues the County receives and to allocate those revenues to the various programs. However, the county receives revenues from a variety of sources. Consequently, not all services provided by the county are tax supported. Some services are fee based and others are supported by special grants and state allocations. In order to avoid subsidizing tax-supported services with fee based and/or grant supported services, it is important to remove these latter services from our analysis. Therefore, this report just compares the property tax receipts with the property tax-supported services in order to determine the fiscal impact of land use changes instead of including the entire budget.

By following the example set in similar studies by the American Farmland Trust (AFT), this report distributes the expenditures of the local government into simple, yet usable categories. The county expenses have been divided into eight crucial groups: Education, Government Administration, Public Safety, Public Services, Social Services, Health Services, Recreation and Cultural, and Economic Development. Each group is divided accordingly among the three land uses as shown below in Table 5.

	Residential	Commercial	Ag/Open Space
Education	X		
Government Administration	X	X	
Public Safety	X	X	X
Public Services	X	X	X
Social Services	X		
Health Services	X		
Recreational and Cultural	X		
Economic Development		X	

Table 5: Allocation of Services across Land Uses

Ag/Open Space is only responsible for two types of expenses. Public safety is required in the form of police and fire protection and public services are necessary in the form of agricultural extension services. Commercial properties also create public safety and public services expenses as well as being responsible for some of the general administration expenses and all of the economic development costs. Residential properties are held responsible for all of the education, health services, recreational and cultural, and social services as well as the remaining portions of the public safety, public services, and general administration expenses.

Fee based costs covered directly from the users of a service are subtracted from these categories ensuring that only the property tax-supported portion of service budgets are allocated across the three land uses. Costs that could not be allocated to a particular land use or cost category were appropriated to all the groups based on their proportion of parcels relative to all parcels within the county. When a cost is allocated across only residential and commercial properties, it is allocated based on the proportion relative to the total number of parcels in the

two categories. The proportional relationship of land uses within Macon County is displayed below in Table 6.

	Residential	Commercial	Ag/Open Space
# of Parcels	22,000	1,350	16,543
% of total parcels	55%	3%	42%
% of Res. & Comm.	94%	6%	

Table 6: Proportions used for Cost Allocations

Table 7 presents the final allocation of the County's cost of services for each land use. Note that commercial properties have the lowest cost allocation. This result occurs due to the low proportion of commercial properties in the county and the limited services provided to these properties. This trend is expected to continue since residential growth is continuing to outdo commercial development. One possible explanation for this is the growing number of vacation and retirement homes. The values in Table 7 were used to calculate the revenue-cost ratios presented in the next section.

	Total	Residential	Commercial	Ag/Open Space
Education*	292,800	292,800		
Government Administration	6,252,983	5,877,804	375,178	
Public Safety	2,958,711	1,627,291	88,761	1,213,072
Public Service	2,740,212	1,507,117	82,206	1,123,487
Social Services	2,076,050	2,076,050		
Health Services	2,553,999	2,553,999		
Recreation	939,329	939,329		
Economic Development	839,165		839,165	
Total ($)	18,653,249	14,874,390	1,385,310	2,336,559
Total (%)		79.74%	7.43%	12.53%

* Public education in North Carolina is supported primarily with state allocations from income and other taxes. Local government pays for buildings and can supplement teacher salaries with sales taxes. This figure includes only the contribution from property taxes for this fiscal year.

Table 7: Total Cost Allocations for Macon County by Land Use Categories

6. Fiscal Impact Analysis

Using the three per parcel revenue values estimated for each land use in section 4 and the cost allocation in section 5, we can derive revenue cost ratios that show the dollars received in tax revenues per dollar of tax supported costs expended per parcel for each group. Table 8 presents these results.

	Residential	Commercial	Ag/Open Space
Per Parcel Cost Allocation	676.11	1026.16	141.24
Tax Estimate	388.78	480.21	160.88
Lower Bound	78.56	0	0
Upper Bound	699.00	1294.96	562.47
Rev/Cost Ratio-Average Tax Estimate	0.58	0.47	1.14
Ratio-Lower Bound	0.12	0	0
Ratio-Upper Bound	1.03	1.26	3.98

Table 8: Fiscal Impact of Alternative Land Uses

The results in Table 8 show that in the case of the typical reference residential and commercial properties the County is receiving less in revenues than they are incurring in costs. Assuming alternative property characteristics such as a barn or basement, or another location, still leads to the same result[17]. However, revenues are closer to costs. These results suggest the county would not want to receive tax payments of less than the average cost of services per residential parcel which is $676.11, nor receive less than $1026.16 for average commercial properties, nor less than $141.24 on average per open space parcel. However, using this study s data we find that 90% of commercial properties, and 76% of both the residential and open space properties pay tax amounts less than the average per parcel cost of services in each category respectively.

7. Comparing Data

In the past four years the number of parcels and the average assessed property values have both changed for each land use category. Since 1996, the number of commercial properties in Macon County has increased by 162% and the number of Ag/Open space parcels has increased by 223%. However, we cannot explain these changes clearly as the categorization of vacant properties has changed since 1996 thus we cannot comfortably compare the number of parcels in the two periods. We can, however, compare assessed property values and from this we see increases in all categories as expected. Be sure to note that these comparisons are made with a sub-sample of the 2000 data set that was matched to the same parcels in the 1996 sample. Table 9 shows these comparisons.

Given the increases in property values, one might expect properties to keep up with the rising expenses. However, in 1996 we allocated 6.5 million dollars of county expenditures

[17] A barn or basement adds $89.00 to tax revenues and the location 2 (Holly Springs) adds $68.00 to revenues

across the three land use categories, where as in this study we are allocating 18.6 million dollars. This is a 286% increase in county property tax expenditures when property assessments are only increasing from 12%-56% for this sub-sample. If the sub-sample is truly representative of the changes in property values across the county since 1996, the change in the revenue cost ratio reported above is not surprising.

	Residential	Commercial	Ag/Open Space
Total Parcels 1996	25,884	515	7,423
Total Parcels 2000	22,000	1,350	16,543
% Change in Parcels*	-15%	162%	223%
Mean Assessed Property Value 1996 sample	$82,768 N=308	$67,019 N=10	$60,871 N=32
Mean Assessed Property Value 2000 sub-sample	$104,311	$75,150	$95,477
% Change in Assessed Property Value	+26%	+12%	+56%

* These numbers are suspect due to the changes in categorization of the vacant properties.

Table 9: Old Data vs. New Data

8. Policy Implications

As the study shows, the county is currently spending more than it is taking in on average for residential and commercial properties and is just covering costs on open space, based on the current tax rate of .43 per $100 of property value. The large confidence bands reported in this study show that at the upper bound estimates all land uses are covering costs. However, as reported earlier, only 10% of commercial properties and 24% of residential and open space actually pay tax amounts greater than the average costs for their respective categories. Thus the upper bound estimates may not be adequate indicators of current conditions in the county.

The property tax supported losses suggested by this study are easily explained by the rising expenditures seen in the county s 2000 budget. Our result is made starker when we

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increasing tax revenues by $157.00.

consider the many other costs incurred by the county that are not considered in the budgeting process. These other costs include the negative impacts of land use changes on the county s rural character and the water quality.

While modest expenditures for soil conservation are included in the county s budget, these do not cover all the costs of conserving water quality. As the number of commercial and residential properties continues to increase the number of construction and grading sites, pavement, manicured lawns, as well as the need for increased sewage treatment all increase. The impact from these increased activities is a reduction in water quality from erosion and effluent in the form of the run off of petroleum products and fertilizers, problem septic systems, etc. These costs are not addressed in the county budgeting process and are also not paid by those who impose these costs on the community. Furthermore, if sprawl development predominates in the county, increased costs of water and sewage infrastructure will occur from the increased development. These costs are also not accounted for in the budgeting or decision processes for land use in the county.

The role of tourism in the economy is another important factor to consider when considering land use changes in Macon County. During the summer, vacationing families double the county's population. Tourists flock to Macon County every year because of its rural, rustic charm. If development continues to consume the Ag/Open space parcels, especially along the major roadways (Wear and Bolstad, 1998), then the tourism market will obviously suffer. Once the beautiful mountain scenery has been altered through development, it may take many years to return to its original beauty. It is better for the community to decide up front if this rural charm is important enough to influence the land use changes. Can the Macon County economy continue to thrive without the many thousands of tourists that come to get away from all the

usual development of "Big City" USA when the costs of land use changes are not covered by the revenue collected?

9. Conclusions

Macon County is in an enviable position in that it currently has significant amounts of open space. Thus the county is ahead in the planning process and is positioned to make proactive decisions about growth in its community as compared to many other communities that are reacting to their diminished quality of life. Although Macon County is ahead of the game, it must take stock of its current position to be sure to avoid problems found in other regions of the U.S. This fiscal impact study is one step in that direction.

According to Macon County officials, county employees will handle the next property appraisal. In the past, the county has contracted an outside firm to handle the property appraisals. Macon County will be able to use this report with its property appraisals to evaluate the impact of significant land use changes on the county budget. The county officials responsible for the next assessment will be aware of the costs associated with land use changes and will be able to design appropriate planning and tax strategies. For example, county officials could consider different tax rates for different land uses. One option might include the assignment of a lower tax rate to open space, since has lower overall costs, thus providing a benefit to those owners in return for the savings they provide the county. This study may provide a catalyst for creative ideas of how to better allocate the cost sharing of county services across land uses.

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