

EXAMINING THE EFFECTS OF THE METROPOLITAN RIVER PROTECTION ACT ON LAND COVER TRENDS ALONG THE CHATTAHOOCHEE RIVER

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Abstract. Analyses of land cover trends were conducted to assess the effectiveness of land use policies required in the Metropolitan River Protection Act along two reaches of the Chattahoochee River. Preliminary findings indicate that the Act may be playing a key role in protecting natural vegetation, particularly within the setback area. Protection of an undisturbed vegetative buffer along the river likely plays an important role in protecting water quality. Finer scale analyses of specific developments along the river would complement this analysis.

INTRODUCTION

In short, the river and the land that drains into it cannot be separated. What is done on the land affects the river (Atlanta Regional Commission, 1981, p. 1).

In 1973, the Georgia General Assembly enacted the Metropolitan River Protection Act (Georgia Laws 1973, Act No. 66) to respond to growing concerns about the negative effects of development along the Chattahoochee River. The Act is based on a fundamental premise--that land use activities along the river affect water quality. To reduce the negative effects of development, the 1973 Act applies site development principles as well as buffer and setback requirements along a 2000-foot corridor on both sides of a 48 mile stretch of the river between Buford Dam and Peachtree Creek. In 1998, the Act was amended to apply these same development standards along a 36-mile stretch that extends downstream from Peachtree Creek to the borders of Fulton and Douglas counties (Georgia Code 12-5-440 et seq). This study examines land cover data within the original 48-mile corridor and the newly enacted 36-mile stretch to identify differences and similarities in land cover trends between 1974 and 1998. The analysis provides an opportunity to explore the relationship between the requirements of the Act and land cover trends and to

determine if land cover data provides evidence of changes in land use at this scale.

BACKGROUND

The Chattahoochee River stretches 430 miles from its origin in White County, Georgia to Lake Seminole along the Georgia-Florida border, where it joins with the Flint River to form the Apalachicola River. The river drains approximately 8,770 square miles of land in Georgia and Alabama (Couch, 1993). The portions of the River analyzed in this study are above, through, and below the Atlanta metropolitan region (Figure 1). The portion upstream from Peachtree Creek is referred to as the "northern reach," and the stretch downstream from Peachtree Creek to the southern border of Douglas



Figure 1. The Chattahoochee corridor protected by the Metropolitan River Protection Act. A represents the northern reach and B represents the southern reach.

County is the “southern reach.” Together, the northern and southern reaches cross into several municipal and county jurisdictions including the cities of Atlanta, Berkeley Lake, Douglasville, Duluth, Roswell, Smyrna, Sugar Hill, and Suwanee; and Carroll, Cobb, Douglas, Forsyth, Fulton, and Gwinnett counties (Atlanta Regional Commission, 1998; Atlanta Regional Commission, 2003).

The northern and southern reaches are within the Piedmont Physiographic province, an area dominated by hard igneous and metamorphic rocks (Clark and Zisa, 1976). Lands within the Piedmont are characterized as moderately hilly with elevations ranging from 740 to 1,250 feet above sea level. The land adjacent to the River is varied and ranges from rock outcrops and steep slopes to gently sloping lands. The rugged and hilly terrain along the river is particularly susceptible to erosion when cleared for development.

In 1969, citizens and elected officials became concerned about development activities along the Chattahoochee River that involved filling in floodplain areas and removing entire hillsides. The Chattahoochee River was recognized as an important multiple-use resource, providing drinking water, hydroelectric power, and recreational opportunities. Pollution, particularly sedimentation associated with development, was of great concern because of potential impairment to these uses (Atlanta Regional Commission, 1972).

In response to these concerns, the Georgia General Assembly enacted the Metropolitan River Protection Act (MRPA—Georgia Laws 1973, Act No. 66). MRPA established three primary mandates. First, it required the Atlanta Regional Commission to develop a comprehensive and coordinated land and water resources plan. Second, it required local governments with lands in the corridor to approve development actions only if they are compatible and consistent with the plan. Finally, it required the Atlanta Regional Commission to review and provide comment on development actions prior to approval by local governments (Atlanta Regional Commission, 1978).

Prior to passage of the Act, the Atlanta Regional Commission had completed the Chattahoochee Corridor Study (Atlanta Regional Commission, 1972). In May 1973, the Commission re-adopted the Chattahoochee Corridor Study as the official Plan, thus meeting the first mandate of the Act (Atlanta Regional Commission, 1978). The guidelines and standards established in the original study became the cornerstones of MRPA. The study identified lands

suitable for recreation and open space protection (of which a significant number were acquired in 1978 as part of the Chattahoochee River National Recreation Area) and established three sets of standards associated with land development. First, land vulnerability standards were developed to limit land disturbance and the amount of impervious surface on sensitive lands. Potentially developable lands within the corridor were given a vulnerability rating based on six features: vegetation, soils, hydrology, slope, aspect, and geology. Each of these features was mapped and then combined as overlays, from which a final vulnerability map of the corridor emerged. Lands were then classified within six vulnerability categories including A (least vulnerable) through F (most vulnerable). Based on the vulnerability classification of the land, limits were established on the amount of clearing and impervious surface allowed (Atlanta Regional Commission, 1981).

Second, buffer zone standards were established to protect natural vegetation along the river and tributaries and to establish an impervious surface setback. The standards require: (1) 50-foot and 35-foot undisturbed natural vegetative buffers along the river (including impoundments) and its tributaries, respectively; and (2) a 150-foot impervious surface setback along the river and its impoundments. In addition, floodplain standards were established to balance the amount of fill and cut occurring within the river’s 100-year floodplain, to prevent flood flows from becoming blocked, and to establish height limits above grade for all structures, excluding bridges. When the Act was extended to the southern corridor in 1998, the same methods were used to establish standards, as described in the 1998 Chattahoochee River from Peachtree Creek to West Point Lake Corridor Plan Study (Atlanta Regional Commission, 2003).

The program has been in place for approximately 30 years, with several studies conducted to improve program implementation procedures (e.g. Atlanta Regional Commission, 1980). However, no studies have been conducted to assess the effect of the Act on land cover within the corridor. For this study, land cover trends within the corridors of the northern and southern reaches and also in the 150-foot setback areas within these corridors were compared to assess the efficacy of the program.

EXPERIMENTAL DESIGN

This study employs a quasi-experimental design to compare land cover in the northern and southern reaches of the Chattahoochee River (Babbie, 2001).

Land cover data from the Georgia Land Use Trends database were used to assess land cover trends within both corridors and in the setback areas (defined in this analysis as 60 meters or 180 feet from each side of the river bank) (NARSAL, 2002). Land cover within the corridor and setback areas were categorized as follows: (1) deciduous forest; (2) evergreen forest; (3) mixed forest; (4) forested wetland; (5) low intensity urban; (6) high intensity urban (7) clearcut/sparse; (8) agricultural (row crops/pasture); (9) open water; and, (10) (beaches, dunes, quarries, etc.). Data are available for the years 1974, 1985, 1992, and 1998. The time frame for this data captures land cover trends just after passage of MRPA through three subsequent periods up to the 1998 MRPA amendments that added the southern reach. Data analysis consists of descriptive and comparative analyses of land cover trends within both corridors and setback areas. Land cover changes are reported as percentages.

RESULTS

The northern and southern reaches examined in this study extend over 80 miles and include over 45,000 acres of land. Land cover for 1974 and 1998 indicate that deciduous and evergreen forests, agriculture, and urban development dominate in both the northern and southern corridors (Table 1). Between 1974 and 1998, total forest lands within the northern corridor experienced a net decrease of 13% (Table 2). Of this decrease, over 11% was due to declines in evergreen forests. Interestingly, between 1974 and 1985, deciduous forests decreased by 10% and then increased by almost 7% between 1985 and 1992. This may be associated with MRPA's vulnerability standards that favor the protection of hardwoods over pines.

Table 1. Land cover (acres and percent) for the north and south corridors for 1974 and 1998

	North Corridor				South Corridor			
	1974 acres	Percent Corridor	1998 acres	Percent Corridor	1974 acres	Percent Corridor	1998 acres	Percent Corridor
TOTAL FORESTS	15,565	62%	12,214	49%	11,467	58%	11,686	59%
Deciduous forest	8,589	34%	7,773	31%	7,471	38%	7,186	36%
Evergreen forest	5,627	22%	2,777	11%	2,746	14%	2,227	11%
Mixed forest	896	4%	1,124	4%	132	1%	1,085	5%
Forested wetland	454	2%	540	2%	1,119	6%	1,187	6%
Total URBAN	2,463	10%	7,402	30%	2,354	12%	3,739	19%
Low intensity urban	1,760	7%	5,627	22%	473	2%	860	4%
High intensity urban	703	3%	1,775	7%	1,881	9%	2,879	14%
AGRICULTURE	4,010	16%	2,569	10%	4,320	22%	2,783	14%
BEACH/QUARRY	15	0%	22	0%	27	0%	99	0%
OPEN WATER	2,080	8%	2,426	10%	1,418	7%	786	4%
CLEARCUT	952	4%	452	2%	273	1%	765	4%
TOTAL ACRES	25,085				19,860			

Table 2. Percent change in land cover for the north and south corridors

Land Cover	North Corridor				South Corridor			
	1974- 1985	1985- 1992	1992- 1998	1974- 1998	1974- 1985	1985- 1992	1992- 1998	1974- 1998
TOTAL FORESTS	-4.40%	-5.48%	3.48%	-13.36%	-1.73%	0.54%	2.29%	1.10%
Deciduous forest	-10.16%	6.38%	0.53%	-3.25%	-5.42%	0.18%	3.80%	-1.43%
Evergreen forest	0.08%	-7.17%	-4.27%	-11.36%	0.23%	0.89%	-3.74%	-2.61%
Mixed forest	3.31%	-3.26%	0.85%	0.91%	4.56%	0.27%	-0.02%	4.80%
Forested wetland	2.37%	-1.42%	-0.60%	0.34%	-1.11%	-0.80%	2.25%	0.34%
TOTAL URBAN	5.83%	7.90%	5.95%	19.69%	1.80%	3.14%	2.03%	6.97%
Low intensity urban	4.12%	7.73%	3.57%	15.42%	-0.06%	0.27%	1.75%	1.95%
High intensity urban	1.71%	0.17%	2.39%	4.27%	1.86%	2.88%	0.29%	5.02%
AGRICULTURE	-0.88%	-2.67%	-2.19%	-5.74%	-3.08%	-2.45%	-2.21%	-7.73%
BEACH/QUARRY	-0.01%	0.02%	0.02%	0.03%	0.05%	0.13%	0.18%	0.36%
OPEN WATER	1.31%	0.64%	-0.57%	1.38%	-1.45%	-0.74%	-0.98%	-3.18%
CLEARCUT	-1.84%	-0.41%	0.27%	-1.99%	4.42%	-0.62%	-1.31%	2.48%

Development may be sited or configured to conserve upland hardwoods at the cost of evergreen stands. Additionally, ecological conditions along the river favor hardwoods thus these forests may be recovering following development. Finally, declines in pine may also be associated with pine beetle outbreaks.

Within the southern corridor, a 1% net increase in forest lands occurred between 1974 and 1998. Deciduous and evergreen forests experienced net declines of 1.63% and 2.49% respectively, while mixed forests increased by almost 5%. Extension of MRPA to the southern corridor may ensure that lands supporting deciduous forests remain undisturbed. Agriculture declined by over 5% in the northern corridor and by 7% in the southern corridor between 1974 and 1998.

Between 1974 and 1998, urban development within the northern corridor increased by almost 20% of which, approximately 15% was due to low intensity development (single family dwellings, playing fields, parks, etc.). Gains in lands devoted to development in the northern corridor appear to be offset by losses in forested and agricultural lands. In the southern corridor, urban development increased by almost 7%, of which a greater proportion was due to high intensity development (e.g. commercial, industrial, etc.). The difference in urban development between the two corridors reflects the more intensive development pressures occurring within the northern corridor. Intensive development pressures are typical in Gwinnett County which lies along part of the eastern side of the northern corridor. Urban development within Gwinnett County increased by approximately 36% between 1974 and 1998, with low intensity urban development accounting for approximately 26% of the growth. During this same period deciduous and evergreen forest lands in the county decreased by approximately 26%. Although the northern corridor

exhibited greater increases in lands converted to urban uses than in the southern corridor, development appears to be somewhat less intensive than in Gwinnett County, an adjacent high growth county (NARSAL, 2002). Comparisons of land cover trends within the setback zones of the northern and southern corridors indicate that MRPA may be protecting forested cover within these areas (Table 3). Between 1974 and 1998, total forested lands increased by approximately 3% in the northern setback area and by over 13% in the southern setback area. Although evergreen forests in the northern setback experienced a net decrease of 13%, deciduous forests experienced a net increase of approximately 12%. Much of this net increase in deciduous forests occurred between 1992 and 1998. Between 1974 and 1998, urban development underwent a net increase of over 3% in both the northern and southern setback areas. Given the higher levels of development occurring in the northern corridor, it appears that the setback restrictions of MRPA may be limiting development along the banks of the Chattahoochee and thus maintaining forest cover.

CONCLUSIONS

Preliminary assessment of land cover trends along two sections of the Chattahoochee River indicate that the Metropolitan River Protection Act may be playing a key role in protecting deciduous forests, particularly within the setback area. Protection of these riparian areas is critical for reducing pollutants into the river. However, differences in land use and development pressure between the two corridors must be taken into account. Comparative analyses of site-level development actions before and after passage of the Act as well as between the two corridors would complement this coarser scale of analysis.

Table 3. Setback land cover change (%)

LandCover	North Setback				South Setback			
	1974-1985	1985-1992	1992-1998	1974-1998	1974-1985	1985-1992	1992-1998	1974-1998
TOTALFORESTS	-284%	420%	212%	349%	020%	427%	935%	1382%
Deciduous forest	-4.18%	3.72%	12.64%	12.17%	5.71%	-3.19%	14.84%	17.37%
Evergreen forest	-4.46%	0.13%	-8.98%	-13.30%	-4.94%	8.51%	-11.32%	-7.75%
Mixed forest	5.84%	-3.83%	0.58%	2.59%	3.44%	0.18%	-2.00%	1.62%
Forested wetland	-0.04%	4.18%	-2.11%	2.03%	-4.00%	-1.23%	7.82%	2.59%
TOTALURBAN	050%	053%	207%	310%	141%	188%	026%	354%
Low intensity urban	-0.13%	0.27%	1.37%	1.50%	0.94%	0.49%	0.94%	2.37%
High intensity urban	0.63%	0.26%	0.70%	1.60%	0.47%	1.39%	-0.69%	1.17%
AGRICULTURE	053%	-460%	007%	-400%	175%	-600%	010%	-415%
BEACHQUARRY	000%	005%	-005%	-001%	003%	-002%	-003%	-002%
OPENWATER	028%	211%	-438%	-198%	-930%	42%	-942%	-1453%
CLEARCUT	152%	-229%	018%	-059%	592%	-433%	-026%	133%

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