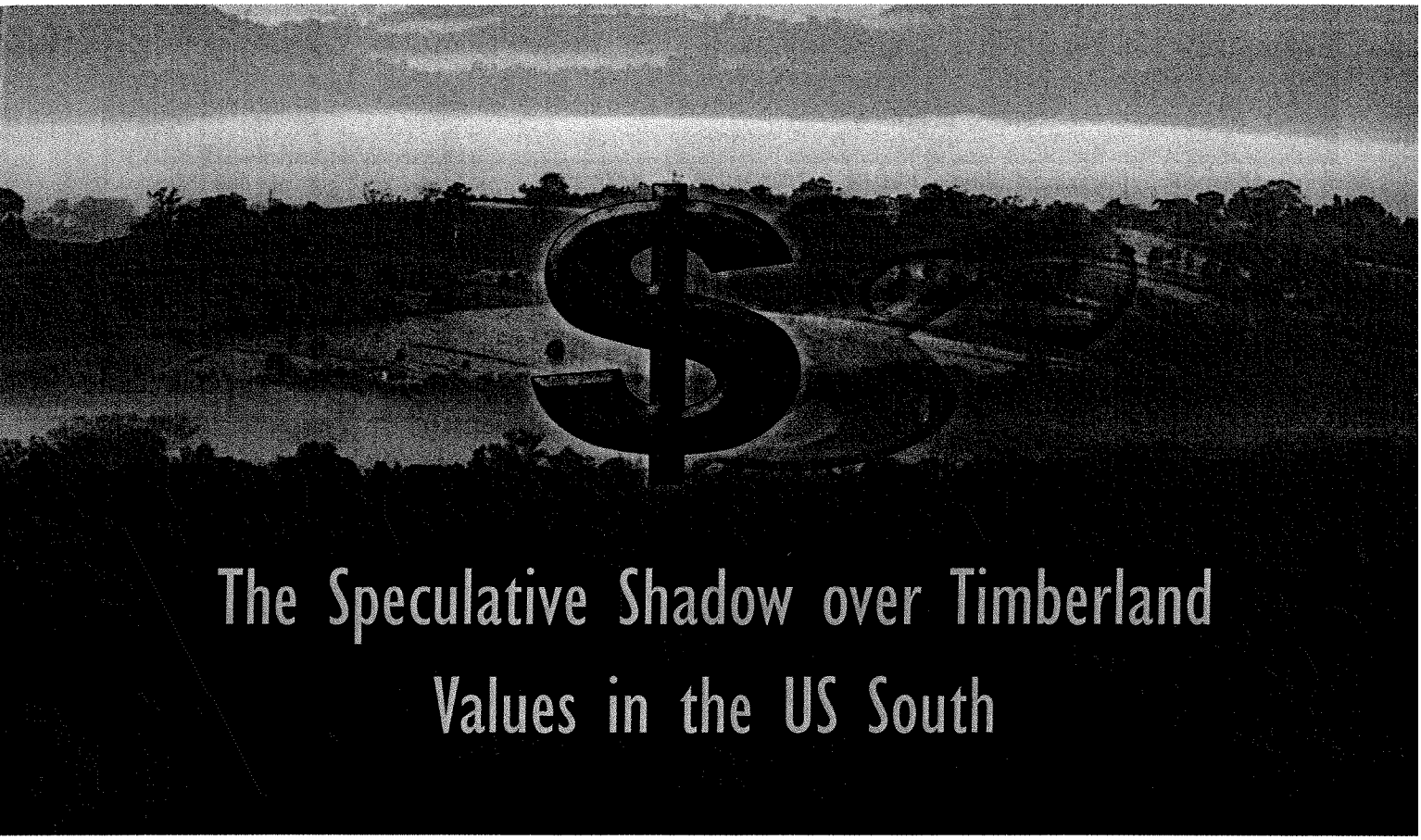


The Speculative Shadow over Timberland Values in the US South

David N. Wear and David H. Newman

ABSTRACT

In well-functioning markets, forestland prices capture a wealth of information regarding current as well as anticipated uses of land and resources contained on it. Theyreflectthevaluation of current uses and incorporate information regarding productivity, standing timber capital, and the effects of taxes that apply to land and production. Land prices are speculative by definition,so they also incorporate information regardinganticipatedfuture uses of the land and resources. A study of spatial patterns of assessed forestland prices in Georgia shows rising nontimbervalues in certain locationsand suggests shifts in the future use of land and resources. As expected, land prices anticipate future development of forested land at the periphery of urbanizing areas. Rising timberland values also portend changes in land uses in some more rural counties. In these areas, it appears that low-density residential growth and recreational values are having an impact on the uses of timberland that is greater than previously thought. These findings provide some insights into thecausesof ongoing shifts in ownership of forested land between industry, individuals, and equity concerns. Anticipated population and income growth in the South could hold important implications for both the supply of timber and the conditions of forestland in a large portion of the region.

Keywords: land use; conservation planning; forest ownership; property assessment; land markets

In 2002, the Southern Forest Resource Assessment found urbanization to be the most substantial threat to forest sustainability in the southeastern United States (Wear and Greis 2002). Ongoing development driven by population and economic growth, portends an erosion of forested land, with forecasts of approximately 12 million ac to be developed by the year 2020. The increasing human presence in the forests of the south has shifted concerns and forest research toward understanding the wildland-urban interface, where population growth can threaten the aesthetic, recreational, biodiversity, and watershed protection benefits of forests (Macie and Hermansen 2003). Urban and suburban development also gives rise to concerns regarding the sustainability of fiber supplies within the world's largest timber-producing region.

This article examines timberland prices in the US South for information regarding the potential for future development. In particular, we use Georgia as a case study because we have access to a substantial price database of timberland assessments for that state. Moreover, Georgia is representative of the type of land-use dynamics that are occurring in many areas of the south experiencing economic growth and development pressures. Prices contain information not only on how the market values current land use but also regarding future uses. Speculation in land

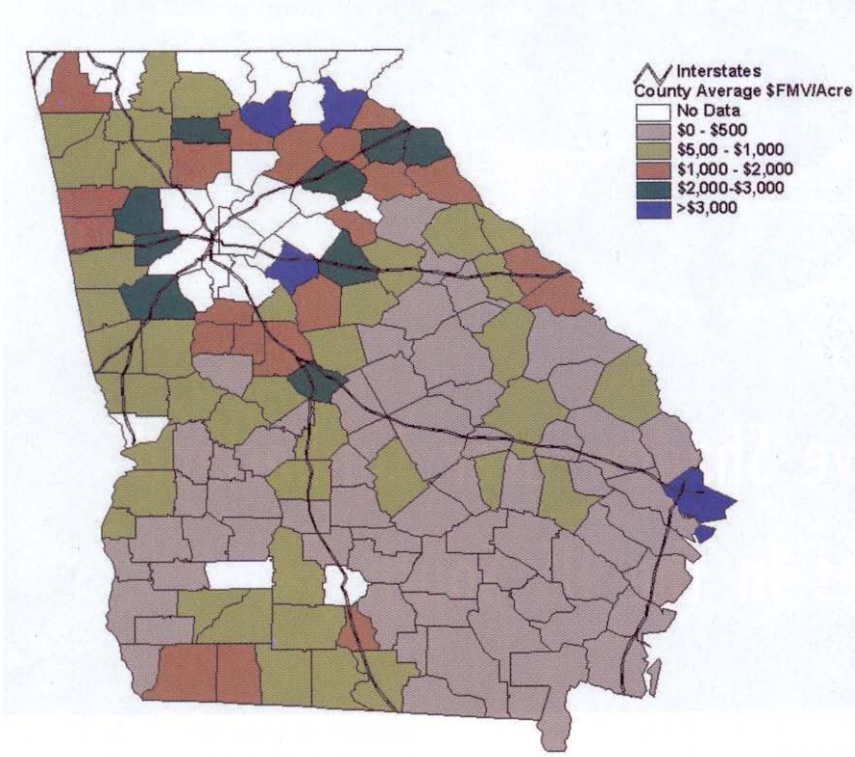


Figure 1. **Average industrial timberland, assessed, fair market values in Georgia in 2002.**

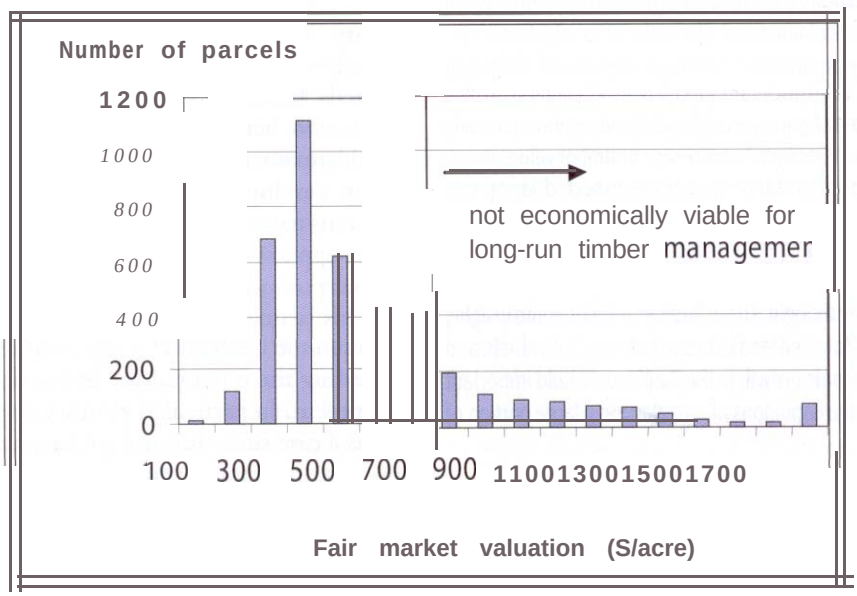


Figure **2. Distribution cd forest industry parcels in Georgia arrayed by fair market valuation ($/ac in 2002). Timberland valuer that are greaterthan $800 indicate that land values are reflecting an antic ipated nontimber land use. The likelihood of long-term timber management on these parcels is very low.**

markets is nothing new in the United States, and the speculative component of timberlands prices provides substantial information regarding the potential for the conversion of forests to other land uses and conversely the potential for effective forest conservation in specific places.

Thinking About Land Prices

The market price of a parcel of land reflects the value to owners in the parcel's highest-value use. If timber production is the parcel's highest-value use, then the market will value that land based on the expected returns to and costs of producing timber. We can break this value into two components: (1) bare land value and (2) the value of standing timber. The bare land value—a familiar concept to foresters—is the net discounted return to continuous timber production for a parcel that currently has no standing forest. The value of the standing timber is the discounted return to harvesting any existing crop of trees at the optimal harvest age. We expect that the market value of timberland will approximate the sum of the appropriately weighted bare land and standing timber values when the highest-value use is timber production.

At any given time, the prices for timberland on the market may vary due to a number of factors, including site quality, proximity to market centers, accessibility and size of the parcel, and expectations regarding future timber prices. Even among comparable parcels, prices will vary based on the age and condition of the standing timber. Timberland prices for comparable parcels should range from a low of the bare land value to a high of the net value of fully mature timber (ready to be harvested) plus the bare land value.

In areas that are experiencing development pressures, land use can rapidly

Table 1. Total area and area by various value thresholds ($/ac) included in the data set of timberland parcels held by industry in Georgia.

Description	Area	Percent of total
Total area	2,358,723	100.0
Area with value >$500/ac	623,621	26.4
Area with value >$600/ac	392,985	16.7
Area with value >$700/ac	228,385	9.7
Area with value >$800/ac	150,927	6.4
Area with value >$900/ac	119,130	5.1
Area with value >$1,000/ac	89,904	3.8

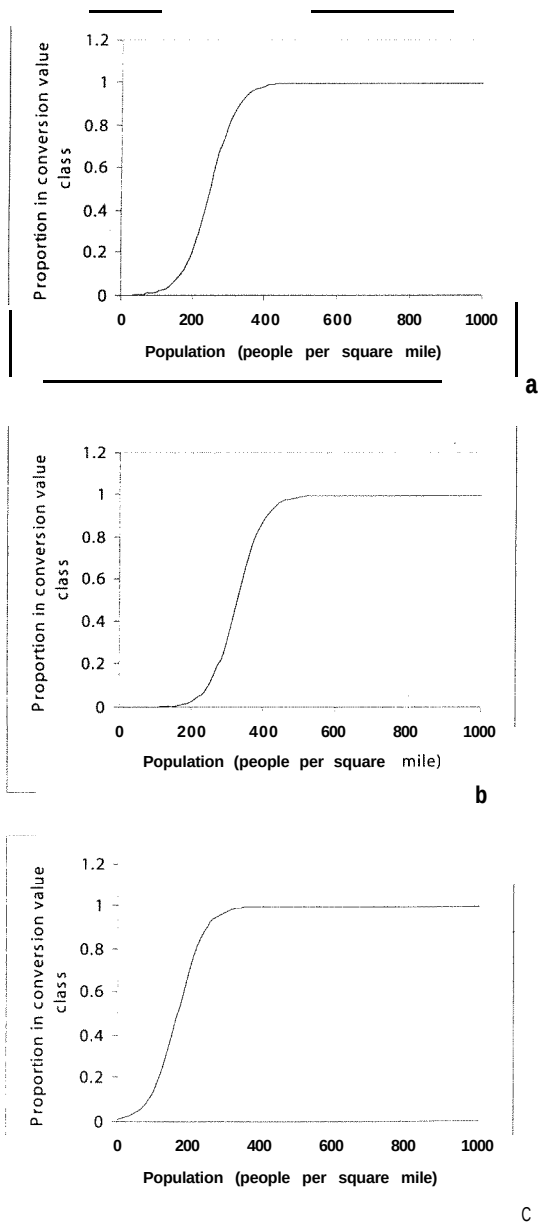


Figure 3. **Relationship between proportion of timberland in conversion-value class (>$800/ac) for three cases: (a) household income at mean values, (b) household income 10% lower than the mean value, and (c) household income 10% higher than the mean value.**

switch from rural uses such as timber and agricultural production to developed uses. These changes are triggered by prices that reflect a change in the highest-value use from rural to urban. Typically land prices signal development activities before they occur because land markets, like other active markets, are "forward-looking." That is, buyers and sellers trade land based on their perceptions of what the future highest-value use will be and how future development is likely to proceed. In areas where future development is anticipated, timberland prices will have two components: (I) the value of the land in the developed use discounted from the anticipated development date, and (2) the value of the standing timber. The sooner development is anticipated, the greater the value attached to the timberland.

Developed areas still comprise a relatively small proportion of the entire landscape in the South (roughly 6% in 1997; Wear and Greis 2002). This is because as one moves further away from the urban core area, the returns to further development decline rapidly. Where development pressures do arise, increased land-use values strongly encourage switching from timber or agricultural uses to development. In these areas, development values can readily swamp timberland values-i.e., the highest-value land use anticipated by the market is rarely unclear because of this strong "location effect." While timber-use values may range from $300–500 per acre, developed use values may quickly soar beyond $4,000 an acre in areas within the development boundary.

Examining Timberland Values in Georgia

For this study, we use a dataset of assessed values for individual parcels of timberland owned by forest products firms in Georgia. In developing these values, tax assessors are required to remove the value of standing timber from their assessments, so that the values should represent solely a land value-i.e., a bare land value if the highest-value use is timber production. These assessed values are determined using, a comparable sales approach, so

Table 2. Results of regression analysis of the proportion of timberland parcels within a county with fair market values greater than 5800 against several explanatory variables. The model is a grouped logit and therefore uses a maximum likelihood technique with the adjustment for heteroscedasticity required by the log-odds transformation (see Maddala 1983). All variables are significant at the 5% level.

Variable	Description and units	Estimate	t value
Intercep	na	–31.0185	–6.51
Productivity	Proportion of county in high productivity land classes	27.50305	6.42
Farm earnings	Earnings divided by area of the county (1996 $)	–79.1835	–4.35
Household income	Income per household (1996 $)	0.000423	3.93
Population	People divided by the area of the county (people per square mile)	0.041839	5.48
Outer Coastal Plain	Dummy variable set to one if the county is in the coastal plain; set to zero otherwise	–6.1298	–7.12

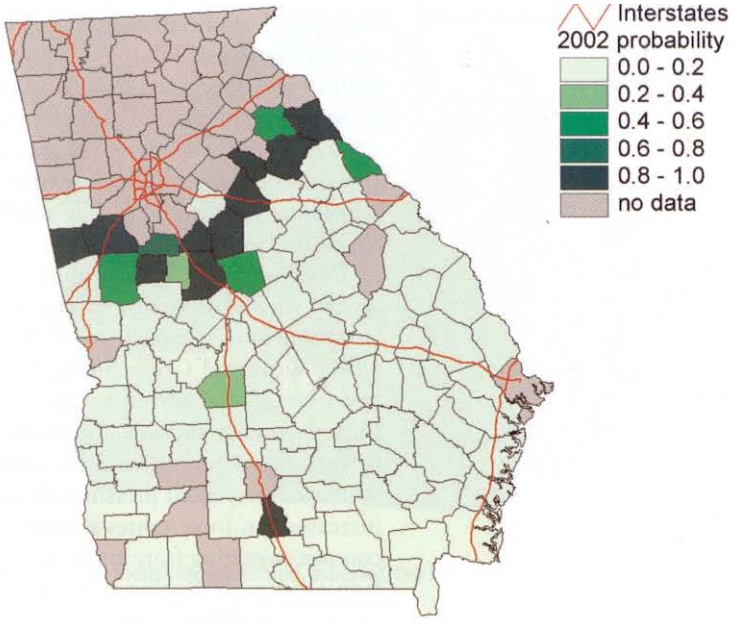


Figure 4. **Distribution of industry timberland in a conversion-value class in Georgia, 2002.**

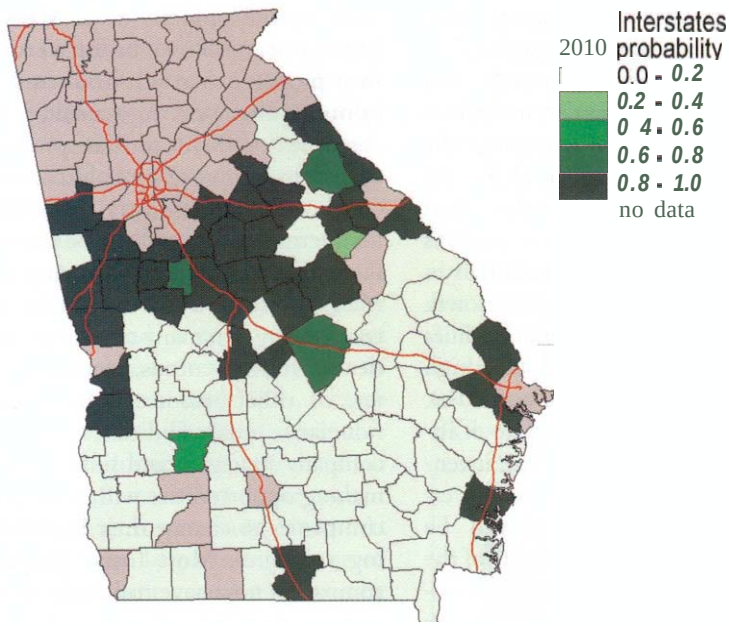
they represent the use value of land in a particular county. A map showing average county values for this timberland is shown in Figure 1.

We examine these data for evidence of changes in highest-value land use (that is, for indications of where timber use is expected to be supplanted by development in the long-run) and discuss the implications for changes in the future distribution of timberland. Forest industry parcels are especially useful for conducting this analysis because they were ostensibly acquired to provide for long-term timber production—their highest-value use at purchase was likely timber production. Georgia also provides a useful study site because of the variety of economic and ecological conditions represented by the state, ranging from the largest metropolitan area in the South (Atlanta) to a subregion of concentrated pulpwood production in the southeastern corner of the state.

Our data set contains tax assessor estimates of the bare land fair market value in 2002 for over 4,200 industrial timberland parcels in Georgia. These parcels represent 2,358,723 ac or about 48% of all the industry timberland in Georgia in 1997 (Thompson 1998). Tracts range in size from an acre to more than 56,000 ac. For each observation, we construct the value per acre by dividing the total parcel value by the parcel acreage. The range of prices is quite substantial from a low of about $100 per acre to a high of more than $10,000 per acre. The distribution of prices is not symmetric, with a mode of $600 per acre and a simple mean of $571 per acre. The area-weighted average timberland price is $440 per acre.

A frequency chart (histogram) of parcel values shows a strong concentration of market value in the $300–500 range (Figure 3). Our experience with calculating bare land values based on timber yield functions and prices indicates that parcels in this price range likely reflect a highest-value use that anticipates continued timber production. Most of these parcels reside in the southeast portion of the state, where the majority of Georgia's industrial timberland is located. A long tail on the high-value side of the distribution reflects parcels that have land values in excess of timber production values. Those parcels with the highest values will not likely be continuing as production timberland in the future. Indeed, news sources indicate that more than 500,000 ac of industrial timberland is currently on the market. The question is at what point is switching anticipated? In Figure 3, we've flagged $800 per acre as a plausible switching point. If this is the case, then the parcels to the right of the $800 mark will likely be developed over the next 10–20 years.

To further examine the influence of development pressures on this land base, we examine the area of timberland maintaining market values in excess of a series of value thresholds (Table 1). Because timber use values are variable, based on site and forest conditions, we use a range of timber value thresholds to estimate the amount of timberland where land-use conversion might be anticipated based on current valuation. For example, if the "switching value" is $500, then 623,621 ac or 26.4% of the timberland in the sample would likely switch in



Figures. Forecast distribution of industry timberland in a conversion-value class in Georgia, 2010.

the future. If the switching value is $800 per acre, then 150,927 ac (6.4%) would likely be converted. We suggest that the range for switching is likely between $600 and $800 per acre, indicating a potential conversion of 6.4–16.7% of industry timberland based on current market conditions and expectations.

Factors Affecting Timberland Prices

As explained above, we expect that several factors help determine the value of timberland in a particular area. These factors include factors influencing the allocation of rural land between agricultural and forestry uses and a set of factors that determine the feasibility of development now or in the future. We estimated and tested the effects of these types of explanatory factors on the formation of timberland values in Georgia for the year 2002.

For each of the 111 counties in our sample (Georgia has 159 counties and we excluded from analysis any county for which we did not have at least five parcel observations—these were largely in northern Georgia), we calculated the proportion of timberland area contained in parcels that had fair market value (FMV) greater than $800.[1] We assume that at this value, there is little chance that the long-term use of the land will be timber production. We then regressed this proportion against the following explanatory variables: (1) proportion of the county in a high site class, (2) farm earnings per unit area, (3) per household income, and (4) the population density of the county. We also include a dummy variable that is equal to one if the county lies in Georgia's Coastal Plain region and zero otherwise. The dummy variable accounts for biophysical differences between this ecoregion and the other regions of the state.[2]

Results of the regression are contained in Table 2. The proportion of conversion-valued timberland is significantly explained by the regression (adjusted $R^2 = 0.78$). Productivity is positively associated with the share of land in the conversion-value category. Farm earnings are found to have a significant and negative effect on conversion-valued timberland, indicating that where agricultural returns are high, timberland prices are suppressed. Household income has a significant and positive effect. As income levels in a county increase, the amount of timberland valued for conversion rises. Population density also has a positive impact on the amount of timberland valued for conversion. The dummy variable for Coastal Plain counties is significant and negative, indicating that, other things constant, Coastal Plain counties have fewer parcels in the conversion-valued category.

To further illustrate the effects of potential development on timberland values, we chart the predicted proportion of timberland in the conversion class as a function for population density (all the other continuous variables in Table 2 are held at their mean values, and the dummy variable is set to indicate an area not in the coastal plain). Figure 3a shows that, for a county with these mean value characteristics, the share of timberland in a conversion class increases rapidly from 25 to 75% as population density increases from about 200 to 290 people per square mile (ppsm). Figures 3b and 3c show how income interacts with the population density variable. In Figure 3b, income is set 10% lower than the mean value. In this case, the conversion zone is between 290 and 370 ppsm. With income set at 10% above the mean value (Figure 3c), the conversion zone is defined as 130–200 ppsm.

Based on these observations, rural land uses clearly dominate in counties with population density below 150 ppsm. A value of 200–350 ppsm represents a transition zone between urban and rural influences on land values. Beyond about 350–400 ppsm, timberland valuations are such that long-term timber production is highly unlikely.

Estimating Conversion Potential

We next used the output of the regression equation to identify areas where timberland conversion might be high in the future. We used two different indicators. First we mapped the observed proportion of timberland in a conversion-value class (>$800 per acre). For our second indicator, we forecast area in the conversion-area class based on forecasts of population density, income, and farm earnings for the year 2010.[3] The fitted regression equation is then used to predict the proportion of the county in the conversion-valued class for the values forecasts for 2010.

The current (2002) distribution of conversion-valued lands (Figure 4) shows that 11 counties in Georgia have 80–100% of industrial timberland values in a conversion class. Ten of these counties are arranged in a band at the eastern periphery of the rapidly devel-

oping area of the southeastern Piedmont (south and east of the Atlanta metropolitan area). The other county contains the city of Valdosta in southern Georgia along Interstate 75. If industry valuations are an indicator of the value of other private timberland in a county, then we can estimate the proportion of all timberland currently in a conversion-value class by multiplying the industry proportion by the total timberland area for each county. Based on estimates from the latest (1997) USDA Forest Service periodic forest inventory (Thompson 1998), we estimate that about 2.1 million ac or approximately 10% of all private timberland in Georgia is in a conversion-value class.

The distribution of conversion-valued timberland forecast for 20 10 (Figure 5) shows an eastward expansion of the band of development observed for 2002. If the forecasts of population, income, and farm earnings hold, then we would expect 33 counties to have 80–100% of industry timberland in a conversion-valued class by the year 2010. Applying the predicted proportions shown in Figure 7 to the 1997 inventory indicates that 5.6 million ac (25%) of the state's timberland would be in a conversion-value class.

Using the same approach-i.e., assuming that the share of industry land in a conversion-value class approximates the value for all timberland owners-we calculated the loss in timber inventories implied by these conversions. Applying the 2002 valuations to growing stock estimates from the 1997 forest inventory (Thompson 1998) indicates that roughly 3 billion cubic feet (BCF) of growing stock, and 1.9 BCF of sawtimber growing stock would be lost to conversion. These both amount to about 10% of total values. Applying the forecast 20 10 valuations to the latest 1997 inventory indicates a total loss of 8.3 and 5.0 BCF growing stock and sawtimber, respectively. This amounts to about 26% of volume totals for Georgia.

Implications

The prices of capital assets such as timberland are forward looking. They capture the perspectives of thousands of market participants and, in so doing, summarize a vast quantity of information and opinion regarding future returns to land. We have exploited the speculative information in timberland prices in Georgia to evaluate the current and future potential for the conversion of timberland to developed uses. We find that current valuations indicate high conversion potentials in 11 counties. Anticipated future growth is forecasted to shift timberland values so that 33 counties would have high conversion potential by the year 2010. Up to 26% of the growing stock inventories measured in the 1997 inventory could be affected based on our estimates. However, this should be viewed as a conservative estimate of the potential effects of development because we were unable to assess prices and conversion in high-growth counties across roughly the northern 25% of the state (these counties did not have five or more industry parcels in our database).

Timber management has historically been considered a residual land use. As such, there were few alternative land uses at the extensive end of production, and millions of acres in the eastern US have migrated into forest production as agricultural production declined. In recent years, rising incomes and populations have led to substantial new land-use opportunities. Timber management must now compete with higher-valued development activities at the intensive margin and with aesthetic and recreational land uses at the extensive end. We thus may expect traditional timber management to once again become a transitional use on the wildland-urban interface.

This changing situation has a number of implications for the future of forest use in many areas. As the price of bare land increases, many landowners can be expected to cash in on this windfall and sell their land for development. As these higher prices become common in the marketplace, tax assessments based on fair market value comparisons for timberland will rise. This puts increasing pressure on those landowners who would like to maintain their traditional forestry activities because of the higher annual costs associated with property taxes. Many of these owners will then be forced to sell their property to avoid these costs, reinforcing the cycle. As a result, it becomes very difficult to resist pressures once conversion begins within an area.

The value of industry timberland for alternative uses will not be the only factor determining its ultimate use. Many forest products companies will continue to own many of their properties for strategic needs, company policy, or other reasons. Nevertheless, fiduciary responsibilities, changing company strategies, and simple profit-making opportunities will often force companies to change their land holding strategies. Most forest products companies now have real estate development divisions and are actively marketing properties. In addition, Weyerhaeuser's recent decision to divest its entire landholdings in central Georgia (>300,000 ac) and Temple-Inland's sale of one-third of its landholdings in north Georgia 3 years ago indicate that companies realize the financial opportunities and burdens that holding timberland entails.

Conversion of timberland can be encouraged, indeed accelerated, by the structure of property taxes. As fair market values increase, so does the basis for taxation. The result is that the tax rate can eliminate the profitability of any timber production plans, thereby encouraging timberland owners to sell. Current use or preferential tax treatments can moderate this effect by setting the basis according to current usage and not the potential for development. Georgia's tax structure is different from other states' because preferential property taxation programs exist only for noncorporate owners and are not available for industrial owners. Most states do not discriminate on the basis of entity but rather attempt to provide tax benefits for land or productivity types. In Georgia, these programs can save anywhere from 25% to more than 90% of a property owner's tax bill. The literature shows these programs to be ultimately ineffective in stopping sprawl and development on high-valued lands, but they can slow conversions in transitional areas and often are seen as an important policy

for reducing the forced sale of lands.

The situation in Georgia has created a system in which land owners who can take advantage of these tax preferences face a significant competitive advantage over larger corporate owners. The desire by suburbanites to own "woodlets," (tracts of woodland that can be owned for aesthetic and lifestyle objectives), and the lower property taxes associated with ownership of these tracts allow these individuals to bid up the price of land. Thus, we face a situation in which the major source of forest production will be individuals who generally have little experience or knowledge of forest management. At the same time, larger tracts are carved up to take advantage of higher per-acre values associated with smaller properties, leading to higher production costs and reduced environmental benefits.

Endnotes

[1] The use of the $800 threshold is based on our own judgment regarding a reasonable switching point and was chosen primarily for illustrative purposes. It is substantially greater than bareland timberland values that could be justified solely on timber growth and current or optimistic prospective prices. Accordingly, we feel this value provides a conservative estimate of the changes that observed prices portend.

[2] The analysis is conducted as a logistic regression with grouped data. The dependent variable is the log-odds ratio, or log (p/I-p), where p is the proportion of industry timberland with a fair market value (FMV) greater than $800. Weighted regression is required to correct for the error structure introduced by using the log odds form (see Maddala 1983).

[3] Forecasts were taken from Woods and Poole's (2004) set of county-level econometric and demographic forecasts.

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