ASSESSING THE IMPACTS OF FORESTS ON HUMAN WELFARE: PRELIMINARY RESULTS FROM THE MID-ATLANTIC INTEGRATED ASSESSMENT

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Abstract. This paper presents results from the first phase of the socio-economic assessment of forest ecosystems in the Mid-Atlantic Integrated Assessment (MAIA). First, we present results of the analysis of changes in the distribution of human population and forest land use in the region. Then, trends in wood products employment and income between 1975–95 are used to examine the economic contributions of forest-based industries in the Mid-Atlantic region. Between 1970–90 the population of the MAIA region increased by 14% (4.3 million people) resulting in the average population density increasing by 25 people per square mile from 179 to 204 people per square mile. Nevertheless, population density was lower in large parts of the region in 1990 than in 1950. Although forests dominate the MAIA landscape, the trend is toward more people owning smaller forest land holdings, with developed lands increasing by 21% and rural lands decreasing by 2.64% between 1982–94. All of this suggests increasing forest fragmentation in all states of the region except New York, Pennsylvania, and West Virginia. Forest industry has been an important contributor to the economy of the MAIA region, producing an average of a quarter million jobs (2.03% of all wage employment) and generating $4.5 billion in wages and salaries each year between 1975–95. If recent trends continue, forest industry will continue to be an important source of employment and income for parts of some states in the MAIA region; however, the forest industry's importance relative to the entire mid-Atlantic economy will likely continue to decline in the 21st century.

1. Introduction

This paper presents results from Phase I of the socio-economic assessment of forest ecosystems in the Mid-Atlantic Integrated Assessment (MAIA), a multi-agency effort headed by the U.S. EPA to assess the state of the environment in the mid-Atlantic region of the United States.[1] The overall goal for the socio-economic assessment is to develop systems for understanding and monitoring the relationship between changes in forest ecosystems and human well-being and quality of life in the MAIA region. The specific objectives are:

- to measure market and non-market benefits produced by MAIA's forest resources,

[1] The USDA Forest Service, Forest Health Monitoring Program is coordinating the analysis of forest ecosystems for the MAIA project and the Southern Research Station's Economics of Forest Protection and Management Work Unit is responsible for the socio-economic component of the MAIA forest assessment.

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- to measure resource and land-use variables that influence production of forest benefits,
- to analyze how policies for forest conservation and management influence human welfare, and
- to develop meta-indicators for measuring how aggregate human well-being is influenced by changes in forest ecosystems.

The MAIA socio-economic assessment is proceeding in two distinct phases. Phase I (expected completion by third quarter 1999) emphasizes trends in forest resource use over the past two decades. Specifically, Phase I activities include developing the list of socio-economic assessment questions, gathering and analyzing available secondary data sources to answer as many of the assessment questions as possible, and determining primary data collection needs for completing a full assessment of all direct and indirect impacts. During Phase II we plan to develop the economic theory for aggregating welfare impacts across benefits and to integrate socio-economic and ecologic assessments to determine impacts of changing ecologic conditions on human welfare. Given adequate Phase II funding, we also plan to initiate primary data collection activities to fill data gaps identified in Phase I.

In this paper, we present some preliminary results from a subset of the 22 assessment questions developed during workshops with interested stakeholders in the MAIA region. First, we present results of the analysis of changes in the distribution of human population and forest land use in the region. Then, trends in wood products employment and income between 1975–95 are used to examine the economic contributions of the forest based manufacturing sector in the mid-Atlantic region. Unfortunately, secondary data is not available to accurately assess the indirect and non-market impacts of the region's forests on human welfare.

2. Data/Methods

Population trends between 1970–90 are analyzed with data from the 1970, 1980, and 1990 U.S. Censuses. To analyze land use trends, we use the Forest Inventory and Analysis (FIA) and National Resources Inventory (NRI) databases. USDA Forest Service conducts periodic (every 5–15 years) forest inventories in every state in the US to create the FIA data sets which include extensive data on forest resources at the county, plot, and tree level (Hansen et al. 1992). NRI data, produced every 5 years by the USDA Natural Resources Conservation Service, includes data on land cover and use, soil erosion, prime farmland, wetlands, and other natural resource characteristics on non-federal rural land in the US. Forest ownership patterns are examined with data from national landowner surveys conducted by the USDA Economic Research Service, USDA Forest Service, National Re-

sources Conservation Service and the National Association of State Foresters (Birch 1996ac).

To quantify the economic importance of forest based industries to the mid-Atlantic region, we examine the employment and income generated by the following sectors: lumber and wood products (Standard Industry Classification (SIC) 24), paper and allied products (SIC 26), and furniture and fixtures (SIC 25). Data is derived from the Bureau of Labor Statistics, ES-202 database. The income from all wages and salaries is corrected for inflation using the GDP price deflator and expressed in terms of buying power in 1982 dollars. To estimate the rate of change in employment and income of the forest products sectors between 1975–95, a linear regression equation of the following form is used:

$$Y = b_0 + b_1X + \epsilon \qquad (1)$$

where Y = natural logarithm of employment or real wages
X = year
b_0 , b_1 = regression coefficients
ϵ = error term

3. Results/Discussion

3.1 POPULATION

Table I displays population and population density statistics for the MAIA region from 1970 to 1990. With 171,129 square miles of land area and a population of 35 million people, the average population density for the entire region was 204 people per square mile in 1990. Between 1970–1990, the region's population grew by 4.3 million people increasing the average population density from 179 to 204 people/square mile. With the exception of Pennsylvania (1%), West Virginia (3%), and the MAIA portion of New York (7.5%), all the other states in the region exhibited population growth from 22 to 33% between 1970–1990, with Virginia experiencing the largest percentage increase in population (33%). New Jersey (MAIA portion only) experienced the highest population density in all three censuses (608 persons per square mile in 1990) followed by Maryland (489 persons/square mile), Delaware (341 persons/square mile) and Pennsylvania (265 persons/square mile).

Aggregating population statistics at the state level, however, masks important geographic variability. For example, disaggregating at the county level (as can be seen in Figures 1 and 2) provides a more enlightening view of population density changes. Figure 1 shows the 1990 population densities for all counties in the region and illustrates the variability across the region. Although high population densities occur in urban areas and the interstate highway corridors that connect

Table I

Population and population density (persons per square mile) *in* the mid-Atlantic in 1970–1990.

	Population			Population Density (Persons per square mile)			Percent Change
	1970	1980	1990	1970	1980	1990	1970–1990
Delaware	548,104	594,338	666,168	277	308	341	23.3
Maryland	3,923,897	4,216,975	4,781,468	397	429	489	23.3
New Jersey*	2,947,516	3,360,649	3,714,568	476	547	608	27.7
New York*	2,611,502	2,703,536	2,792,817	120	125	129	7.5
North Carolina*	2,409,462	2,751,334	3,133,536	104	118	135	29.8
Pennsylvania	11,800,766	11,863,895	11,881,643	262	264	265	1.1
Virginia	4,651,448	5,346,818	6,187,358	117	135	156	33.7
West Virginia	1,744,237	1,949,644	1,793,477	73	81	75	2.8
Total	30,636,932	32,787,189	34,951,035	179	192	204	14.1

Source: 1970, 1980 and 1990 Census of Population and Housing, Bureau of Census, U.S. Department of Commerce.

* Population figures for NJ, NY, and NC are the totals of the subset of counties in the mid-Atlantic region.

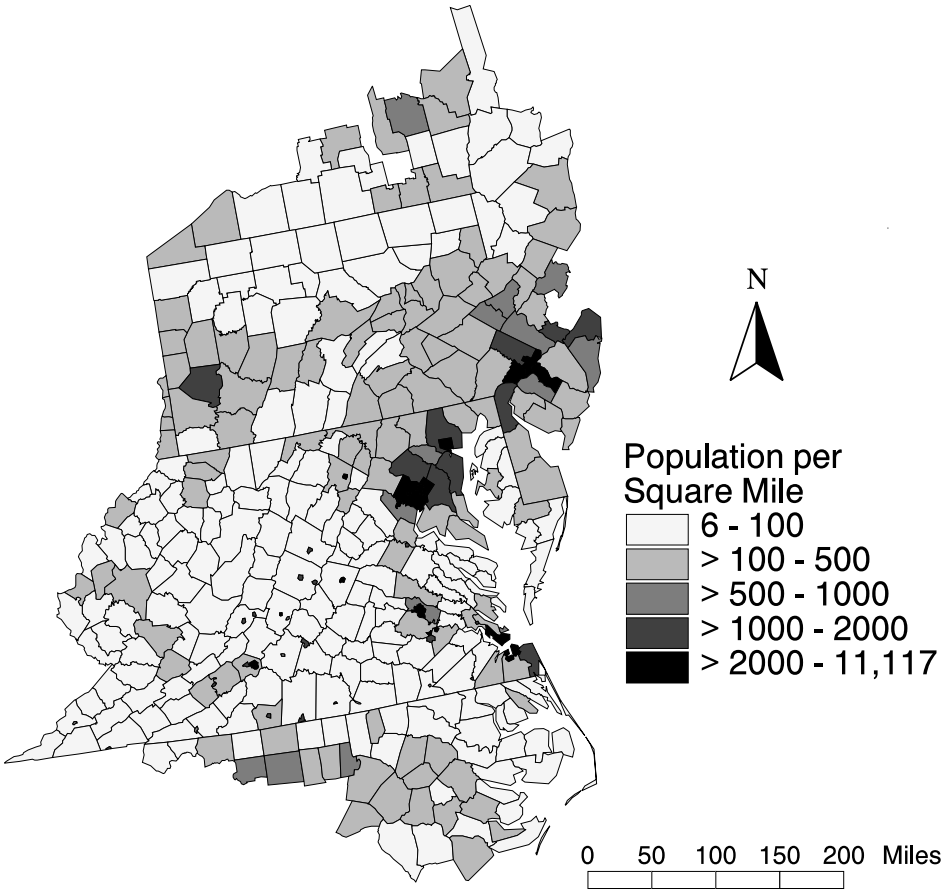

Figure 1. *Population density (persons/square mile) in the Mid-Atlantic region in 1990.*

them (dark grey and black counties), most of the region's counties fall into the lowest density category of 6–100 persons/square mile.

Figure 2 depicts the percent change in population density by county between 1950–90 and 1970–90. The 1950–90 map in Figure 2a shows that a large portion of the region (including almost all of West Virginia and portions of southern Virginia, North Carolina and Pennsylvania) has actually experienced significant decreases (greater than 15 %) in population density since 1950. In contrast, between 1970–90 (Figure 2b) the number of counties exhibiting decreasing population density dropped dramatically. It appears that a large rural to urban migration during the 50s and 60s reduced the population in large areas in West Virginia, Virginia, North Carolina and Pennsylvania while populations in urban areas increased dramatically throughout the region. During the 70s and 80s, population increased in almost all counties in the region. In many counties, however, the increases in population density between 1970–90 have yet to make up for the decreases that occurred between 1950–70. This suggests that issues of the impacts of

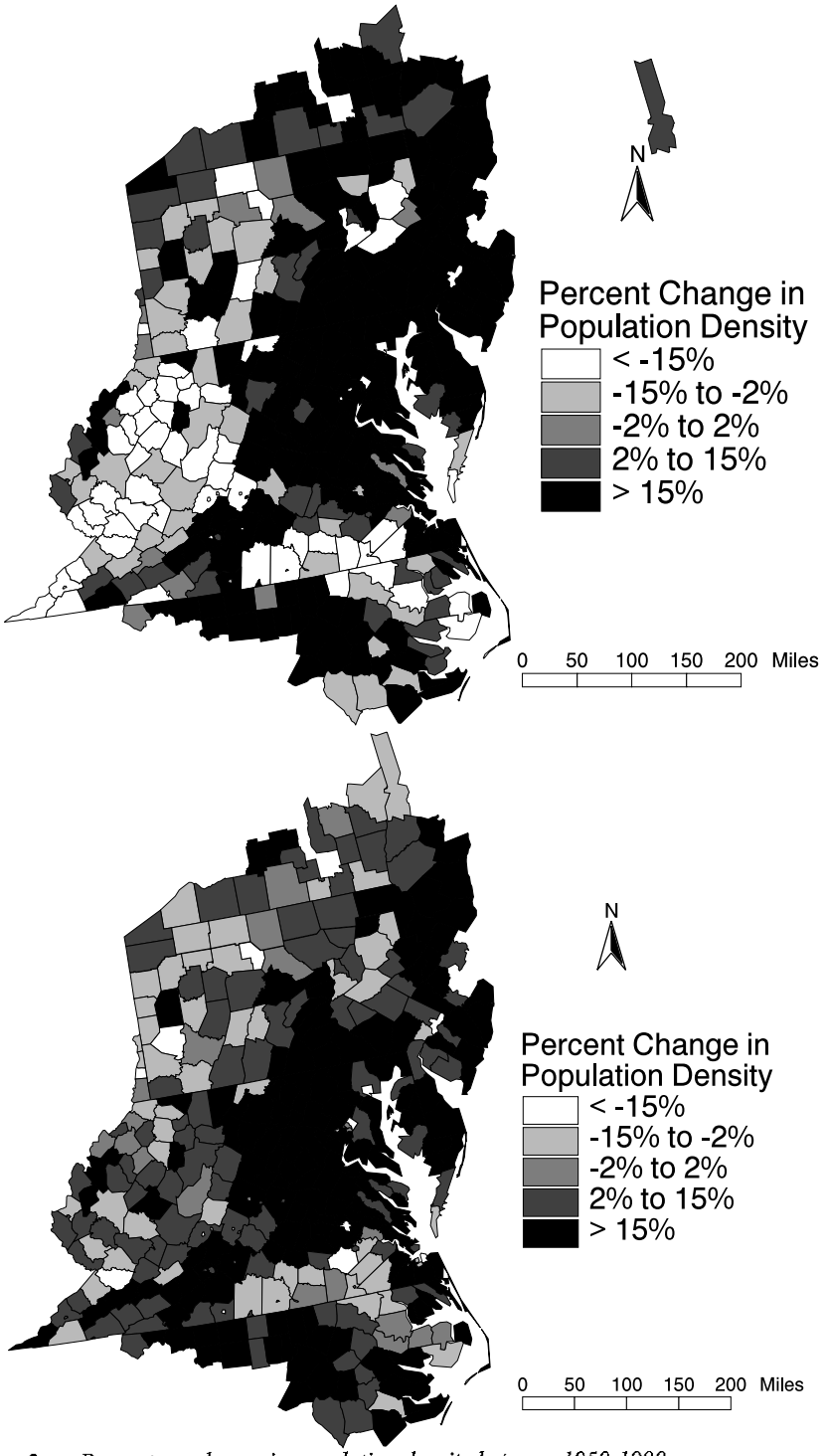

Figure 2. *a. Percentage change in population density between 1950-1990.*
b. Percentage change in population density between 1970-1990.

forests on humans (and vice-versa) will be quite different along the rapidly urbanizing eastern seaboard and inland rural areas in West Virginia, Pennsylvania and southeastern Virginia and North Carolina.

3.2 LAND USE

The data in Appendix 1 (based on the 1992 National Resources Inventory), indicate that the mid-Atlantic region covers a total surface area of 113.9 million acres. Non-federal developed lands (i.e., urban) account for 11.1 million acres (9.7%),

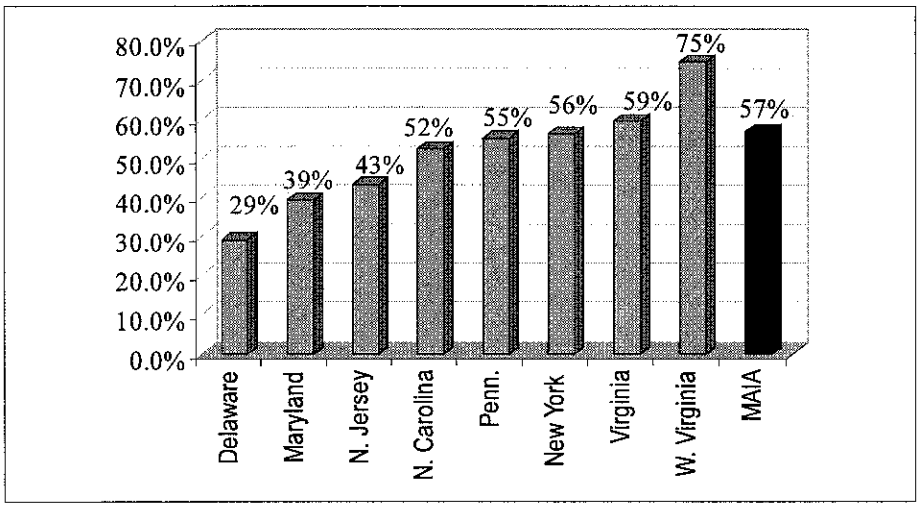

Figure 3. *Percent of all non-federal lands classified as forest land in the mid-Atlantic region in 1992 (figures for NJ, NY and N.C. are the totals of the subset of counties in the mid-Atlantic region).*

while 80% of the surface area (92 million acres) in the MAIA region is classified as rural. The remainder consists of federal land (5.5 million acres) and water (5.1 million acres). Figure 3 depicts the percentage of all non-federal lands classified as forest in the mid-Atlantic states in 1992.[2]

Appendix 2 provides additional information about mid-Atlantic rural lands by disaggregating them into rural land use classes (crop, pasture, range, forest, and minor land uses). Figure 4 uses the data in Appendix 2 to show how the distribu-

[2] "Forest land" is a land cover/use category that is at least 10% stocked by single-stemmed woody species of any size that will be at least 4 meters (13 feet) tall at maturity. Also included is land bearing evidence of natural regeneration of tree cover (cut over forest or abandoned farmland) and not currently developed for non-forest use. Ten percent stocked, when viewed from a vertical direction is a canopy cover of leaves and branches of 25% or greater. The minimum area for classification of forest land is 1 acre, and the area must be at least 100 feet wide.

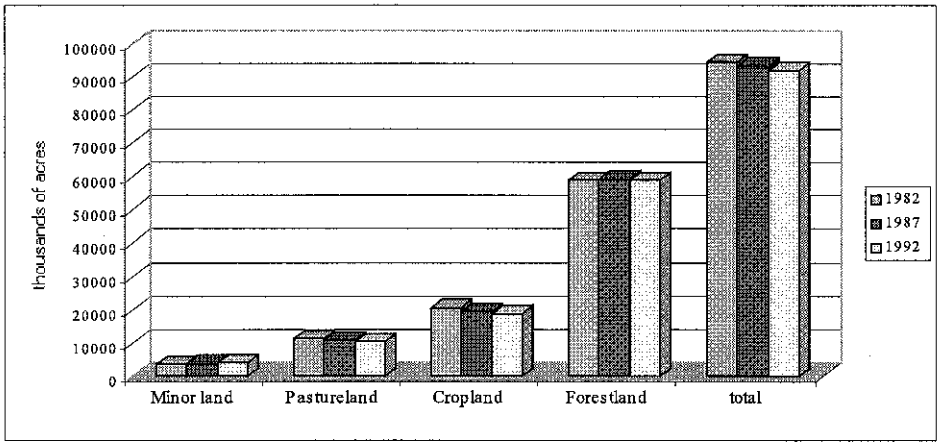

Figure 4. *Land cover of non-federal rural lands in the MAIA region 1982–1992.*

tion of rural lands between land use classes changed between 1982–92. The total amount of rural land decreased by 2.64% (2.5 million acres) while developed (i.e., urban) lands increased by 21% (1.94 million acres) between 1982–92. Rural lands classified as forest declined by only 0.42% (250,000 acres). As a result, the percentage of rural lands classified as forest actually increased from 63.3% in 1982 to 63.7% in 1992. This suggests that agricultural lands are rapidly being converted to forests and/or developed lands, and that agricultural rather than forest lands are the primary source for urban development. Of course, these aggregate data mask large differences between states in the region. Figure 5 shows the percentage change in forest land at the state level between 1982–92. While forest land in the entire region decreased by less that one-half of one percent, forest land declined from 2.44–6.75% in Delaware, Maryland, and the portions of New Jersey and North Carolina falling in the MAIA region.

The US Forest Service Forest Inventory and Analysis (FIA) estimates that 63.5 million acres of forest land in the MAIA region are suitable for timber production. Twenty-one percent of the timberland is owned by public agencies and 79% is privately owned. Forest industry controls 7%, municipal and county governments control 1%, and the federal government controls 6%. The 2.1 million private forest landowners in the MAIA region comprise 21% of all private forest landowners and 13% of all private forest land in the U.S.

Figure 6 shows how the size of these private forest land ownerships have changed between 1982–94. For the entire region, the number of owners increased by 10% while the number of acres of privately owned forest land increased by only

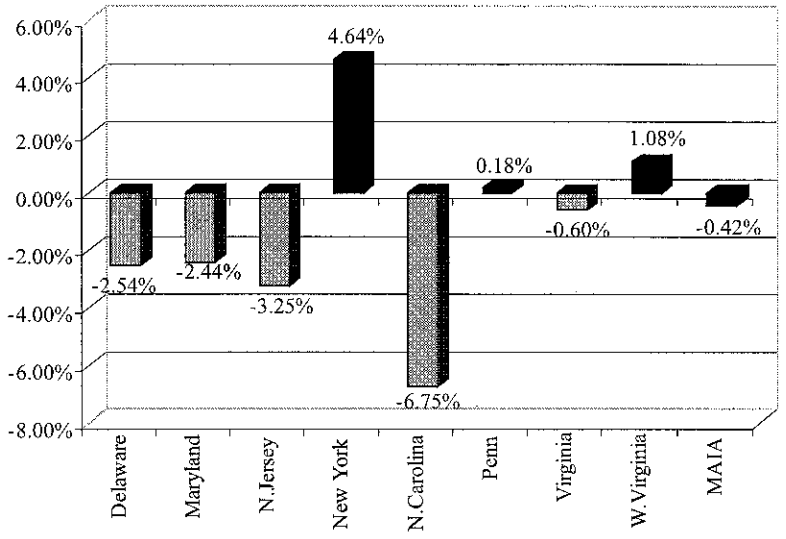

Figure 5. *Percentage change in forest land by state between 1982–92 (figures for NJ, NY and NC are the totals of the subset of counties in the mid-Atlantic region).*

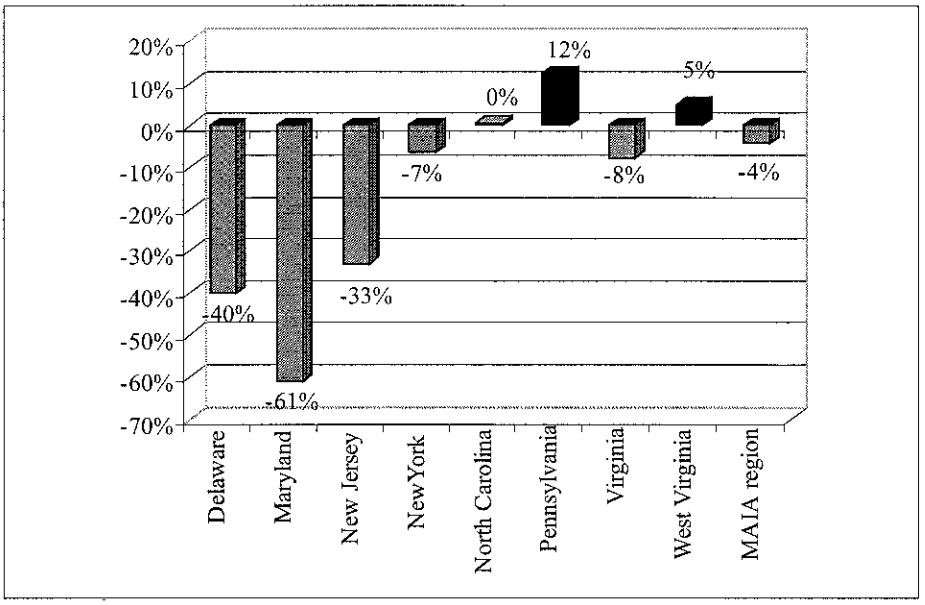

Figure 6. *Percent change in acres of forest land per owner 1982–94 (figures for NJ, NY and NC are the totals of the subset of counties in the mid-Atlantic region). Source: Birch 1996ac.*

5.75% between 1982–1994. As a result the average size of forest land ownerships decreased by 61% in Maryland, 40% in Delaware, 7% in New York, and 8% in Virginia suggesting potential forest fragmentation problems. Only Pennsylvania and West Virginia experienced an increase in the size of the average forest land ownership between 1982–94.

3.3 MARKET BENEFITS/FOREST PRODUCTS BENEFITS

3.3.1 *Wage Employment*

Appendix 3 summarizes the employment contributions of forest-based industries in relation to all sectors in the economy of the mid-Atlantic region. Total employment in the mid-Atlantic region averaged 11.9 million per year between 1975–95. During this period, the lumber and wood-products industries produced on average 83,600 jobs per year, the furniture industries 73,100 jobs per year, while the paper and allied industries provided 87,400 jobs per year. For the entire MAIA region, forest industries produced an average of 244,100 jobs annually (2.03% of all wage employment) between 1975–95. At the state level, forest industries contributed more than 2% of all employment in the MAIA portion of North Carolina (2.78%), Pennsylvania (2.13%) and Virginia (3.32%). In the remaining states, forest industry employment ranged from a low of 0.78% of all employment in New Jersey (MAIA portion only) to 1.77% in Virginia.

Wage employment in the lumber and wood products sector (SIC 24) expanded at an average annual rate of 1.32% between 1975–95 (Figure 7 and Appendix 3). This was the only forest products sector that observed any statistically significant change in employment for the entire MAIA region between 1975–95. Employment in the furniture and fixtures sector, however, was quite volatile during the last two decades. Following an overall upswing between 1975–87, employment in furniture and fixtures (SIC 25) has consistently declined since 1987 falling in 1990 to lower levels than in 1975. In contrast, employment in the paper and allied products sector was quite stable between 1975–95, with employment slightly higher in 1995 than in 1975. Between 1975–95, wage employment in the entire economy in the mid-Atlantic region expanded at a higher average annual rate than in the forest industry sectors (Appendix 3). As a result, forest industry's share of employment in the MAIA fell from 2.31% in 1975 to 1.74% in 1995.

3.3.2 *Wages and Salaries*[3]

Appendix 4 and Figure 8 summarize the contributions to wage and salary income for the lumber and wood products sector, paper and allied products sector, and furniture and fixtures sector in relation to all sectors in the economy of the mid-Atlantic region. Between 1975–95, real wage and salary income for the entire MAIA economy averaged $222.3 billion per year of which about 2.02% ($4.5 bil-

[3] All wage and salary figures are in 1982 dollars.

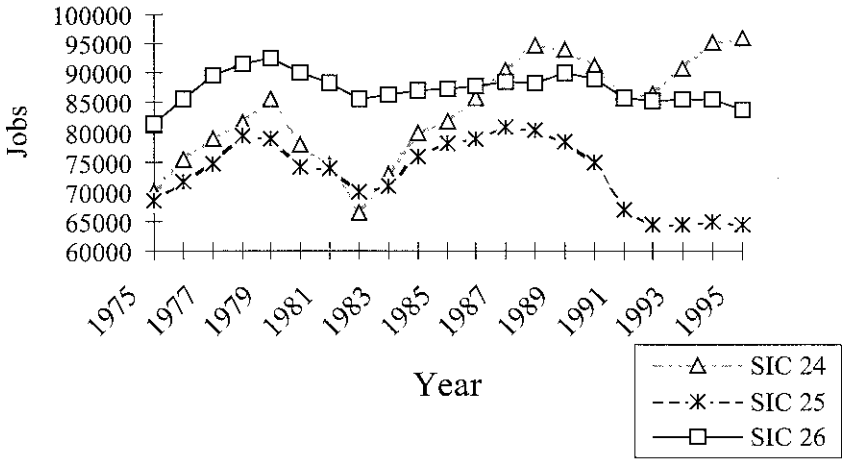

Figure 7. *Wage and salary employment in lumber and wood products (SIC 24), furniture and fixtures (SIC 25), and paper and allied products (SIC 26) in the mid-Atlantic region (Source: Department of Labor, unemployment insurance database, ES202).*

lion) was produced by forest industries. Wages and salaries grew more rapidly than employment in all sectors in all states.

The paper industries in the mid-Atlantic region produced an average of $2.1 billion per year in wage income, while the lumber and wood products sector produced $1.3 billion per year, and the furniture industries $1.1 billion per year. However, wages in the lumber and wood products industries grew more rapidly (3.34% per year) than both the paper industries (2.16% per year) and the furniture industries (1.35% per year). Overall, wage income for the mid-Atlantic region economy as a whole grew faster (3.81% per year) than in the forest industry sectors (2.16 to 3.34% per year).

The average wage per job increased in all the sectors between 1975–95. The average real wage per job for the entire economy of the mid-Atlantic region was about $18,000 between 1975–1995, growing from about $16,000 in 1975 to $21,000 in 1995, an increase of 31%. The wage per job in the paper industries increased by 52% between 1975–95 compared to a 40% increase in the lumber and wood products industries and 39% in the furniture industries. Although forest industry average wage per job increased more rapidly than in the entire MAIA economy, the average wage per job in the lumber and wood products industries ($14,816) and furniture industries ($15,497) fell below the regional average by 18% and 14%, respectively. In the paper industry, however, the average wage per job ($24,000) was higher than the regional average for the entire economy by almost 33%.

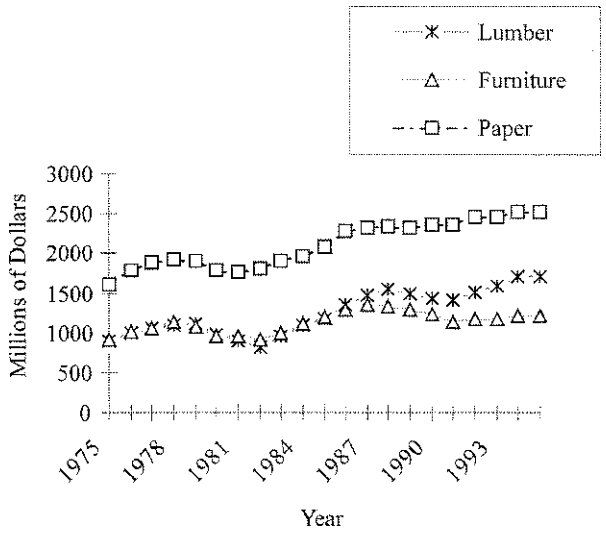

***Figure 8**. Total wages and salaries (1982 dollars) for forest industries in the mid-Atlantic region, 1975-1995. (Source: Department of Labor, unemployment insurance database, ES-202).*

4. Conclusions

Between 1970–90, the population of the MAIA region increased by 14% (4.3 million people) resulting in the average population density increasing by 25 people per square mile from 179 to 204 people per square mile. Nevertheless, in large parts of the region, population density was lower in 1990 than in 1950. Forests dominate the MAIA landscape, accounting for about 60% of the land area. However, in recent years more people are owning smaller forest land holdings. Developed (urban) lands have increased by 21% while the amount of rural land decreased by 2.64% between 1982–94. The result is increasing forest fragmentation in all states of the region except New York, Pennsylvania, and West Virginia.

Forest industry has been an important contributor to the economy of the MAIA region, producing an average of a quarter million jobs (2.03% of all wage employment) and generating $4.5 billion in wages and salaries each year between 1975–95. However, with the exception of SIC 25 (furniture and fixtures) in Delaware, and SIC 24 (lumber and woods products) in Delaware, West Virginia, and Pennsylvania, the forest industry sector has not grown as rapidly as the rest of the MAIA economy. Several states have experienced negative rates of growth in forest industry sectors. As a result, the share of employment in forest industries de-

clined during the last two decades in all states except West Virginia and Delaware. Likewise, growth in wage and salary income in the forest industries lagged the rest of the MAIA economy between 1975–95. With the exception of the paper and allied products industry, wages per job in forest industry were 14–18% lower than the average wage for the entire economy. If recent trends continue, forest industry will continue to be an important source of employment and income for parts of some states in the MAIA region; however, forest industry's importance relative to the entire Mid-Atlantic economy will likely continue to decline in the 21st century.

From our current effort at socio-economic assessment of forest ecosystems, we have found that population, land use, and the market benefits produced by the forest products industries can be analyzed with currently available secondary data. However, additional primary data collection efforts are required to fully and accurately analyze the non-market, non-consumptive benefits produced by forest ecosystems. Additional research is also needed to integrate socio-economic and ecological assessments and to aggregate the direct and indirect impacts of forests across populations to determine the net benefits accruable to society from changes to forest ecosystems.

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APPENDIX 1

Surface Area of Non-Federal Land and Water Areas (thousand acres).

State	Year / Change	Federal Land	Water Area	Non Developed and Other Land	Rural	Total Non Federal Developed and Other Land	Total Surface Area
Delaware							
	1982	33.2	62	169.6	1043.7	1213.3	1309
	1987	33.1	62.6	187.3	1025.5	1212.8	1309
	1992	33.1	62.8	204.8	1007.8	1212.6	1309
	% Change 1982-87	**-0.30**	**0.97**	**10.44**	**-1.74**	**-0.04**	
	% Change 1982-92	**-0.30**	**1.29**	**20.75**	**-3.44**	**-0.06**	
Maryland							
	1982	158.6	487	946.2	5102.7	6048.9	6695
	1987	159.3	489.7	1029.6	5015.9	6045.5	6695
	1992	166.6	494.1	1095.2	4938.6	6033.8	6695
	% Change 1982-87	**0.44**	**0.55**	**8.81**	**-1.70**	**-0.06**	
	% Change 1982-92	**5.04**	**1.46**	**15.75**	**-3.22**	**-0.25**	
New Jersey*							
	1982	140.3	225.3	775.3	2967.7	3743	4109
	1987	143.8	230.8	948.9	2785.1	3734	4109
	1992	155.6	233.2	1009.4	2710.4	3719.8	4109
	% Change 1982-87	**2.49**	**2.44**	**22.39**	**-6.15**	**-0.24**	
	% Change 1982-92	**10.91**	**3.51**	**30.19**	**-8.67**	**-0.62**	
New York							
	1982	40.9	365.4	914.4	12802.2	13716.6	14123
	1987	40.5	368.5	949.8	12764.1	13713.9	14123
	1992	40.5	375.8	1008.6	12698.0	13706.6	14123
	% Change 1982-87	**-0.98**	**0.85**	**3.87**	**-0.30**	**-0.02**	
	% Change 1982-92	**-0.98**	**2.85**	**10.30**	**-0.81**	**-0.07**	
North Carolina							
	1982	571.6	2388.6	1075.4	13072.5	14147.9	17108
	1987	709.2	2397.4	1276.0	12725.5	14001.5	17108
	1992	889.9	2408.8	1506.4	12307.0	13813.4	17108
	% change 1982-87	**24.07**	**0.37**	**18.65**	**-2.65**	**-1.03**	
	% change 1982-92	**55.69**	**0.68**	**40.08**	**-5.86**	**-2.36**	

State	Year / Change	Federal Land	Water Area	Non Developed and Other Land	Rural	Total Non Federal Developed and Other Land	Total Surface Area
Pennsylvania							
	1982	676.2	496.8	2996.1	24828.1	27824.2	28997
	1987	678.0	497.1	3181.0	24641.1	27822.1	28997
	1992	682.0	502.5	3432.1	24380.6	27812.7	28997
% change 1982-87		**0.27**	**0.06**	**6.17**	**-0.75**	**-0.01**	
% change 1982-92		**0.86**	**1.15**	**14.55**	**-1.80**	**-0.04**	
Virginia							
	1982	2352.5	907.8	1736.5	21093.8	22830.3	26091
	1987	2372.7	914.7	1978.0	20825.2	22803.2	26091
	1992	2389.1	927.3	2182.9	20591.3	22774.2	26091
% change 1982-87		**0.86**	**0.76**	**13.91**	**-1.27**	**-0.12**	
% change 1982-92		**1.56**	**2.15**	**25.71**	**-2.38**	**-0.25**	
West Virginia							
	1982	1101.6	164.8	574.7	13667.0	14241.7	15508
	1987	1116.8	165.4	612.1	13613.8	14225.9	15508
	1992	1200.6	169.5	689.3	13448.7	14138.0	15508
% change 1982-87		**1.38**	**0.36**	**6.51**	**-0.39**	**-0.11**	
% change 1982-92		**8.99**	**2.85**	**19.94**	**-1.60**	**-0.73**	
MAIA Region							
	1982	5074.9	5097.7	9188.2	94577.7	103765.9	113939
	1987	5253.4	5126.2	10162.7	93396.2	103558.9	113939
	1992	5557.4	5170.0	11128.7	92082.4	103211.1	113939
% change 1982-87		**3.52**	**0.56**	**10.61**	**-1.25**	**-0.20**	
% change 1982-92		**9.51**	**1.42**	**21.12**	**-2.64**	**-0.53**	

Source: 1992 National Resources Inventory, Natural Resources Conservation Service, USDA
* Figures for NJ, NY and NC are the totals of the subset of counties in the mid-Atlantic region

APPENDIX 2

Land Cover/Use of Non-Federal Rural Land (thousand acres) in the MAIA.

State	Year/Change	Crop Land	Pasture Land	Forest Land	Minor Land Cover/Uses	Total Rural Land
Delaware						
	1982	518.8	36.6	361.9	126.4	1043.7
	1987	510.6	31.4	357	126.5	1025.5
	1992	499.1	25.8	352.7	130.2	1007.8
	% change 1982-87	**-1.58**	**-14.21**	**-1.35**	**0.08**	**-1.74**
	% change 1982-92	**-3.80**	**-29.51**	**-2.54**	**3.01**	**-3.44**
Maryland						
	1982	1794.7	533.7	2423.1	351.2	5102.7
	1987	1739.8	549.5	2391	335.6	5015.9
	1992	1673.1	545.4	2364	356.1	4938.6
	% change 1982-87	**-3.06**	**2.96**	**-1.32**	**-4.44**	**-1.70**
	% change 1982-92	**-6.78**	**2.19**	**-2.44**	**1.40**	**-3.22**
New Jersey*						
	1982	733.4	202.2	1660.3	371.8	2967.7
	1987	629.4	154.3	1626.5	374.9	2785.1
	1992	592.3	141	1606.4	370.7	2710.4
	% change 1982-87	**-14.18**	**-23.69**	**-2.04**	**0.83**	**-6.15**
	% change 1982-92	**-19.24**	**-30.27**	**-3.25**	**-0.30**	**-8.67**
New York*						
	1982	2961.8	2206.5	7366.9	267	12802.2
	1987	2871.3	1964.2	7508.5	420.1	12764.1
	1992	2806	1762.1	7708.8	421.1	12698
	% change 1982-87	**-3.06**	**-10.98**	**1.92**	**57.34**	**-0.30**
	% change 1982-92	**-5.26**	**-20.14**	**4.64**	**57.72**	**-0.81**
North Carolina*						
	1982	4144	603	7773.9	551.6	13072.5
	1987	3998.8	618.4	7521.5	586.8	12725.5
	1992	3848.2	601.9	7249.5	607.4	12307
	% change 1982-87	**-3.50**	**2.55**	**-3.25**	**6.38**	**-2.65**
	% change 1982-92	**-7.14**	**-0.18**	**-6.75**	**10.12**	**-5.86**

State	Year/Change	Crop Land	Pasture Land	Forest Land	Minor Land Cover/Uses	Total Rural Land
Pennsylvania						
	1982	5896.3	2590.7	15289	1052.1	24828.1
	1987	5741.7	2452.7	15363.7	1083	24641.1
	1992	5595.8	2326.2	15315.9	1142.7	24380.6
	% change 1982-87	**-2.62**	**-5.33**	**0.49**	**2.94**	**-0.75**
	% change 1982-92	**-5.10**	**-10.21**	**0.18**	**8.61**	**-1.80**
Virginia						
	1982	3396.9	3390.9	13620.4	685.6	21093.8
	1987	3109.1	3400.1	13657.8	658.2	20825.2
	1992	2901.1	3444	13538.9	707.3	20591.3
	% change 1982-87	**-8.47**	**0.27**	**0.27**	**-4.00**	**-1.27**
	% change 1982-92	**-14.60**	**1.57**	**-0.60**	**3.17**	**-2.38**
West Virginia						
	1982	1093	1869	10422.1	282.9	13667
	1987	997.6	1738.5	10576.7	301	13613.8
	1992	914.7	1608.9	10534.3	390.8	13448.7
	% change 1982-87	**-8.73**	**-6.98**	**1.48**	**6.40**	**-0.39**
	% change 1982-92	**-16.31**	**-13.92**	**1.08**	**38.14**	**-1.60**
MAIA						
	1982	20538.9	11432.6	58917.6	3688.6	94577.7
	1987	19598.3	10909.1	59002.7	3886.1	93396.2
	1992	18830.3	10455.3	58670.5	4126.3	92082.4
	% change 1982-87	**-4.58**	**-4.58**	**0.14**	**5.35**	**-1.25**
	% change 1982-92	**-8.32**	**-8.55**	**-0.42**	**11.87**	**-2.64**

Source: 1992 National Resources Inventory, Natural Resources Conservation Service, USDA.
* Figures for NJ, NY, and NC are the totals of the subset of counties in the mid-Atlantic region.

APPENDIX 3

Average Wage/Salary Employment and Annual Rates of Change in All Sectors, Lumber and Wood Products (Sic 24), Furniture and Fixtures (Sic 25), and Paper and Allied Products (Sic 26) in 1975-1995.

State/sector	Average Employment (thousand employees)	Percent of Total Economy's Employment	Average Annual Rate of Change (%)
Total MAIA Region			
All sectors	11969.8	100.00	1.93
SIC 24	83.6	0.70	1.32
SIC 25	73.1	0.61	NS
SIC 26	87.4	0.73	NS
Total SIC 24+25+26	244.10	2.04	
Delaware			
All sectors	248.3	100.00	2.75
SIC 24	0.82	0.33	3.36
SIC 25	0.5	0.20	5.8
SIC 26	2.5	1.01	NS
Total SIC 24+25+26	3.82	1.54	
Maryland			
All sectors	1455	100.00	2.62
SIC 24	3.8	0.26	NS
SIC 25	3.3	0.23	-1.23
SIC 26	9.4	0.65	-0.84
Total SIC 24+25+26	16.50	1.14	
New Jersey*			
All sectors	1441.2	100.00	2.24
SIC 24	2.6	0.18	-1.44
SIC 25	1.8	0.12	NS
SIC 26	6.8	0.47	-1.62
Total SIC 24+25+26	11.20	0.77	
New York*			
All sectors	972.7	100.00	1.93
SIC 24	4.7	0.48	NS
SIC 25	6.6	0.68	1.15
SIC 26	4.2	0.43	0.84
Total SIC 24+25+26	15.50	1.59	

State/sector	Average Employment (thousand employees)	Percent of Total Economy's Employment	Average Annual Rate of Change (%)
North Carolina*			
All sectors	1439	100.00	2.46
SIC 24	16.8	1.17	NS
SIC 25	16.7	1.16	-1.06
SIC 26	6.5	0.45	1.34
Total SIC 24+25+26	40.00	2.78	
Pennsylvania			
All sectors	4042.6	100.00	0.97
SIC 24	25.4	0.63	2.98
SIC 25	19.3	0.48	NS
SIC 26	41.3	1.02	-0.43
Total SIC 24+25+26	86.00	2.13	
Virginia			
All sectors	1893.3	100.00	3.22
SIC 24	23.3	1.23	NS
SIC 25	24	1.27	-0.95
SIC 26	15.5	0.82	1.21
Total SIC 24+25+26	62.80	3.32	
West Virginia			
All sectors	477.7	100.00	NS
SIC 24	6.2	1.30	2.3
SIC 25	0.97	0.20	-2
SIC 26	1.3	0.27	-1.92
Total SIC 24+25+26	8.47	1.77	

NS indicates that the rate of change was not significant at the 95% level.
*Figures for NJ, NY, and NC are the totals of the subset of counties in the mid-Atlantic region. (Source: Department of Labor, unemployment insurance database, ES-202).

APPENDIX 4

Wages and Salaries and Annual Rates of Change in All Sectors, Lumber and Wood Products (Sic 24), Furniture and Fixtures (Sic 25) and Paper and Allied Products (Sic 26), 1975-1995.

State/sector	Average Wage and Salary (millions $)[1]	Percent of Total Economy's Wages and Salaries (%)	Average Annual Rate of Change (%)
Total MAIA Region			
All sectors	222295.7	100.00	3.81
SIC 24	1253	0.56	3.34
SIC 25	1128.7	0.51	1.35
SIC 26	2115.8	0.95	2.16
Total SIC 24+25+26	4497.5	2.02	
Delaware			
All sectors	4985.4	100.00	4.19
SIC 24	12.4	0.25	4.7
SIC 25	7.9	0.16	7.86
SIC 26	54	1.08	2.44
Total SIC 24+25+26	74.3	1.49	
Maryland			
All sectors	27517.2	100.00	4.69
SIC 24	62	0.23	1.57
SIC 25	55.7	0.20	NS
SIC 26	202.9	0.74	1.2
Total SIC 24+25+26	320.6	1.17	
New Jersey*			
All sectors	29204.3	100.00	5.02
SIC 24	45.3	0.16	NS
SIC 25	33.5	0.11	2.29
SIC 26	159	0.54	0.88
Total SIC 24+25+26	237.8	0.81	
New York*			
All sectors	17014.4	100.00	3.57
SIC 24	74.3	0.44	2.19
SIC 25	109.5	0.64	2.95
SIC 26	87.4	0.51	3.05
Total SIC 24+25+26	271.2	1.59	

State/sector	Average Wage and Salary (millions $)[1]	Percent of Total Economy's Wages and Salaries (%)	Average Annual Rate of Change (%)
North Carolina*			
All sectors	25583	100.00	3.43
SIC 24	216	0.84	2.55
SIC 25	243.9	0.95	1.45
SIC 26	156.1	0.61	3.49
Total SIC 24+25+26	616	2.40	
Pennsylvania			
All sectors	75782.4	100.00	2.55
SIC 24	423.1	0.56	4.52
SIC 25	345.4	0.46	1.4
SIC 26	1027.4	1.36	1.78
Total SIC 24+25+26	1795.9	2.38	
Virginia			
All sectors	33680.7	100.00	5.39
SIC 24	338.7	1.01	3.02
SIC 25	320.5	0.95	NS
SIC 26	406.7	1.21	3.65
Total SIC 24+25+26	1065.9	3.17	
West Virginia			
All sectors	8528.3	100.00	0.67
SIC 24	81.1	0.95	4.18
SIC 25	12.4	0.15	NS
SIC 26	22.2	0.26	NS
Total SIC 24+25+26	115.7	1.36	

[1] 1982=100, prices are adjusted for inflation and expressed in terms of value in 1982.
*Figures for NJ, NY and NC are the totals of the subset of counties in the Mid-Atlantic region.
NS indicates that the rate of change was not significant at the 95% level.
(Source: Department of Labor, unemployment insurance database, ES-202)