

OUTLOOK FOR SUSTAINABLE FIBER SUPPLY THROUGH FOREST MANAGEMENT AND OTHER DEVELOPMENTS IN THE U.S. PULP AND PAPER SECTOR

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ABSTRACT

Continued growth and sustainable development of fiber supply in the U.S. pulp and paper sector appears to be assured for decades to come because of ongoing improvements in forest management, along with projected shifts in product markets, international trade, and production technology. This is one conclusion that may be drawn from a recent U.S. Department of Agriculture, Forest Service, assessment of timber supply and demand, which included a detailed analysis of economic issues surrounding sustainable development of fiber supply and demand in the U.S. pulp and paper sector. The analysis encompassed economic projections of regional trends in pulpwood supply and demand, process substitution and capacity growth, trends in paper recycling, and potential development of agricultural fiber resources, as well as overall trends in production, consumption, and trade throughout the pulp and paper sector. This paper summarizes the analysis, key assumptions, and key findings related to projected fiber supply and demand in the U.S. pulp and paper sector.

INTRODUCTION

The U.S. pulp and paper industry is the world's largest and is still growing. This industry depends almost exclusively on wood for fibrous raw material input and accounts for roughly half of U.S. industrial wood fiber consumption in the form of roundwood, wood residues, and recycled fiber. Pulpwood demands in the expanding U.S. wood panel industry are also increasing. The Forest Service timber assessment is a detailed assessment of wood resource supply and demand in the United States. It includes analysis of the pulp and paper sector along with pulpwood use in wood panels as part of the broader timber supply and demand outlook (draft results of the 2000 Forest Service timber assessment are presented on the Internet at the following website: <http://www.fs.fed.us/pnw/sev/rpa/index.htm>). This paper explains highlights of the wood fiber outlook, focusing on the pulp and paper sector. One conclusion that may be drawn from the analysis is that continued growth and sustainable development of fiber supply in the U.S. pulp and paper sector appears to be assured for decades to come because of ongoing improvements in forest management, along with projected shifts in product markets, international trade, and production technology.

Two important assumptions in the analysis are about markets and government policy. The first assumption is that conventional market transactions will remain the primary means by which wood fiber resources are allocated in the U.S. forest product sector. The second assumption is that no fundamental changes will occur in existing government policies or programs. Although the assessment recognizes the influence on fiber markets of existing government policies, such as those related to forest resources, recycling, trade, or environmental protection, the base case outlook does not explore any new policies or programs (alternative scenarios are used to explore effects of different policy options).

The base analysis was derived using economic models, including the North American Pulp and Paper (NAPAP) Model. The NAPAP Model applies conventional regional market modeling techniques to compute annual market equilibria based on optimization of consumer and producer surplus in the pulp and paper sector (1,2,3). The model computes market equilibria for a 65-year period, starting with 1986 through the present and out to the year 2050.

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The overlap of projections with historical data allows for testing and calibration of model performance (average errors between historical data and projected equilibrium product demands, pulpwood supply, and recycling rates during the historical period are less than 1 percent per year). Changes in regional production capacities for pulp and paper manufacturing processes, including shifts between virgin fiber and recycling technologies, are simulated in the model as economic responses to projected market conditions, and in turn, projected market equilibria are influenced by changing technology. The American Forest & Paper Association pulp and paper data series (4) was generally the source of the historical production and consumption data used in this analysis and shown in this report. Projections were derived independently using the Forest Service NAPAP Model, which is maintained at the U.S. Department of Agriculture, Forest Service, Forest Products Laboratory, in Madison, Wisconsin.

PAPER AND PAPERBOARD DEMAND OUTLOOK

Markets were analyzed and projected for all paper and paperboard commodities, including paper products such as newsprint, printing and writing paper, tissue and sanitary paper, and packaging paper, as well as paperboard products such as containerboard, bleached board, and recycled paperboard. Domestic demand relationships vary among different commodities with respect to population and gross domestic product (GDP), with varying potential for product substitution by electronic media or plastics (5). Basic assumptions for the economic determinants of population and per capita GDP growth are shown in Figure 1.

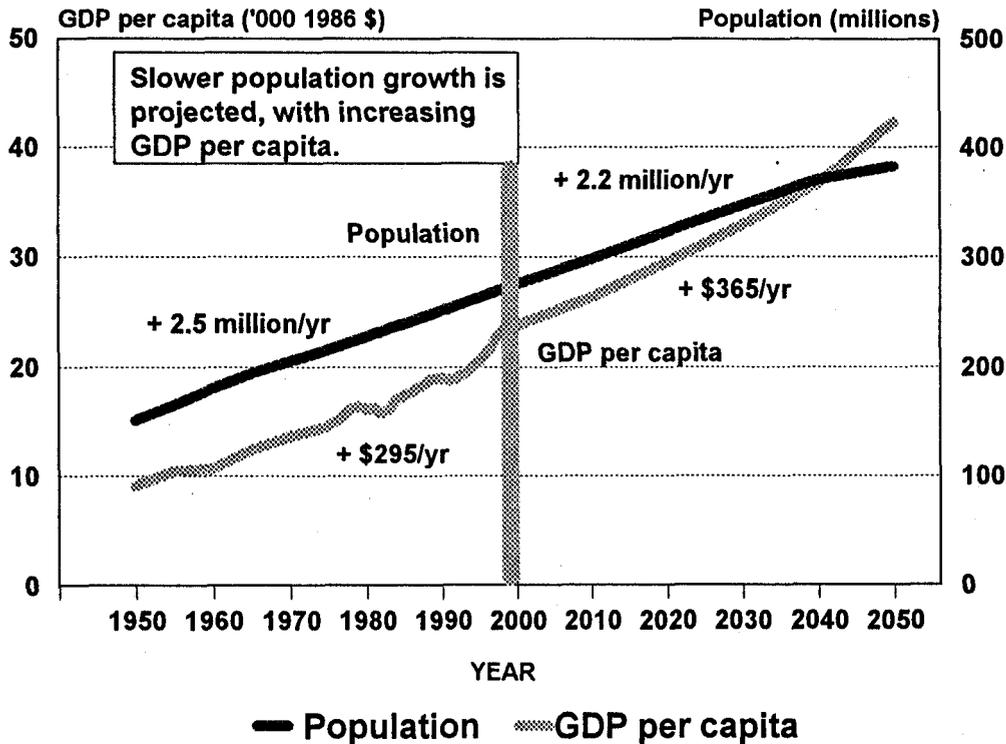


Figure 1. --Historical and projected trend assumptions for U.S. population and GDP per capita.

United States consumption of paper and paperboard is projected to increase but at a decelerating rate of growth, consistent with trends of recent decades and varying by product category. Consumption per unit of real GDP is projected to gradually decline, which is also consistent with historical trends since the 1950s. In recent decades, paperboard consumption has increased more rapidly than paper consumption, a trend that is projected to continue. Paperboard consumption rose from 110 kg per capita in 1980, at 5.4 metric tons per million dollars of real GDP (in

1992 dollars), to 152 kg per capita in 1998 at 5.5 metric tons per million dollars of real GDP (in 1992 dollars), a gain of 39 percent in per capita consumption but with little gain relative to real GDP. Paperboard consumption is projected to climb to 177 kg per capita by 2010 at 5.3 metric tons per million dollars of real GDP (in 1992 dollars) and just over 225 kg per capita by 2050 at 4.3 metric tons per million dollars of real GDP. Paper consumption (excluding paperboard and building paper) increased from 148 kg per capita in 1980, at 7.3 metric tons per million dollars of real GDP, to 185 kg per capita in 1998 at 6.6 metric tons per million dollars of real GDP, a gain of 25 percent in per capita consumption but with a decline in consumption relative to real GDP. Paper consumption is projected to reach 209 kg per capita by 2010 and is projected to remain around that level in per capita consumption over the remainder of the projection period, declining in consumption per million dollars of real GDP to 6.2 metric tons in 2010 and 3.9 metric tons in 2050.

Demand trends vary greatly among individual paper products. Per capita newsprint consumption, for example, peaked historically at 51 kg in 1987 and declined to 40 kg per capita in 1996. Newsprint consumption picked up recently with the strong economy (to around 43 kg), but consumption is projected to fall back to less than 40 kg after 2010 and recede to only 18 kg by 2050, reflecting gradual substitution by electronic media. Similarly, consumption of unbleached kraft paper is projected to gradually recede, reflecting continued substitution of paper by plastic bags, although it is not expected to decline as rapidly as in the past two decades. On the other hand, per capita consumption of printing and writing paper continues to increase, rising from 64 kg in 1980 to 105 kg in 1998, boosted by complementary demands for computer printers, office copiers, and print media. Printing and writing paper consumption is projected to increase but at a decelerating rate of growth, climbing to 125 kg per capita by 2010 and gradually approaching 135 kg by 2050, with gradually declining consumption per unit of GDP. Tissue, toweling, and sanitary paper products increased in per capita consumption from 17 kg in 1980 to 22 kg in 1998, and consumption is projected to increase throughout the projection period, reaching more than 40 kg per capita by 2050, with fairly constant consumption per unit of GDP (at 0.8 metric tons per million dollars of GDP in 1992 dollars).

Among paperboard commodities, the growth trends are more consistently upward. Per capita consumption of containerboard climbed from 71 kg in 1980 to 104 kg in 1998 (+46 percent), while per capita consumption of all other categories of paperboard (other recycled paperboard, bleached paperboard, and building paper) rose from 39 to 49 kg between 1980 and 1998 (+26 percent). With projected economic expansion in the base scenario, per capita containerboard consumption is projected to increase to 129 kg in 2010 and nearly 180 kg in 2050, although consumption per unit of GDP is projected to gradually recede during the projection period. Other paperboard consumption is projected to rise slowly and plateau at just over 50 kg per capita beyond 2010.

Figure 2 illustrates the historical and projected trend in total per capita U.S. paper and paperboard consumption (including building paper) and consumption per million dollars of real GDP. While per capita consumption of paper and paperboard has more than doubled since the early 1950s, consumption per million dollars of GDP has steadily declined. The historical trends indicate that consumption of paper and paperboard products has been increasing, but growth is more mature and less robust than growth in the overall economy. Per capita consumption is projected to increase from around 340 kg at present to around 440 kg in 2050. The pronounced historical pattern of decelerating growth in demand observed in the latter half of the 20th century is projected to continue, with average compound growth in per capita consumption declining to less than half a percent per year during the next 50 years. Consumption of paper and paperboard per million dollars of real GDP (in 1992 dollars) is projected to decline from around 12.0 metric tons in 1999 to around 8.3 metric tons in 2050. On a total tonnage basis, U.S. paper and paperboard consumption is projected to increase from 94 million metric tons in 1999 to 114 million metric tons in 2010 and 167 million metric tons in 2050. Primarily population, economic growth, and end use assumptions drive the projected demands. The base case analysis finds that projected shifts in fiber supply exert only modest influences on equilibrium demand levels, as indicated by a flat projected trajectory for product price cycles despite increased consumption. The projected annual rate of growth in tonnage during the next 50 years is 1.2 percent, less than half the average rate of the past 50 years.

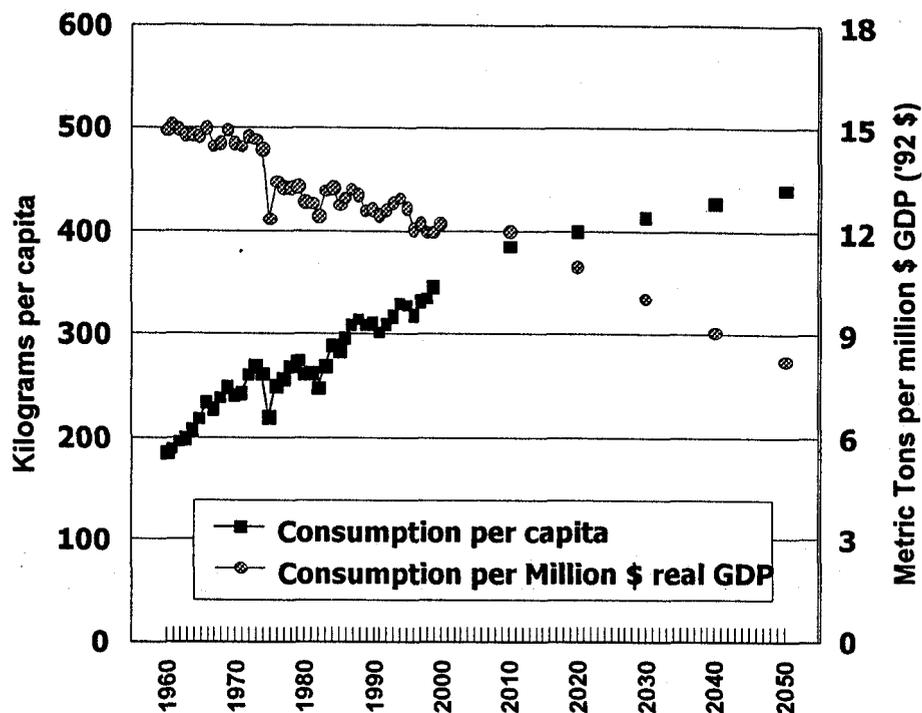


Figure 2. --Historical and projected trends in US. per capita paper and paperboard consumption and consumption per unit of real GDP (in 1992 dollars).

PRODUCTION AND TRADE OUTLOOK

The base case analysis projects increased U.S. imports of pulp, paper, and paperboard during the next decade, with slower than historical growth in exports, which is consistent with trends of recent years. The U.S. trade deficit in paper and paperboard commodities has widened in recent years under the influence of weak Asian export markets and more recently a strong U.S. dollar. Exports declined as a result of the Asian economic decline in 1997 and 1998 and also more recently because of the high dollar value. United States imports of paper and paperboard surged ahead in recent years, attracted by a strong dollar. In the long run however, with projected expansion in U.S. pulpwood supplies, annual paper and paperboard exports are projected to recover from 1999 levels (at less than 9 million metric tons) and climb gradually by nearly 5 million metric tons during the projection period. Imports of paper and paperboard are projected to continue increasing during the next decade (from around 15 million metric tons in 1999 to around 20 million metric tons by 2010), but imports are then projected to level off as U.S. softwood pulpwood supplies become more abundant and enhance U.S. competitiveness. Figure 3 illustrates historical and projected U.S. paper and paperboard production, consumption, and trade on a tonnage basis. Projected U.S. trade flows remain small in relation to domestic production and consumption. The analysis indicates that domestic production will account for the bulk of projected increases in domestic demands, as in past decades.

An important projected shift in U.S. fiber supply and demand is a projected increase in softwood pulpwood supply relative to hardwood pulpwood supply beyond 2010. Southern pine pulpwood supply is projected to become relatively more abundant after 2010 as a result of expanded pine plantations and intensified timber management. The area of pine plantations in the U.S. South is projected to continue increasing, from nearly 30 million acres (12 million hectares) to around 45 million acres (18 million hectares) in the decades ahead. Millions of acres of pine plantations have been planted in the South just since the early 1980s. On the other hand, increases in hardwood pulpwood harvest are likely to become constrained by available timber inventories in the long run. After continuing to increase during the next decade, hardwood pulpwood supply is projected to gradually level out or recede. Consequently, hardwood market pulp production is projected to gradually decline as imports of hardwood market pulp (from Latin America and elsewhere) increase to several times current levels (from less than 2 million metric tons to more than 5 million metric tons per year during the next 50 years). Conversely, production and exports of softwood market pulp are projected to increase in the period after 2010 as extensive pine plantations mature and provide more abundant softwood pulpwood supply.

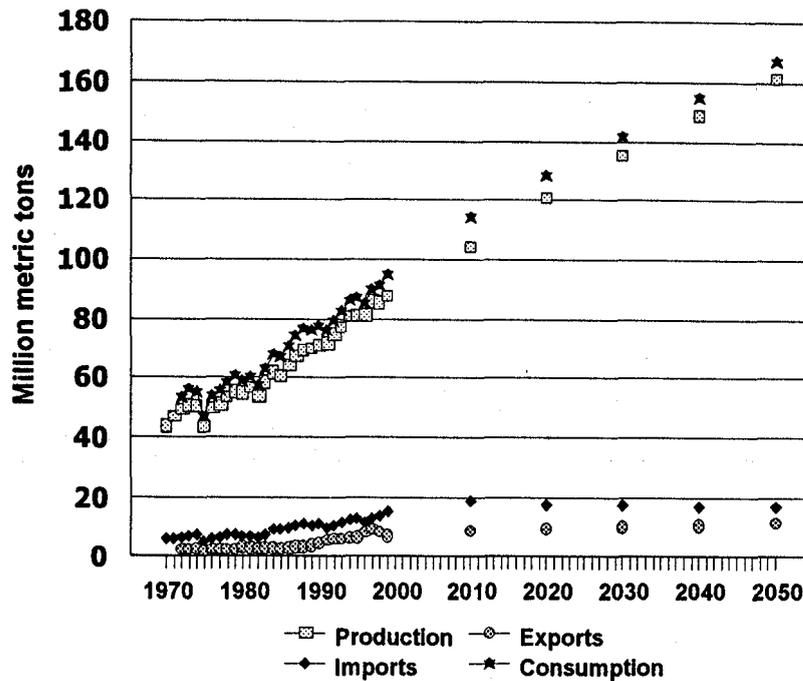


Figure 3. —Historical and projected trends in U.S. paper and paperboard production, consumption, and trade.

WOOD FIBER SUPPLY AND DEMAND OUTLOOK

The U.S. wood fiber supply and demand outlook is characterized by projected expansion in softwood roundwood pulpwood supply (particularly after 2010), decelerating growth in paper recovery for recycling, and limited growth in hardwood pulpwood and wood residue supplies. The bulk of the projected increase in pulpwood supply is accounted for by projected increases in pulpwood receipts at wood pulp mills. Pulpwood exports are projected to decline gradually in the long run with global expansion in pulpwood plantations. The analysis also included projected expansion of roundwood demand at wood panel mills [such as oriented strandboard (OSB)] in the total pulpwood supply and demand outlook. Pulpwood consumption for wood panel production is projected to more than double during the next 50 years, but roundwood demands at wood panel mills will still account for just a small fraction of total pulpwood receipts. Pulpwood receipts at wood panel mills are projected to increase from roughly 8 percent of total U.S. pulpwood supply at present to 13 percent by 2050, primarily as a result of expansion in OSB production capacity in the North and South. Expansion of softwood pulpwood harvest, primarily in the South, accounts for most of the projected increase in pulpwood supply in the long run. Table 1 shows historical and projected wood fiber supply (encompassing receipts at domestic pulp mills, roundwood receipts at wood panel mills, and exports).

Table 1. U.S. domestic supply of wood fiber raw materials, historical and projected in millions of metric tons (dry weight basis).

	1986	1996	2010	2020	2030	2040	2050
Softwood pulpwood	62.5	62.5	62.5	70.1	79.2	85.1	87.5
Timber harvest	35.6	41.8	47.1	55.7	63.1	67.1	67.8
Wood residues	26.9	20.7	15.5	14.5	16.1	18.0	19.7
Hardwood pulpwood	36.5	47.4	57.7	61.3	59.3	62.3	70.0
Timber harvest	29.0	40.2	49.3	52.6	50.3	51.9	51.4
Wood residues	7.5	7.1	8.1	8.7	8.9	9.0	9.1
Hardwood agrifiber	0.0	0.1	0.2	0.0	0.1	1.3	9.4
Total pulpwood	99.0	109.9	120.2	131.5	138.5	147.4	157.5
Recovered paper	20.3	38.6	57.3	67.3	77.8	86.9	95.3
Pulpwood and recovered paper	119.4	148.6	177.5	198.8	216.3	234.3	252.8

Figure 4 shows trends in recovery of paper for recycling in the United States. The tonnage of paper and paperboard recovered for recycling in the United States has doubled since the mid 1980s, but growth in recycling is slowing down. Recovery rose dramatically to 45 percent in recent years from only around 25 percent in the late 1970s. The recovery rate is projected to climb only gradually to 50 percent by 2010 and to around 55 percent toward the end of the projection period. In the absence of new policy incentives, the base analysis indicates that paper recovery for recycling will continue to follow a sigmoid (S-shaped) expansion curve, characteristic of market-driven technological developments, continuing to increase but in the phase of decelerating growth.

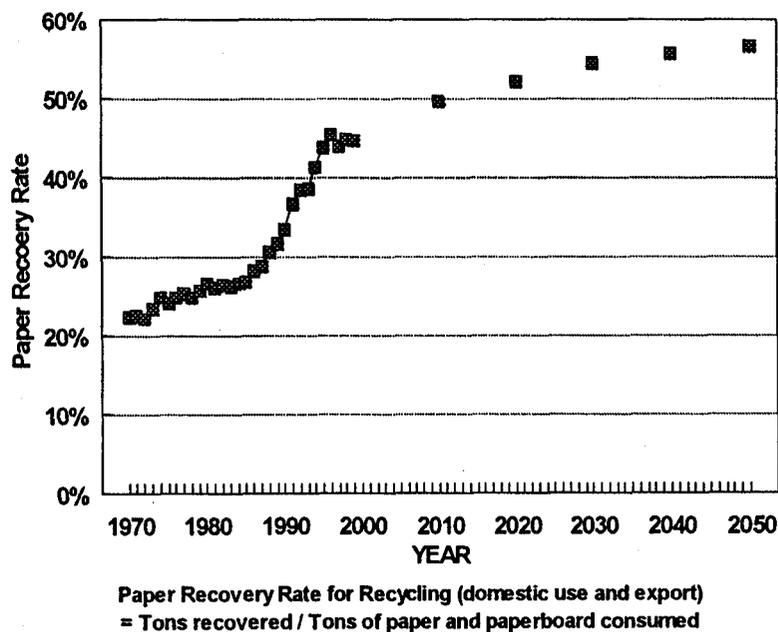


Figure 4. --Historical and projected trends in U.S. wastepaper recovery rate.

Supply of mill residues for pulpwood has declined since the 1980s, with reduced softwood lumber production in the U.S. West and increased production of wood products that generate fewer residues for pulping (such as OSB for example). The Forest Service timber assessment includes a detailed analysis of lumber, plywood, and wood panel production, and the analysis indicates that future growth in supplies of wood residues will remain limited. Hardwood pulpwood harvest will increase during the next decade, but after 2010 hardwood roundwood supplies will become limited by available timber inventories. After 2010, softwood pulpwood harvest will increase, facilitated by expanded pine plantations in the South, intensified forest management, and increased growth.

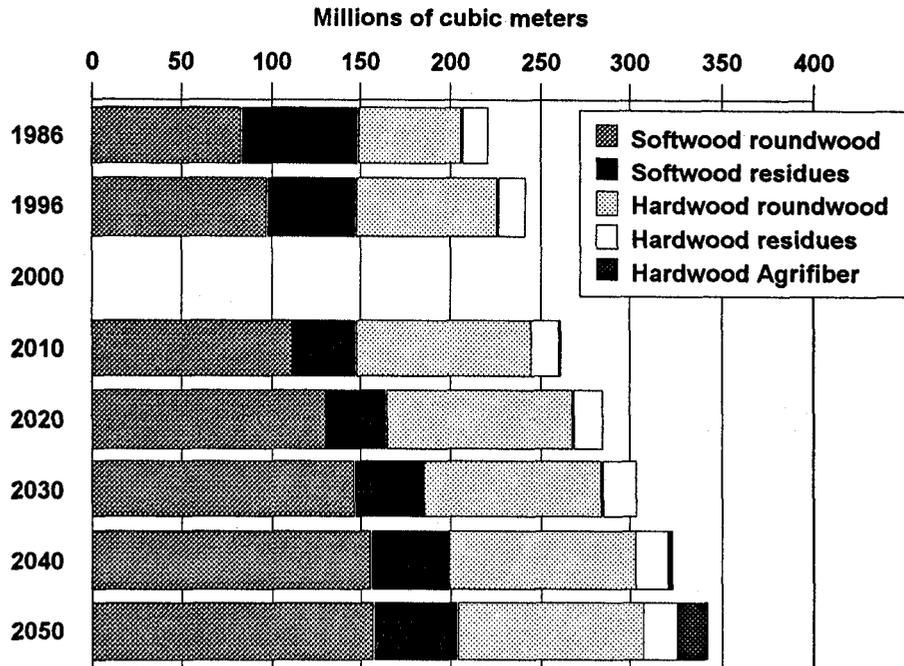
Projected gains in paper recycling, other technological shifts, and reduced pulpwood exports will offset increased pulpwood consumption in wood panels, reducing the intensity of total pulpwood consumption relative to paper and paperboard production. Even though wood panel production will contribute to increased demand for pulpwood in the United States, the ratio of total pulpwood supply to paper and paperboard production will continue to decrease, largely because of gains in recycling and declining pulpwood exports. The total supply of pulpwood in the United States (roundwood and residue receipts at wood pulp mills, pulpwood exports, and roundwood pulpwood for wood panels) in dry weight per ton of paper and paperboard produced in the United States has already receded from 1.54 tons in 1986 to 1.34 tons in 1996. The base analysis projects that this ratio will continue to recede, reaching 1.15 tons in 2010, 1.02 in 2030, and 0.97 in 2050, despite increased consumption of pulpwood in wood panel production.

Figure 5 shows recent historical and projected trends for pulpwood, balancing U.S. supply quantities by source and by destination. Resource categories include hardwood and softwood (roundwood forest harvest and wood residues) and hardwood agrifiber. Destinations include pulpwood receipts at domestic wood pulp mills (by far the largest category), roundwood pulpwood receipts at wood panel mills (such as OSB mills), and pulpwood exports. Receipts at wood panel mills are projected to more than double and account for about 30 percent of projected growth in pulpwood supply and demand, yet panel mills still account for just 9 percent of total pulpwood supply by 2010 and just 13 percent by the end of the projection period. United States pulpwood exports are projected to decline with worldwide expansion of global fiber supply from wood fiber plantations.

Hardwood agrifiber supply reflects ongoing development of short rotation woody crops for fiber products, for example, growing trees such as hybrid poplars on agricultural lands. Such plantations have been established commercially in the United States on a limited scale. The base case analysis evaluates the market potential of hardwood agrifiber using current cost and productivity assumptions. Although agrifiber is projected to provide an increasing share of pulpwood supply, the total supply is projected to remain relatively small until the end of the projection period (reaching 5 percent of total U.S. pulpwood supply by 2050). In this analysis, expansion in agrifiber supply is offset for several decades by projected expansion in fiber supply from southern pine plantations. The market outlook for agrifiber could improve if projected increases in harvest of pulpwood on forestland are more limited or if significant yield gains or material quality improvements are achieved through genetic engineering of agrifiber crops.

Pulpwood receipts at Canadian wood pulp mills are assumed to remain at levels characteristic of the past decade (100 to 110 million m³ per year). Wood residues are the dominant element of pulpwood receipts at pulp mills in Canada (more than 60 percent), but expansion in residue supply is limited by projected improvements in Canadian lumber recovery efficiency. Thus, although Canada is projected to remain a significant element within the North American pulp and paper sector and the largest source of U.S. imports, Canadian producers are not projected to gain dominant U.S. market shares in any major commodity area. However, with declining U.S. consumption of newsprint in the long run, Canadian producers are projected to increase production and export of printing and writing paper products and paperboard.

U.S. Pulpwood Supply by Source (including roundwood harvest in forests, wood residues and agrifiber)



U.S. Pulpwood Supply by Destination (including pulp mill receipts, exports, and roundwood for panel mills)

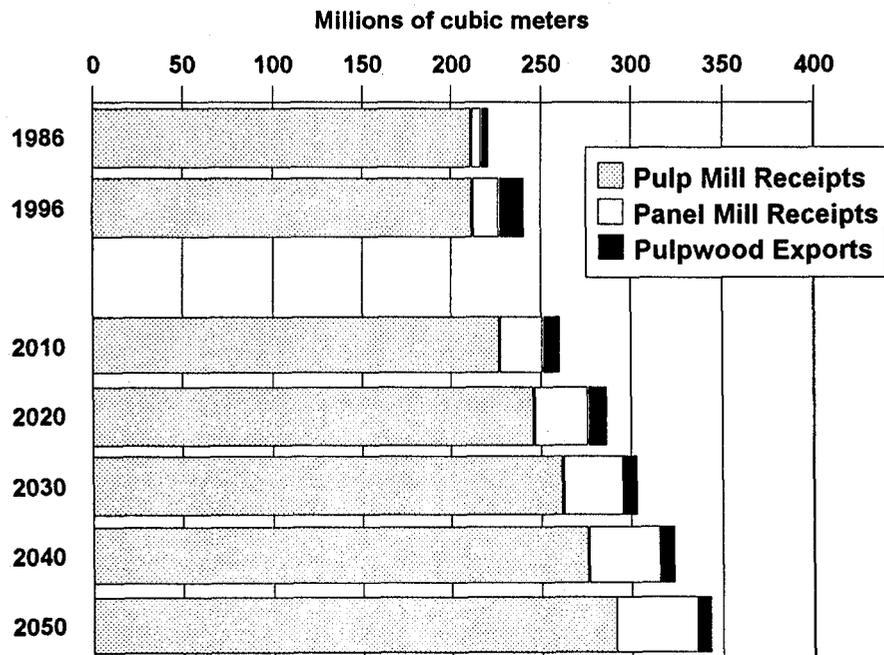


Figure 5. -U.S. pulpwood supply by source and destination, historical and projected.

REGIONAL PULPWOOD SUPPLY AND DEMAND OUTLOOK

Projected expansion in U.S. pulpwood supply and demand is concentrated in the eastern United States and primarily in the South. Figure 6 shows projected equilibrium pulpwood supply quantities by region, including pulpwood roundwood, wood residues, and agrifiber supply (which includes receipts at wood pulp mills, roundwood pulpwood receipts at wood panel-OSB mills, and pulpwood exports).

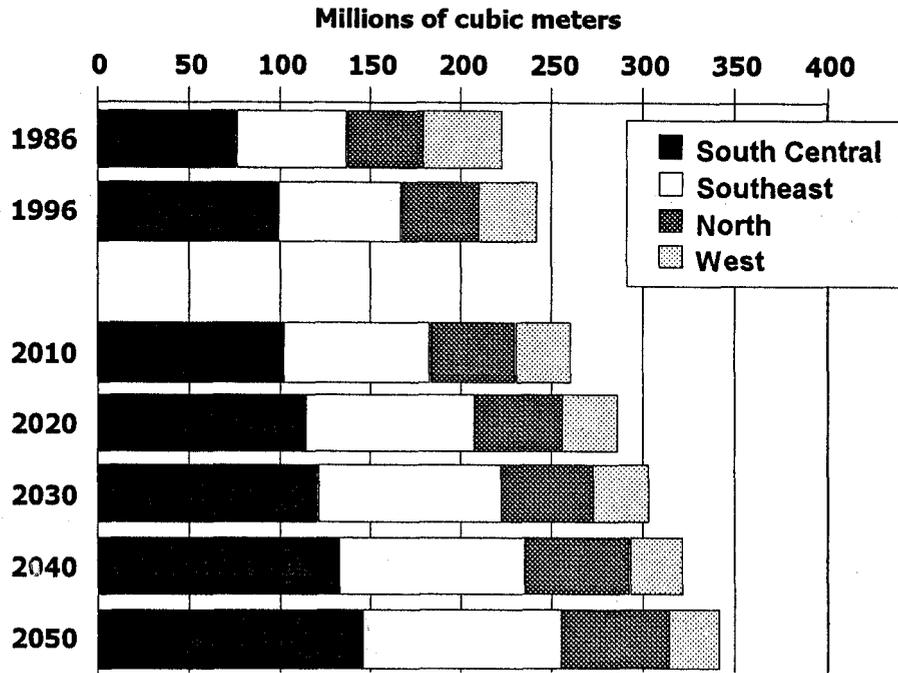


Figure 6. --Projected annual U.S. pulpwood supply by region, 2010–2050.

Expansion of roundwood pulpwood supply in the South is facilitated in the long run by intensified timber management and a 53 percent projected increase in the area of southern pine plantations (mostly loblolly pine). Softwood roundwood remains the largest element of U.S. pulpwood supply throughout the projection period. During the next decade, expansion in softwood pulpwood harvest will be limited by the age class structure of the forest, and real stumpage prices for softwood pulpwood are projected to be about one-third higher than recent levels by around 2010. Beyond 2010 however, with higher yields and increased pulpwood supply from pine plantations, softwood pulpwood stumpage prices in the South are projected to drop back down and stabilize at near to current real price levels throughout the remainder of the projection period. On the other hand, hardwood pulpwood harvest increases in the East during the next decade but timber inventory constraints emerge for hardwood in the South, ultimately limiting further expansion in southern hardwood pulpwood harvest beyond 2010.

Hardwood pulpwood supply is projected to gradually level out after 2010 as a result of inventory-related constraints on hardwood timber harvest, particularly in the South. Harvest constraints are imposed in this analysis to ensure that projected timber harvest never exhausts the available timber inventory volume on forest industry and nonindustrial forestlands throughout the projection period. Available volume includes timber that has reached merchantable age classes and is not withheld from harvest. Estimates of future timber volumes withheld from harvest in the South were deduced from landowner intentions derived from surveys of forest industry landowners and state foresters. The surveys indicated clearly that not all timber volume on industrial and private timberland is expected to be available

for harvest within the context of conventional and anticipated forest management practices, such as for some hardwood timber volumes in riparian or bottomland areas or on steep slopes.

As projected hardwood pulpwood supply becomes more constrained by available timber inventory beyond 2010, hardwood pulpwood prices are projected to increase, eventually stimulating commercial development of hardwood agrifiber (tree crops such as hybrid poplars grown on agricultural land). Hardwood agrifiber does not however appear to become economically competitive on a large scale until around 2030, when real stumpage prices for hardwood pulpwood are projected to reach about double current levels. Hardwood agrifiber supply is then projected to expand in the last two decades of the projection period, mainly in the South, eventually supplying about 5 percent of total U.S. pulpwood needs by the end of the projection period and helping reduce hardwood pulpwood stumpage prices in the last two decades of the projection period.

Hardwood as a share of total U.S. pulpwood supply on a volume basis (including roundwood for wood panels) was about 33 percent in 1986 and 39 percent in 1996. Hardwood is projected to increase to 43 percent of total U.S. supply in 2010 but then fall back to just less than 40 percent toward the end of the projection period. Softwood roundwood (excluding residues) was about 38 percent of total U.S. pulpwood supply in 1986 and 41 percent in 1996. Softwood roundwood is projected to rise slowly in the next decade to 42 percent of total pulpwood supply and then increase more rapidly to 49 percent by 2030 and 46 percent by 2050.

EMERGING REALITIES AND OPPORTUNITIES

This analysis concludes that domestic wood fiber supplies will be adequate to sustain significant projected expansion in domestic production and consumption of pulp, paper, and paperboard products, provided that projected development of forest management and plantations will continue in the long run, particularly on private forestland in the South. Paper and paperboard consumption are projected to follow the historical pattern of decelerating growth. Pulpwood supply projections are similar to those of the 1993 Renewable Resources Planning Act (RPA) timber assessment base scenario (6,7) and much lower than projections in earlier Forest Service assessments of the 1970s and 1980s (8,9,10) largely because of increased paper recycling since the mid 1980s (1). However, pulpwood harvest is still projected to increase, primarily in the eastern United States, because projected paper recovery for recycling grows more slowly in future decades, demands for roundwood pulpwood are increasing at OSB mills, and wood residue supplies are declining in proportion to fiber demands. The analysis highlights some emerging realities and opportunities.

Although hardwood pulpwood harvest will probably increase during the next decade, further growth in southern hardwood pulpwood supply appears somewhat limited by available timber inventories beyond 2010. This presents opportunities for expansion in southern softwood pulpwood supply as well as hardwood agrifiber supply. Southern softwood pulpwood harvest is projected to expand significantly beyond 2010, partly displacing growth in hardwood pulpwood supply. Nevertheless, hardwood pulpwood stumpage prices are still projected to increase, eventually leading to commercial feasibility of expanded hardwood agrifiber supply by 2030. The South is projected to remain the dominant U.S. region in production of wood fiber products and in total pulpwood supply and demand.

An emerging reality is that the U.S. West will continue to recede in importance in terms of pulpwood supply and demand. This trend may have negative implications for efficient management of forest health, regional fire hazards, and watershed quality. The West is experiencing a large accumulation of fire-prone small-diameter timber, particularly on public forestlands, with accumulating wood volumes dwarfing regional capacities to harvest and use such timber. Wood pulp mills and wood panel mills (such as OSB mills) are by far the largest potential consumers of small-diameter timber in the United States, but pulp and OSB mill capacities have receded in the West in recent years and they are not projected to increase significantly in the future according to this analysis. Pulp mills and OSB mills are at the highest end of the capital investment spectrum in forest products, costing up to hundreds of millions of dollars apiece and making investors in such mills prudently wary of financial risks. Financial risks to investment in the West include uncertainty about future timber supplies from public lands. Small-log sawmills and other higher value processing options may exist for small-diameter timber in the West, but large-scale expansion in thinning and processing would in all likelihood generate large quantities of residues and roundwood suitable primarily for pulpwood. With relatively abundant supplies of pulpwood in the East and most of the projected growth in pulpwood supply concentrated in the South, efforts to significantly expand commercial thinning of small-diameter timber to

reduce fire hazards on public lands in the West may lead to challenging market conditions (for example, excess regional supply of small timber and depressed timber sales). In the absence of stable and expansive fiber product investment opportunities in the West, little or no wood pulp or OSB capacity expansion will occur and the region will probably continue to face the dilemma of forest health and fire hazards with limited opportunities for self-funded strategic responses (large-scale removal of small-diameter timber through commercial sale of pulpwood).

In summary, continued growth and sustainable development of fiber supply in the U.S. pulp and paper sector appears to be assured for decades to come because of ongoing improvements in forest management, along with projected shifts in product markets, international trade, and production technology. Among U.S. regions, the South will continue to experience more growth in fiber supply and pulp, paper, and paperboard production than any other region. The U.S. North will remain important but will experience slower growth, and the West will gradually recede in importance in terms of pulpwood supply and demand (although capacity based on recycled fiber will continue to grow in all regions in the long run). Although wood fiber markets will undoubtedly continue to experience cycles of adjustment and change, including development of new fiber resources such as agricultural short rotation woody crops, this analysis concludes that wood fiber supplies will be adequate to sustain foreseeable future economic development and growth in the U.S. pulp and paper sector.

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