

The U.S. forest sector in 2030: Markets and competitors

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Abstract

The Global Forest Products Model was used to project international forest sector developments, conditional on the latest RPA Timber Assessment of future domestic changes in the United States. While the United States, Japan, and Europe were predicted to remain major importers of forest products out to 2030, the rapid economic growth of China would make it the world's largest market for raw wood, and intermediate and final forest products. Mexico and the Republic of Korea would also become important markets for solid wood and fiber products. The U.S. share of global exports of industrial roundwood and other paper and paperboard were predicted to increase out to 2030. In competition with the United States, it was predicted that Finland, Austria, Latvia, Chile, and New Zealand would increase their share of global sawnwood exports, and Austria and the Republic of Korea would emerge as exporters of printing and writing paper.

The last 30 years have seen considerable change in the global forest sector. The development of plantations has caused wood supply and forest industries to move from regions such as the United States Pacific Northwest, to Chile, Brazil, and the southern United States (FAO 1997a). Technological advances have improved wood utilization and created new products (FAO 1998). For example, oriented strandboard has replaced plywood in construction (FAO 1997a) and electronic media have begun to replace newsprint (Zhang and Buongiorno 1997).

Rapid economic growth in Southeast Asia, particularly in Japan and the Republic of Korea, has increased their forest products consumption (FAO 1999).

Increased globalization has stimulated international trade. The global trade of printing and writing paper has reached 39 percent of production, up from 13 percent in 1970 (FAO 2001). As access to markets has improved, the location of production has moved (FAO 1997a).

All these changes will continue to influence the global forest sector for many years to come, affecting the location of forest industries and forest products demand, the mix of forest products produced and consumed, their trade, and their prices.

A thorough analysis of the future of the U.S. forest sector is the Resource Planning Act (RPA) Timber Assessment (Haynes 2003). However, its focus is on the United States and Canada. Our purpose here is to complement the RPA Timber Assessment by describing in more detail its global context. The results present a possible future for overseas markets for, and competitors to, the United States to 2030, consistent with the RPA view of domestic developments. The Global Forest Products Model (GFPM) (Buongiorno et al. 2003) was used to make these predictions, taking into account the numerous and complex links between countries and industries. The GFPM assumptions, for example

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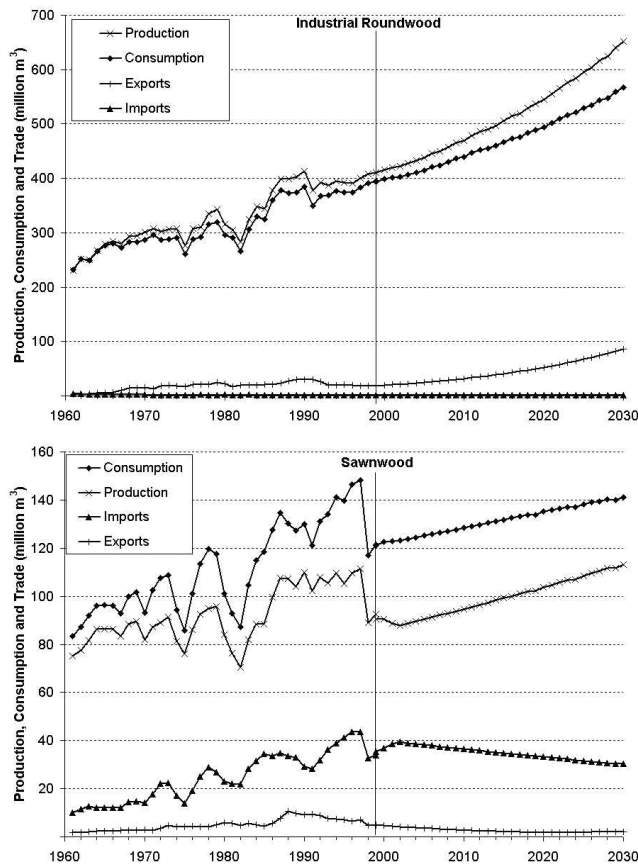


Figure 1. — U.S. historical and projected consumption, production, and trade of industrial roundwood and sawnwood. Source: Historical data, 1961 to 1999, FAO (2001); projections, 1999 to 2030, the Global Forest Products Model.

regarding the determinants of domestic demand, were adjusted to make the GFPM projections of U.S. production and consumption comparable to the RPA's (Adams et al. 2003a).

Methods

The GFPM gives projections of production, consumption, imports, exports, and prices, for 180 countries and 14 forest products groups (Buongiorno et al. 2003).¹ The GFPM has been applied in the Food and Agriculture Organization global outlook (FAO 1997b), the analysis of the effects of accelerated tariff liberalization (Zhu et al. 2001), the study of the effects of trade agreements on the New Zealand forest sector (Turner et al. 2001), and to predict the global impact of waste paper recycling in the United States (Zhu and Buongiorno 2002). A validation of the GFPM (Buongiorno et al. 2003, p. 75) for 1980 to 1994 showed that it predicts satisfactorily long run ag-

gregate trends, if not all the details of the world forest sector.

The principle of the GFPM is that world markets balance demand and supply in the short run. Long-run changes are governed by market forces, and by policy. For example, end product demand depends on economic growth and prices, while wood supply and waste paper recovery depend on prices and policies. GFPM projections, therefore, reflect particular assumptions regarding the working of markets, subject to existing policies.

The changes in U.S. and Canadian gross domestic product that drive future demand in the GFPM were similar to those in the RPA (Adams et al. 2003b). The elasticities of end-product demand and of import demand were adapted from Buongiorno et al. (2003, Chapter 4) and Turner and Buongiorno (2004). The substitution of oriented strandboard in place of other wood-based panels in the United States has caused particleboard consumption and imports to grow rapidly from the early 1990s, while the

consumption of fiberboard and plywood has changed little since the 1970s (Fig. 2). Similarly, the substitution of electronic media for newsprint has resulted in the stagnation of U.S. newsprint consumption and imports since the early 1990s (Fig. 4), in spite of strong economic growth. These changes were captured by adjusting the income elasticities of domestic and import demand for fiberboard, plywood, and newsprint in the United States until the GFPM projections resembled those in the RPA.

In the GFPM, the demand for raw wood and intermediate products derives from the demand for final products through input-output coefficients and corresponding manufacturing costs that describe technologies in each country, subject to available capacity, which changes endogenously (Buongiorno et al. 2003). The supply of wood and non-wood fibers in each country is represented by supply equations. The shifts in wood supply assumed in the GFPM were consistent with the changes in production predicted in the RPA between 2000 and 2030 (0.5% to 0.8% per year in the United States, and 0.0% per year in Canada). The U.S. maximum waste paper recovery assumed in the GFPM rose from 43 percent in 2000 to 52 percent in 2030.

In the GFPM, each country exports to, and imports from, the world market. The projected prices clear markets so that demand is equal to supply for every product and country. Barriers to trade are described by trade inertia and ad-valorem tariffs. For solid wood products, it was assumed that tariffs had been reduced to their Uruguay Round levels (Barbier 1996) by 1999. Tariffs on pulp and paper were reduced by 1/5 each year from 2000 onwards, leading to total tariff elimination by 2004.

Results and discussion

The U.S. forest sector to 2030

According to the GFPM projections, U.S. consumption would increase most rapidly for particleboard and paper and paperboard (except newsprint), it would stagnate or decline for plywood and fiberboard, and increase only slightly for sawnwood (Figs. 1 to 4). The difference between production and consumption depends on the competitive advantage of the United States compared to other countries. For commodities in which the United States has a relatively high pro-

¹ The specific data and assumptions for this study are available from the authors.

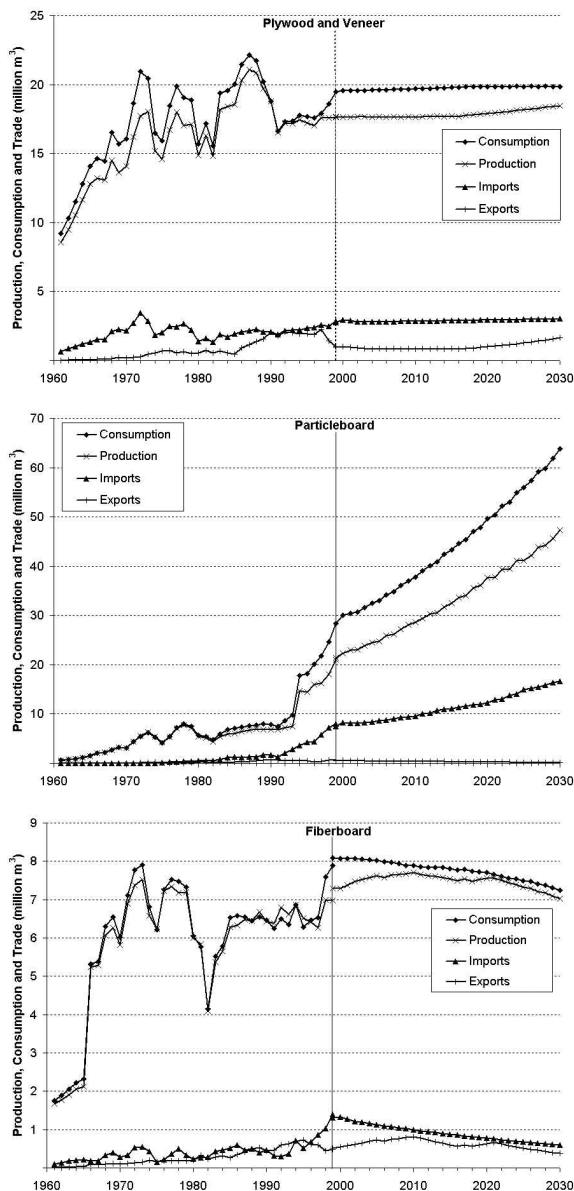


Figure 2. — U.S. historical and projected consumption, production, and trade of wood-based panels. Source: Historical data, 1961-1999, FAO (2001); projections, 1999 to 2030, the Global Forest Products Model.

duction cost, such as particleboard and printing and writing paper, the share of imports in total consumption increases (Figs. 2 and 4). Sawwood imports are projected to decrease slightly (Fig. 1), due to the assumed continuing growth in the U.S. industrial roundwood harvest, accompanied by stagnation in Canada. Meanwhile, the United States would increase its exports of industrial roundwood, waste paper, and other paper and paperboard (Figs. 1, 3, and 4).

Predicted growth in U.S. other paper and paperboard production and exports differs from the RPA, which predicts slower growth. In the RPA, China's low

wage rate is assumed to give it a competitive advantage in paper manufacture over the United States. Manufacturing costs in the GFPM, calculated from production, consumption, and price data (Buongiorno et al. 2003, p. 73), give China less of a competitive advantage. The RPA also emphasized the 1999 to present decline in U.S. paper production, while the GFPM did not, reflecting its focus on long-term trends (Buongiorno et al. 2003, p. 87).

The RPA projections show little or no growth in the real U.S. prices of plywood, oriented strandboard, and paper/paperboard. Similarly, the GFPM pre-

dicted little change in the world real price of plywood and particleboard. However, the GFPM projected growth in the prices of paper and paperboard after 2010 (Fig. 5) differs from the RPA projections, which show very little change.

Projected changes in foreign markets and U.S. competitors

Importers. — The major forest products importers (Table 1) accounted for 71 percent (for other paper and paperboard) to 83 percent (for industrial roundwood) of global imports of forest products in 1999. By 2030, the same countries accounted for a similar share of imports.

At present, Japan is an important market for industrial roundwood (30% of world imports), plywood (23%), sawwood (9%), and wood pulp (8%). The GFPM projections suggest that Japan will increase slightly its imports of industrial roundwood and wood pulp out to 2030, but it will no longer be the largest market for these products, as its share of global imports will decline to 10, 7, and 2 percent, respectively. The value of Japan's imports of sawwood and plywood would decline to the point that Japan would take only 4 and 8 percent of global imports. The decline in Japan's share is due to its lower projected economic growth, compared with other economies such as China and the Republic of Korea.

In 1999, the United States was a major importer of most "final" forest products: sawnwood, wood-based panels and paper products (accounting for over 30% of world imports of sawnwood, particleboard, and newsprint) and wood pulps (taking in 17% of world imports). Like Japan, by 2030 the United States will still be an important destination for forest products. Its value of all forest products imports is projected to increase, except for fiberboard, and other paper and paperboard. However, the U.S. share of global imports for all products, particularly plywood and fiberboard, will decline. In 2030, the United States will still account for a large share of global imports of sawnwood (19% of world imports), particleboard (23%), and newsprint (26%).

China's (including Taiwan) imports are currently smaller than those of Japan or the United States, except for fiberboard (16% of world imports), waste pa-

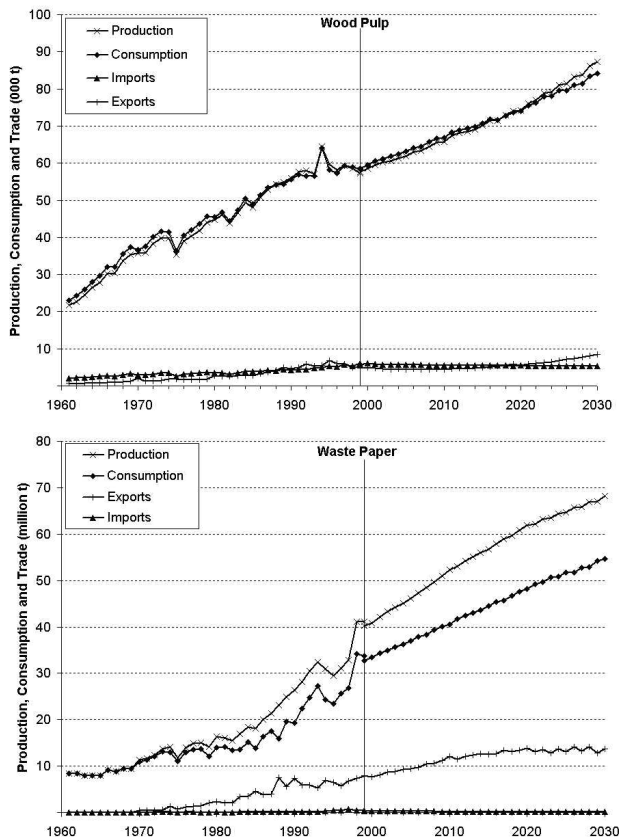


Figure 3. — U.S. historical and projected consumption, production, and trade of wood pulp and waste paper. Source: Historical data, 1961 to 1999, FAO (2001); projections, 1999 to 2030, the Global Forest Products Model.

per (15% of world imports), and other paper and paperboard (19% of world imports). Projected strong economic growth in China, greater than 6 percent per year, will make it one of the largest markets by 2030. The size of the Chinese economy will surpass that of Germany by 2030, though it will still be considerably smaller than that of Japan or the United States. The GFPM projects large growth in China's imports of all products. China would become the world's largest importer of industrial roundwood (31% of world imports), sawnwood (22%), plywood (23%), wood pulp (40%), waste paper (37%), and printing and writing paper (26%). China's increase in wood pulp and waste paper imports is driven by increased paper production to meet its rapidly growing demand. By 2030, China would account for 8 percent of the global consumption of newsprint (behind the United States and Japan), 32 percent of printing and writing paper, and 38 percent of other

paper and paperboard (surpassing the United States and Japan in both cases).

The other countries in **Table 1** make up a smaller share of global imports. The Scandinavian countries are an important market for industrial roundwood, but their share of world imports will decrease by 2030 (from 15% to 8%), although the value of their imports will increase. The major European countries² are an important market for all forest products, particularly sawnwood, particleboard, fiberboard, wood pulp, and paper products, for which they account for over 25 percent of world imports. By 2030, the value of European imports of all forest products, except fiberboard, will increase; however, their share of global imports will decline. Europe will remain an important importer of paper products out to 2030, accounting for 22, 30, and 26 percent of global imports of newsprint, printing/writing paper, and other paper/paperboard, respectively.

Some currently small importers are projected to become growing markets for forest products. For example, Mexico is predicted to become a growing

market for sawnwood, plywood, fiberboard, and paper products, increasing its value (from \$1.7 billion in 1999 to \$9.4 billion in 2030) and its share of imports. The Republic of Korea's imports of industrial roundwood, plywood, wood pulp, and waste paper increases from \$2.2 billion in 1999 to \$16.1 billion in 2030. The Korean increasing imports of wood pulp and waste paper are to serve its expanding paper industry, whose production share increases from 2.9 to 4.0 percent, making it the fifth largest producer in 2030. Its share of global exports of paper and paperboard increases from 3.1 to 5.2 percent, making it the sixth largest exporter in 2030.

Surprisingly, Canada grows from seventh largest importer of industrial roundwood in 1999 to the second largest in 2030 (**Table 1**), its share of global imports growing from 5 to 14 percent. This reflects the RPA Assessment assumption that Canadian industrial roundwood production will not grow from 2000 to 2030, due to environmental policy. At the same time, Canada is a relatively low-cost manufacturer of forest products, therefore industrial roundwood would be imported to meet the shortfall in domestic supply

Exporters. — The main forest products exporters (**Table 2**) accounted for 71 percent (of fiberboard and industrial roundwood) to 92 percent (of waste paper) of world exports in 1999. These same countries are projected to account for a similar share of exports by 2030, except for an increase in their share of fiberboard and industrial roundwood.

Canada is at present one of the largest exporters, accounting for 36 percent of world exports of sawnwood, 20 percent of wood-based panels, 31 percent of wood pulp, and 16 percent of paper and paperboard. Given Canada's intense trade with the United States, these are also commodities for which the United States is a major importer. Canada is predicted to maintain or increase its share of global exports of newsprint (44% of world exports in 1999 and 2030), printing and writing paper (10% of world exports in 1999 growing to 17% in 2030), and other paper and paperboard (8% of world exports in 1999 growing to 9% in 2030). As the value of U.S. imports of paper and paperboard are projected to increase little or decline (**Table 1**), Canada would expand exports to other countries.

² Austria, Germany, United Kingdom, France, Netherlands, Italy, Spain, and Belgium.

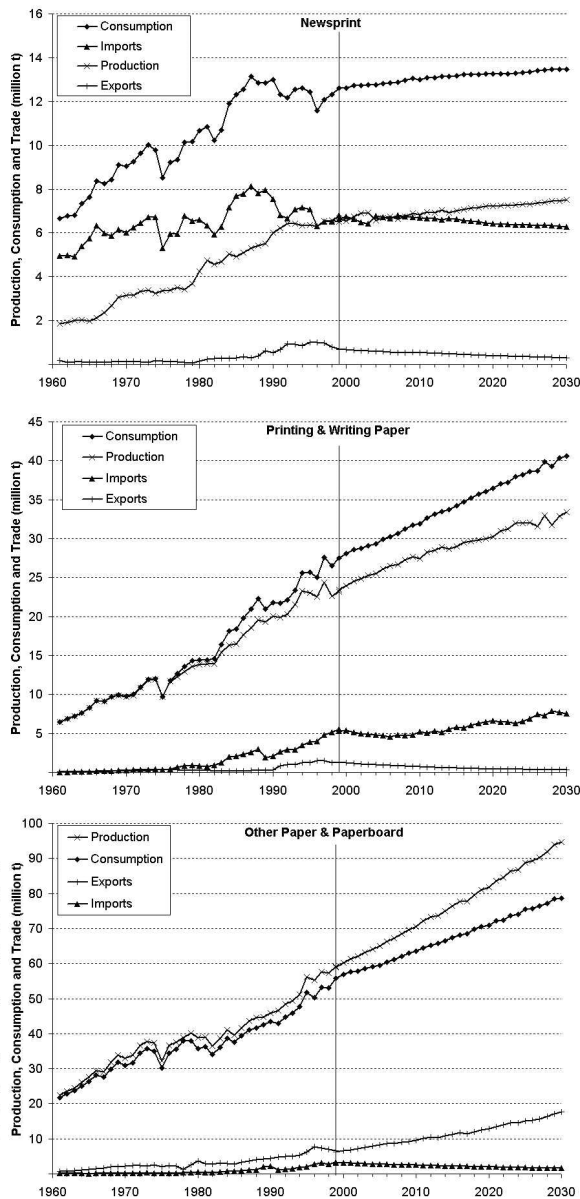


Figure 4. — U.S. historical and projected consumption, production, and trade of paper and paperboard, Source: Historical data, 1961 to 1999, FAO (2001); projections, 1999 to 2030, the Global Forest Products Model.

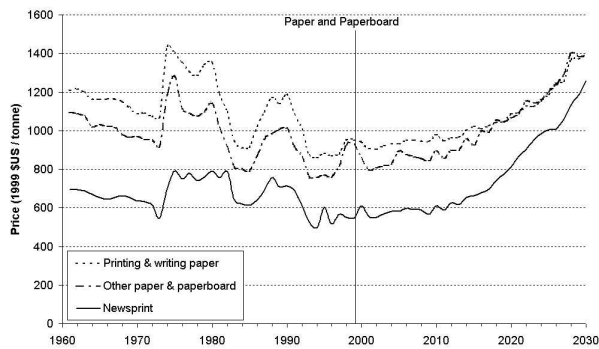


Figure 5. — Historical and projected world prices of paper and paperboard. Source: Historical data, 1961 to 1999, FAO (2001); projections, 1999 to 2030, the Global Forest Products Model.

The United States is currently a major exporter of industrial roundwood (14% of world exports), wood pulp (14%), recovered paper (40%), and other paper and paperboard (16%). The shares of other forest products exports are smaller, but still significant.

By 2030, the United States is projected to account for a larger share of global exports of industrial roundwood (22%), and other paper and paperboard (25%). Meanwhile, the United States will experience a decline in its share and value of exports of sawnwood, particleboard, fiberboard, newsprint, and printing/writing paper (from 4% to less than 1%). Projected declines in U.S. exports of sawnwood and printing/writing paper are particularly large. The United States loses its share of global exports of sawnwood to Finland, Austria, Latvia, Chile, and New Zealand, which together increase their share from 19 percent in 1999 to 43 percent in 2030. The United States loses its share of printing and writing paper exports to Finland, Canada, Austria, and the Republic of Korea. Finland and Canada, already large exporters of printing and writing paper, increase their export share to 23 and 17 percent, respectively. Austria and the Republic of Korea are emerging exporters of printing and writing paper, increasing their share of exports to 10 and 6 percent, respectively.

The Scandinavian countries are major sources of paper and paperboard, exporting \$16.9 billion worth (24% of world exports). They are projected to increase their exports to \$67.1 billion in 2030, making up 31 percent of the world exports.

Europe also accounts for a large share of world exports: 30 percent for particleboard, 32 percent for fiberboard, 33 percent for printing and writing paper, and 20 percent for other paper and paperboard. While the value of these exports will increase out to 2030, the shares of Europe will decrease to 18 percent for printing/writing paper and to 6 percent for other paper and paperboard. At the same time European exports of particleboard and fiberboard will increase considerably in value and share. By 2030, Europe will account for 47 percent of particleboard exports and 57 percent of fiberboard exports.

In 1999, the Russian Federation was the largest exporter of industrial roundwood, accounting for 22 percent of ex-

Table 1. — Past and predicted import value and rank of main importers.

	1999		2030			1999		2030	
	Imports (10 ⁶ \$US)	Rank	Imports (10 ⁶ \$US)	Rank		Imports (10 ⁶ \$US)	Rank	Imports (10 ⁶ \$US)	Rank
Industrial roundwood					Sawnwood				
Japan	3,464	1	5,407	3	United States	8,836	1	9,124	2
China	1,049	2	17,443	1	Japan	2,468	2	2,024	4
Sweden	881	3	1,501	10	Italy	1,853	3	1,824	5
Finland	835	4	2,950	5	United Kingdom	1,743	4	2,163	3
Austria	663	5	4,585	4	Germany	1,326	5	1,231	8
Korea, REP	649	6	1,806	9	Denmark	1,184	6	1,628	7
Canada	612	7	7,662	2	Netherlands	883	7	943	10
Italy	512	8	2,248	7	China	822	8	10,612	1
Belgium	322	9	2,296	6	France	749	9	710	12
Spain	282	10	506	11	Spain	710	10	824	11
India	166	11	2,077	8	Egypt	648	11	1,802	6
					Mexico	258	12	1,183	9
Plywood and veneer					Particleboard				
Japan	2,227	1	1,481	3	United States	2,592	1	6,835	1
China	1,287	2	4,400	1	Germany	493	2	822	8
United States	1,265	3	1,256	4	United Kingdom	391	3	1,456	6
Germany	542	4	558	8	Spain	350	4	1,183	7
United Kingdom	461	5	689	6	Netherlands	271	5	751	9
Korea, REP	380	6	2,820	2	France	212	6	401	13
Canada	281	7	301	13	Canada	192	7	425	11
Netherlands	263	8	327	11	China	181	8	4,148	2
Italy	260	9	278	14	Italy	168	9	409	12
Belgium	260	10	326	12	Denmark	159	10	375	14
Singapore	174	11	1,115	5	Poland	73	11	1,789	4
Mexico	150	12	376	9	Czech Rep.	64	12	1,545	5
Egypt	122	13	329	10	Russian Fed.	58	13	2,116	3
Philippines	65	14	598	7	Israel	29	14	608	10

Table continued on next page.

ports. This share is projected to increase to 30 percent by 2030. Indonesia and Malaysia are major exporters of plywood (50% of world exports in 1999) and they should maintain their share out to 2030.

Chile and New Zealand emerge as significant exporters by 2030. Chile's share of the world exports of industrial roundwood increases from 2 to 4 percent, that of sawnwood from 1 to 3 percent, and that of wood pulp from 5.5 to 6.3 percent. By 2030, New Zealand accounts for 5 percent of global exports of industrial roundwood, 4 percent of sawnwood, 11 percent of fiberboard, 3 percent of wood pulp, and 2 percent of newsprint.

Conclusions

While the United States, Japan, and Europe are projected to remain important importers of forest products out to

2030, rapid economic growth in China will result in it becoming the world's largest importer. As projected by the GFPM, China's imports would consist of final goods as well as raw materials and intermediate products. This is in contrast to Japan, which has historically been, and is predicted to continue to be, predominantly an importer of raw and intermediate products.

Important emerging markets for forest products imports are Mexico, for solid wood and paper products and the Republic of Korea for industrial roundwood, plywood, wood pulp, and recovered paper. The predicted growth in Mexican imports of forest products presents an opportunity for expanding U.S. exports. This opportunity may be strengthened by the North American Free Trade Agreement (Prestemon and Buongiorno

1996). The prospect of a larger Free Trade Area of the Americas may, however, strengthen the competitiveness of other Latin American countries, such as Chile, relative to the United States.

The dominance of Canada as an exporter of forest products is projected to continue out to 2030, due in part to the continued importance of U.S. imports. The GFPM projections show the United States will increase the value and its share of exports of industrial roundwood and other paper and paperboard by 2030. At the same time, there would be a decline in the value of U.S. exports of sawnwood and printing/writing paper.

Finland, Austria, Latvia, Chile, and New Zealand are projected to gain some of the U.S. share of sawnwood exports. Austria and the Republic of Korea are emerging exporters of printing and writ-

Table 1. — Past and predicted import value and rank of main importers (continued).

	1999		2030			1999		2030	
	Imports (10 ⁶ \$US)	Rank	Imports (10 ⁶ \$US)	Rank		Imports (10 ⁶ \$US)	Rank	Imports (10 ⁶ \$US)	Rank
Fiberboard					Wood pulp				
China	547	1	2,826	1	United States	2,352	1	3,427	3
United States	395	2	194	3	Germany	1,517	2	2,357	6
United Kingdom	244	3	157	4	China	1,462	3	23,413	1
Japan	206	4	454	2	Italy	1,311	4	2,599	5
Germany	178	5	90	10	Japan	1,127	5	1,212	10
Netherlands	158	6	131	6	Korea, REP	896	6	5,931	2
France	130	7	67	12	France	865	7	1,340	8
Spain	120	8	73	11	United Kingdom	698	8	1,487	7
Italy	113	9	58	13	Netherlands	416	9	683	11
Greece	97	10	108	8	Belgium	293	10	509	12
Korea, REP	53	11	127	7	Indonesia	293	11	2,734	4
Mexico	52	12	135	5	Thailand	142	12	1,260	9
Philippines	32	13	97	9					
Waste paper					Newsprint				
China	343	1	21,984	1	United States	3,594	1	7,667	1
Korea, REP	238	2	5,293	3	United Kingdom	793	2	1,854	3
Canada	220	3	8,077	2	Germany	787	3	1,850	4
Indonesia	199	4	5,022	4	China	593	4	4,646	2
Mexico	134	5	2,210	8	Netherlands	313	5	1,137	7
Netherlands	121	6	338	11	Japan	312	6	478	13
France	113	7	249	12	France	272	7	565	10
Germany	102	8	238	13	India	267	8	1,512	5
Thailand	96	9	2,162	9	Italy	257	9	505	12
India	83	10	0	14	Spain	221	10	560	11
Sweden	71	11	3,598	5	Brazil	212	11	1,161	6
Austria	70	12	3,396	6	Turkey	173	12	683	8
Philippines	39	13	811	10	Mexico	97	13	664	9
Finland	4	14	2,782	7					
Printing and writing paper					Other paper and paperboard				
United States	4,629	1	10,257	2	China	5,991	1	40,148	1
Germany	3,465	2	2,797	7	Germany	2,444	2	5,504	2
France	2,794	3	9,818	3	United States	2,437	3	2,153	8
United Kingdom	2,709	4	4,339	4	Spain	2,320	4	3,238	6
China	2,200	5	22,675	1	France	1,758	5	3,008	7
Italy	1,348	6	2,802	6	United Kingdom	1,703	6	5,482	3
Belgium	1,260	7	1,559	11	Italy	1,662	7	1,624	11
Netherlands	1,174	8	2,566	9	Netherlands	1,185	8	5,263	4
Spain	1,074	9	3,130	5	Canada	1,131	9	1,033	12
Canada	744	10	615	12	Belgium	1,076	10	1,982	9
Australia	602	11	2,575	8	Mexico	794	11	4,489	5
Mexico	380	12	2,533	10	Malaysia	512	12	1,930	10

Table 2. — Past and predicted export value and rank of main exporters.

	1999		2030			1999		2030	
	Exports (10 ⁶ \$US)	Rank	Exports (10 ⁶ \$US)	Rank		Exports (10 ⁶ \$US)	Rank	Exports (10 ⁶ \$US)	Rank
Industrial roundwood					Sawnwood				
Russian Federation	2,337	1	16,342	1	Canada	9,469	1	11,005	1
United States	1,497	2	11,857	2	Sweden	2,623	2	4,453	4
Australia	798	3	3,398	3	Finland	1,963	3	7,902	2
Malaysia	564	4	219	11	Austria	1,532	4	6,849	3
Germany	524	5	1,356	10	Russian Federation	1,522	5	1,608	8
New Zealand	481	6	3,000	4	United States	1,210	6	666	10
Estonia	345	7	1,854	7	Latvia	725	7	2,651	5
France	278	8	2,205	5	Malaysia	719	8	501	11
South Africa	263	9	1,514	9	Germany	565	9	208	12
Chile	261	10	2,068	6	Brazil	549	10	824	9
Czech Republic	218	11	1,729	8	Chile	387	11	1,637	7
					New Zealand	357	12	1,740	6
Plywood					Particleboard				
Indonesia	2,809	1	4,564	2	Canada	2,520	1	4,323	2
Malaysia	2,057	2	5,316	1	Belgium	675	2	4,601	1
Canada	752	3	1,507	3	Germany	521	3	3,330	4
Brazil	576	4	377	8	France	463	4	3,451	3
Finland	485	5	1,088	4	Austria	389	5	2,488	5
United States	443	6	686	5	United States	195	6	50	11
Russian Federation	405	7	294	11	Poland	188	7	1,493	6
China	218	8	569	6	Czech Republic	136	8	1,115	7
Belgium	174	9	326	9	Switzerland	133	9	927	9
France	132	10	146	12	Thailand	130	10	866	10
Slovakia	105	11	433	7	Malaysia	108	11	974	8
Austria	93	12	306	10					
Fiberboard					Wood pulp				
Canada	366	1	638	5	Canada	4,453	1	17,345	1
Germany	328	2	1,488	1	United States	1,966	2	5,529	3
Malaysia	249	3	39	11	Sweden	1,213	3	4,513	4
France	194	4	283	8	Brazil	1,173	4	5,829	2
New Zealand	156	5	694	3	Finland	799	5	3,583	6
United States	155	6	123	10	Chile	781	6	3,718	5
Belgium	144	7	713	2	Russian Federation	566	7	2,754	8
Italy	144	8	645	4	Indonesia	500	8	2,845	7
Poland	123	9	19	12	Portugal	488	9	2,443	9
Spain	111	10	17	13	New Zealand	265	10	1,530	10
Ireland	96	11	186	9					
Austria	87	12	330	7					
Thailand	81	13	380	6					
Waste paper					Newsprint				
United States	793	1	13,258	1	Canada	4,347	1	13,009	1
Germany	339	2	4,687	5	Sweden	1,130	2	3,054	2
Belgium	169	3	2,070	7	Finland	676	3	2,298	3
Netherlands	162	4	4,366	6	Russian Federation	594	4	1,861	4
France	93	5	5,768	2	Norway	444	5	1,314	7

Table continued on next page.

Table 2. — Past and predicted export value and rank of main exporters (continued).

	1999		2030			1999		2030	
	Exports (10 ⁶ \$US)	Rank	Exports (10 ⁶ \$US)	Rank		Exports (10 ⁶ \$US)	Rank	Exports (10 ⁶ \$US)	Rank
Canada	46	6	19	11	France	407	6	1,381	6
United Kingdom	43	7	5,600	4	United States	370	7	362	11
Denmark	36	8	1,134	10	Korea, REP	364	8	1,644	5
Australia	30	9	1,693	9	Germany	302	9	739	8
Norway	27	10	9	12	Indonesia	165	10	353	12
Singapore	23	11	1,773	8	New Zealand	120	11	557	9
China	19	12	5,698	3	Austria	112	12	415	10
Printing and writing paper					Other paper and paperboard				
Finland	5,866	1	20,039	1	United States	4,809	1	23,948	1
Germany	4,183	2	4,755	7	Sweden	3,362	2	16,661	2
Canada	2,964	3	15,143	2	Finland	2,355	3	10,771	3
Sweden	2,117	4	8,232	4	Canada	2,257	4	8,954	4
Austria	1,999	5	9,149	3	Germany	2,090	5	1,108	12
Indonesia	1,604	6	7,685	5	China	1,947	6	3,197	7
France	1,466	7	471	12	France	1,550	7	1,026	13
Belgium	1,256	8	855	11	Korea, REP	936	8	3,857	5
United States	1,108	9	418	14	Italy	781	9	1,226	11
Netherlands	1,093	10	425	13	Netherlands	767	10	357	14
Korea, REP	782	11	5,694	6	Austria	668	11	2,504	8
Japan	617	12	3,830	8	Japan	571	12	3,556	6
Norway	551	13	2,619	9	Russian Federation	480	13	2,432	9
Thailand	336	14	2,024	10	Norway	386	14	2,078	10

ing paper that would increase their share of world exports at the expense of the United States.

These projections could be affected by future policies, for example if the U.S. government decided to prevent a large growth of raw wood exports. If exports of logs are banned or limited, there will be a cost (reduced welfare) to the country that could be computed with the GFPM.

A shortcoming of this study is that it was done after the RPA Timber Assessment. The RPA scenario for the United States was fixed, and a coherent scenario was then developed for the rest of the world with the GFPM. In truth, international considerations have been taken into account in developing the RPA Assessment. But, outside of the relation between the United States and Canada, this was done by drafting plausible futures for U.S. exports and imports. The GFPM instead describes quantitatively how the United States affects, and is affected by, the rest of the world through the many trade linkages in far parts of the world.

A better approach might then be to combine the RPA Assessment models

and the GFPM, at least informally if not mathematically, through an exchange of information as the RPA scenarios are being developed. In that scheme, the GFPM would provide the RPA models with data on the international context (at minimum, import and export levels consistent with developments in the rest of the world), while the RPA models would feed the GFPM with information on U.S. trends likely to affect its competitiveness worldwide. This would then increase the likelihood that the RPA projections fully reflect the complex links of the U.S. forest sector with the rest of the world through trade, in an increasingly global economy.

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