

**CIFPAC REPORT**



# Atlantic Canada's Forest Industry

## PART ONE

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*Current Status, Future Opportunities*

Donald W. Floyd and Rajendra Chaini



The Canadian Institute for Forest Policy and Communication at the University of New Brunswick provides non-partisan natural resource policy analysis. Visit our website at: [www.cifpac.unb.ca](http://www.cifpac.unb.ca)



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## Executive Summary

The forest products industry in Atlantic Canada is undergoing an historic period of restructuring as a result of fundamental changes in the economics of production, new technologies and environmental concerns. In the near term, the traditional forest products sector is likely to be smaller in terms of its contribution to the region's economy and number of workers it employs than it has been in the past. At the same time, the forests of Atlantic Canada are growing in importance because of their role in maintaining ecosystem services. There are important choices to be made about the future of our forests and the future of our forest products economy.

Several "first principles" should guide decision makers as they consider the future of the region's forests and forest economy:

- Globalization is reshaping the industry. Demand for forest products is growing globally, but it is growing more quickly in the developing nations of Asia and South America than it is in the mature markets of North America, Japan and western Europe. Intensively managed fibre plantations are replacing natural forests as a source of raw material.
- Some of Atlantic Canada's competitive advantages are disappearing. New biotechnologies are beginning to overcome some of the limitations of semitropical fibres. The combination of fast-growing conifers and eucalypts and investment in new, large facilities means that manufacturing can be more profitable in China, India, Malaysia, and Uruguay than in northeastern North America. Maintaining competitiveness in this environment depends upon investing in new uses for forest fibre, research, technology, and technology transfer.
- Profitability must be maintained throughout the value chain. For Atlantic Canada's forest products sector to function well, each sub-sector including both forest owners and forest products producers must be profitable. Governments that pursue economic development strategies in this sector should keep this principle in mind as they support individual initiatives.
- Atlantic Canada's forest economy has been subject to cycles of boom and bust for at least 300 years. Economies and communities that depend upon one or two products and single markets are inherently more volatile and less resilient than systems with multiple products and customers. In difficult times, successful firms diversify their products and customers. Communities become resilient by investing in infrastructure and education that make them attractive to new residents and businesses. Governments engaged in economic development should employ the concept of a balanced portfolio to encourage a diversity of products, markets, and enterprise size.
- Atlantic Canada's forest fibre resources are fully allocated. The current debate often focuses on whether forest products manufacturing or environmental protection should get a larger or smaller piece of the forest pie: Shall we have more 2x4s or more pine martin habitat, more wood chips or more carbon sequestration? In the long term, this internecine conflict can end only by enlarging the pie or increasing the productivity and synergy of the parts. Under most foreseeable scenarios, expansion of one sector (for example, renewable energy production) will mean that less fibre is available for other uses.

Several large -scale drivers are propelling the changes in the region's forest economy. They include changes in the global environment, economy, demographics, technology and an evolving certification and "green" products movement.

The region enjoys and number of comparative strengths including its expertise in sustainable forest management science and technology, a robust forest resource characterized by species and ownership diversity, an experienced cadre of forest managers, well developed public-private partnerships and well established forest research and educational institutions.

Its weaknesses include a limited capacity for basic research and technology transfer, reliance on a limited number of products and a limited number of markets, exposure to currency risk, relatively low biological productivity, relatively high fibre costs and a history of poor cooperation among affected stakeholders.

The sector faces several threats in the near to mid-term. They include the erosion of the “social license” to practice forestry, potentially significant changes in regional climate patterns, increasing risk associated with introduced insects and pathogens that result from trade as well as environmental factors, trade restrictions, and conversion of some forests to other uses caused by decreasing returns to ownership. Opportunities for the sector include the expansion of renewable fuels for electrical energy generation, biochemicals that may eventually include liquid fuels, engineered wood products, forest derived nutraceuticals and pharmaceuticals and forest management focusing on carbon sequestration.

We offer three conclusions. First, the most important role for government with regard to economic development and forest policy is to create the conditions that allow competitive firms to diversify their products and markets. One potential opportunity for diversification in the near-term is electrical generation from wood fibre.

A second area for exploration is federal and provincial support for applied and basic research in alternative forest products and markets. The provincial and federal governments, acting in concert, should implement a mechanism for programmatic funding of research and technology transfer designed to develop new products and markets for the region’s forest products economy.

Third, three of Atlantic Canada’s provincial governments (New Brunswick, Nova Scotia and Prince Edward Island) have good opportunities to design and implement innovative policy options for private forest land conservation because of land tenure patterns. Among the possibilities are financial and technical assistance for production of ecosystem services, multi-landowner certification, new approaches to organizing smallholdings to reduce operating costs, and a renewed focus on business support services for secondary manufacturing facilities.

We remain cautiously optimistic about the future of Atlantic Canada’s forests and forest products industry because of its growing value for a variety of uses beyond lumber and pulp and paper manufacturing. The regional forest products economy clearly has the capacity to grow and prosper. Successful reinvention must come from government and the firms themselves.

# Atlantic Canada's Forest Industry: Current Status, Future Opportunities

*Donald W. Floyd and Rajendra Chaini\**

## Preface

Governments in Atlantic Canada, the thousands of individuals who make their living directly or indirectly in the wood products sector, and the forest products industry itself are rightfully concerned about the future of one of the mainstays of the regional economy. In early 2006, the Atlantic Canada Opportunities Agency approached the Canadian Institute for Forest Policy and Communication (CIFPAC) at the University of New Brunswick with a request to produce a report on the state of the region's forest products industry. With the cooperation of the provinces of New Brunswick, Newfoundland and Labrador, Nova Scotia, and Prince Edward Island and the Canadian Forest Service's Atlantic Forestry Centre, we formed a steering committee and agreed upon an outline and a six-month timeframe for the project.

The data presented are principally drawn from databases maintained by Statistics Canada, the Canadian Council of Forest Ministers and the Canadian Forest Service. We have also used data collected by the provinces of New Brunswick, Newfoundland and Labrador, Nova Scotia, and Prince Edward Island, and financial information publicly reported by Fitch Ratings, PriceWaterhouseCoopers, and Reuters. Our intention is to develop a regional compendium of time-series data on forests and the forest products industry that can be updated annually and posted on the CIFPAC website (<http://www.cifpac.unb.ca/>).

Ours is an initial effort in an area of analysis that has not been completed before. It is a work in progress that will grow and continue to evolve. Because of confidentiality requirements, the published Statistics Canada data omit information about many industrial facilities. A more complete analysis would require direct surveys of manufacturers—something not possible within the budget and timeframe. Despite the data limitations, we believe that with time, CIFPAC's database will become a valuable public document, accessible to all the interest groups with a stake in the future of our forests.

This report offers an overview of the current regional forest products economy based upon the best data available. We also offer our observations on some of the opportunities and challenges that we will confront in the near future. We are cautiously optimistic about the future of the region's forests and forest industries. Forests are more important to society today than at any time in the past century because of growing concerns about sustainability. Atlantic Canada's forestry sector has the professional expertise and capabilities required to manage forests for carbon, renewable energy, and a rich array of bioproducts, as well as traditional wood products.

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## Introduction

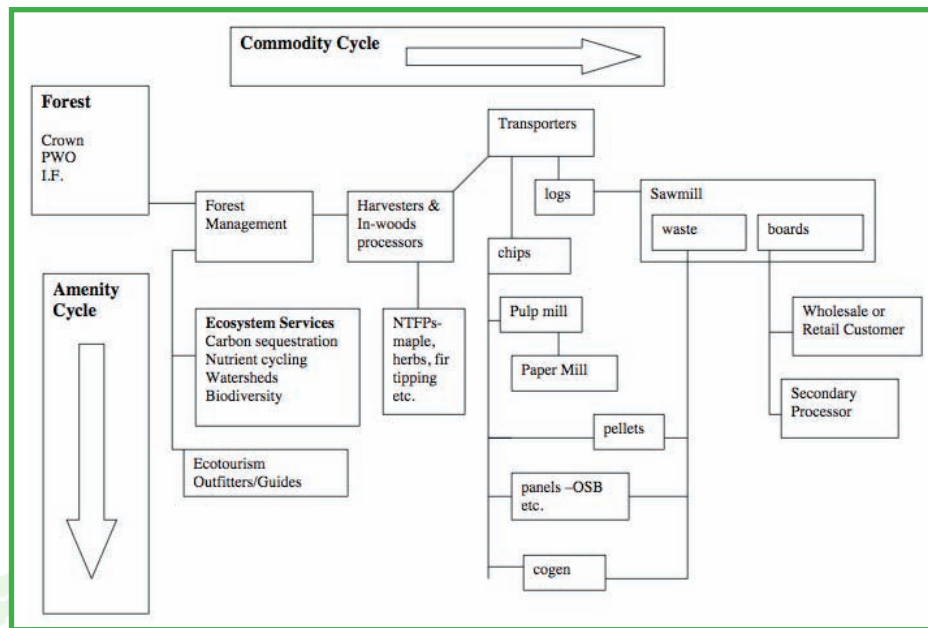
The forest products sector in Atlantic Canada is a complex mix of actors and issues. It is characterized by competing firms, governments focused on the twin goals of economic development and resource conservation, tens of thousands of private woodlot owners, First Nations, a well-organized environmental community, and a public that cares deeply about its forests. This complexity is essential to the sector's resilience but challenges policy makers who must allocate public resources and values in pursuit of sustainability.

This report focuses on Atlantic Canada's forest products industry and economic development issues, but it should be read in a broader context: the growing realization of the importance of the forest as a provider of ecosystem services (carbon sequestration, biodiversity conservation, and watershed protection, among others), ecotourism, and cultural and spiritual values. Many of these forest values are unpriced and do not find a place in traditional economic measures, such as gross domestic product. We surmise that they are at least as valuable to the region's citizens as the commodities that find their way from our Acadian and boreal forests to the global marketplace.

It is useful to think of our forests and our many forest products industries as a system of interconnected parts (Figure 1). Forest owners include private woodlot owners (PWO), industrial firms (IF), and the provincial and federal governments. First Nations also play an important role in this mix because of the establishment of prior rights in New Brunswick and Nova Scotia and settlements in Labrador. The diverse mix of ownerships is one of the factors that distinguish the region's forests. A second salient feature is species diversity: three of the provinces (New Brunswick, Nova Scotia, and Prince Edward Island) contain a mix of hardwoods and conifers that provide opportunities beyond traditional softwood lumber and newsprint. All of the region's forests have been commercially exploited for more than 400 years and have changed as a result of their economic value and the management regimes we have imposed upon them.

Within this complex system is an amenity cycle that creates value in place. This includes ecosystem services, ecotourism, and watershed production. Within the commodity cycle, one finds products that gain value as they are extracted from the forest and used as inputs in a manufacturing process. These products include everything from pharmaceuticals, lumber, and fine cabinetry to paper towels, toilet paper, and firewood. The producers range in size from multinational corporations to families that own a few hectares of forest where they observe the wildlife and harvest firewood.

The turn of the 21st century finds our forest products economy in an unparalleled flux. Resource extraction and primary production from forests and the fishery dominated the economy from 1700 to the late 1990s. Today, traditional forest products are a small but still vital part of a broader economy that is largely focused on services and emerging technologies.



**Figure 1. A Simplified Forest System Schematic.**

The forest products industry in Atlantic Canada faces significant challenges. The region's forest economy is closely tied to primary products (a variety of pulp and paper products and lumber) and dominated by a single trading partner. The current combination of a weak U.S. housing market, declining newspaper circulation, a strong Canadian dollar, and rising energy prices has forced the closure of many mills and the loss of thousands of jobs.

At the same time, there are tremendous opportunities for the forestry sector as it reinvents itself. Because it is based upon renewable resources, the forest products industry has a smaller carbon footprint than any other industrial sector in Canada. It is the only economic sector that can become a net producer of renewable, carbon-neutral energy in the near term.

Overall, diversification of products and markets should be the first priority for Atlantic Canada's forestry sector, with an immediate focus on renewable energy resources. The industry has clear competitive advantages that it can exploit with policy assistance from the federal and provincial governments. It may be possible in the short to medium term to expand cogeneration of electricity based on renewable fuels, and in the longer term to begin the process of developing biorefineries that can produce liquid fuels, biobased industrial chemicals, and traditional pulp and paper.

## Organization of the Report

This report is divided into two parts. The first part begins with a set of "first principles" to keep in mind. These frame the discussion of trends and the analysis of the regional forest products economy that follow. The first part also offers a strategic analysis of strengths, weaknesses, threats, and opportunities. Readers seeking options for the future of the sector may wish to focus their attention here.

The second part of the report is a statistical abstract of the region's forest products economy. It includes economic data on the region's forests, forest products production, interprovincial trade, value of shipments, exports and imports, direct and indirect employment, and contribution to gross domestic product. These data underlie the analyses of the first part.

## PART ONE

### I. First Principles

*Globalization matters.* Demand for forest products is growing globally, but it is growing more quickly in the developing nations of Asia and South America than it is in the mature markets of North America, Japan and western Europe. The nature of the forest products industry has changed. Globally, intensively managed fibre plantations are replacing natural forests as a source of raw material. These plantations can be established relatively quickly near the most rapidly expanding markets. New industrial facilities are now free to locate near sources of fiber demand (where labour costs are typically lower) rather than adjacent to traditional sources of fibre supply (Bael and Sedjo, 2006). The medium and large-scale firms located in Atlantic Canada that employ many workers and generate the most economic value must compete in this arena. Local and niche markets provide the best opportunities for small and medium sized enterprises. These firms will become relatively more important in the region's economy if the large-scale commodity producers cannot maintain profitability.

*Biology + technology = economic advantage.* Some of Atlantic Canada's competitive advantages are disappearing. Trees grow faster in tropical and semitropical climates. New biotechnologies are beginning to overcome some of the previous limitations of semitropical fibres. The combination of fast-growing conifers and eucalypts and investment in new facilities means that manufacturing facilities can be more profitable in China, India, Malaysia, and Uruguay than in northeastern North America. Maintaining competitiveness in this environment depends upon investing in new uses for forest fibre, research, technology, and technology transfer. In nearby Maine, the state and U.S. federal governments are investing more resources in research to facilitate this transformation than is Atlantic Canada.

*Profitability must be maintained throughout the value chain.* For Atlantic Canada's forest products sector to function well, each subsector must be profitable. If the forest owner does not realize a profit from her woodlot, she is likely to turn her land to a use that will benefit herself and her heirs in other ways. Similarly, if the transport owner-operators and the harvesting and silviculture contractors cannot make a profit in forestry, they will find another place for their investments and labour. The same is true for the workers on the shop floor, the millers, and the wholesalers and the retailers. There will always be some tension between producers and manufacturers, but ultimately all the subsectors need to be profitable for the system to work. Governments that pursue economic development strategies in this sector should keep this principle in mind as they support individual initiatives.

*Risk can be managed.* Demand for forest products has always been highly cyclical. Atlantic Canada's forest economy has been subject to cycles of boom and bust for at least 300 years. Economies and communities that depend upon one or two products and single markets are inherently more volatile and less resilient than systems with multiple products and customers. In difficult times, successful firms diversify their products and customers. Communities become resilient by investing in infrastructure and education that make them attractive to new residents and businesses. Governments engaged in economic development should employ the concept of a balanced portfolio to encourage diversity of products, markets, and enterprise size.

*Atlantic Canada's forest fibre resources are fully allocated.* The current debate often focuses on whether forest products manufacturing or environmental protection should get a larger or smaller piece of the forest pie: Shall we have more 2x4s or more pine martin habitat, more wood chips or more carbon sequestration? In the long term, this internecine conflict can end only by enlarging the pie or increasing the productivity and synergy of the parts. Under most foreseeable scenarios, expansion of one sector (for example, renewable energy production) will mean that less fibre is available for other uses.

*There are no silver bullets.* Don Roberts, a leading forest economist and managing director for CIBC World Markets, quips that "if the answers were easy, we would have thought of them already." It does seem likely that in the immediate future, the forest products industry in Atlantic Canada, as a whole, will be smaller than it has been, employ fewer people, and contribute less to the region's economic output. Nevertheless, there are opportunities for sustainable growth, new products, and new markets. Some firms will expand and profit, others will leave the business. Importantly, the forest resource itself will continue to grow and sustain us.

## II. Trends

Several macrolevel agents of change affect many dimensions of the region's forest and the forest products industry—in particular, changes in the physical environment, economics, demography, and technology. In addition, we note emerging trends in "green" certification for forest management and building construction, production and consumption, and prices and markets.

### Environmental Change

Disturbance events such as fires, hurricanes, ice storms, and insect irruptions have historically been the drivers of ecological change in the region. Gradually warming temperatures will change the frequency, spatial distribution, and intensity of these events. Temperature increases will eventually lead to changes in the species assemblages of Atlantic Canada's forests. Forest insects and diseases will also change as "southern" species begin to move north. It is difficult to predict how these new migrants will be affected by the region's soils, freeze-thaw regimes, and other environmental factors. It does seem likely that new plant communities will emerge.

Gradually warming seasonal minimum temperatures and species introduced through trade are already affecting forest insect distributions in Canada. Locally, brown spruce longhorn beetle (*Tetropium fuscum*) is affecting the movement of forest products within Nova Scotia and between parts of Nova Scotia and New Brunswick. It appears that the recent spread of this introduced species may have been influenced by the expansion of suitable habitat as a result of Hurricane Juan. Similarly, the Canadian Food Inspection Agency (CFIA) has imposed inspection requirements on Christmas trees and nursery stock in the region because of the potential for the further spread of the gypsy moth (*Lymantria dispar*).

Atlantic Canada is heavily dependent upon trade. It seems reasonable to expect that phytosanitary requirements will become even more important in the future. Policies that encourage imports and exports of forest products must recognize the increasing risks of introduced forest pathogens and insects. These restrictions will provide both opportunities and challenges for the wood products industry. Firms that produce certified shipping materials and firms that produce products that meet export requirements (beyond the United States) might find expanding niches.

## Economic Change

### *Supply and Demand Projections*

Global demand for industrial roundwood, sawnwood, panels, pulp, and paper has steadily increased for the past 45 years. However, there are significant differences in demand growth among regions and products. For example, industrial roundwood demand has increased steadily in all regions except the former Soviet Union and Japan. The reduction in the former Soviet Union was the result of restructuring its economy in the 1990s. In Japan, the reduction was the result of a prolonged recession during the same decade. Sawnwood consumption follows the same pattern except in China. Here, sawnwood production declined as industrial roundwood was shifted to provide material for panels (Tables 1, 2). Europe and the U.S. represent, by far, the largest markets, but their rates of growth are much lower than in the rapidly developing nations of Asia and South America. Because the latter regions enjoy lower labour costs, a less expensive fibre supply, and a relatively stable level of political risk, they have attracted much of the now-globalized investment capital pool.

The recent rapid growth of the Chinese and (to a lesser extent) Indian economies has important implications. PriceWaterhouseCoopers (2007a: 11) makes the following observation:

The China effect cannot be underestimated. Despite its own fiber deficit, China has become the world's second largest producer of wood and paper products, after the US. It has also become a major exporter of a wide range of forest-based products, both directly (panels, remanufactured wood products and paper) and indirectly (paper packaging for exports of consumer goods). China's development is the single largest driver of increasing international trade flows in raw materials for, and finished products of, the forest paper and packaging industries. These trends will not only continue, they are likely to accentuate. Trend projections suggest that before 2015, China will overtake North America as a producer of paper and board products. Collectively, China and other fast growing (and fiber short) Asian economies, notably India, could increase their current share of global paper and board production and consumption by as much as 50% by 2015.

The State Forestry Administration of China (Xinhua 2007) reported that China's foreign trade in forest products reached US\$27.2 billion in the first half of 2007, up 35.3 percent over the same period in 2006.

Changing market conditions have resulted in a substantial restructuring of the forest products sector. Traditional, vertically integrated firms have divested much of their freehold forest and several asset classes to concentrate in narrower sectors. For example, the proposed merger of Abitibi-Consolidated and Bowater will produce the world's largest producer of newsprint. Domtar acquired Weyerhaeuser's fine-paper division and has spun off its sawmills to Conifex Inc. In September, Stora Enso announced the sale of its North American operations, including the Port Hawkesbury facility, to New Page Corporation, which is owned by Cerberus Capital Management LP, a private equity investment firm. PriceWaterhouseCoopers attributes the increase in mergers and acquisitions over the past four years to restructuring and rationalization.

Table 1 shows the current consumption of wood products by world region, and Table 2 indicates how consumption patterns have changed over the past 40 years.

*Table 1. World and Regional Consumption of Wood Product Categories, by Volume and as a Proportion of Total World Consumption, 2000*

Region	Pulp	Pulp	Paper	Paper	Sawnwood	Sawnwood	Panels	Panels
	mt	%	mt	%	m <sup>3</sup>	%	m <sup>3</sup>	%
<b>Total</b>	<b>171.2</b>	<b>100</b>	<b>324</b>	<b>100</b>	<b>421.9</b>	<b>100</b>	<b>193.9</b>	<b>100</b>
CAC	1	0.6	8.2	2.5	7.1	1.7	1.3	0.6
ESA	5.8	3.4	18.3	5.7	22.2	5.3	7.8	4
Europe	48.2	28.2	85.5	26.4	103.4	24.5	59.3	30.6
NENA	1.1	0.7	7.1	2.2	11.7	2.8	5.7	2.9
Oceania	5.6	3.3	10.1	3.1	8.6	2	5.5	2.8
South America	6.8	4	11.5	3.5	25.5	6	9.1	4.7
SS Africa	1.7	1	2.7	0.8	6.5	1.5	1.3	0.7
Former USSR	4.6	2.7	4.6	1.4	16.9	4	5.1	2.6
Canada	15	8.8	8.1	2.5	21.2	5	5.2	2.7
China	7.7	4.5	42.4	13.1	12.1	2.9	24	12.4
Japan	14.3	8.4	31.8	9.8	27	6.4	11.9	6.1
U.S.	59.2	34.6	93.7	28.9	159.6	37.8	57.6	29.7

Source: FAO 2004

Key: CAC = Central America and Caribbean, ESA = East and South Asia, NENA = Near East and North Africa, SS Africa = Sub-Saharan Africa

*Table 2. Average Annual Percentage Change in Volume of Wood Products Consumption, 1961–2000*

Region	Industrial Roundwood	Sawnwood	Panels	Pulp	Paper
	<b>Total</b>	<b>1.12%</b>	<b>0.5%</b>	<b>5.11%</b>	<b>2.59%</b>
CAC	2.06	2.68	5.91	3.18	6.18
ESA	1.21	1.44	5.2	5.94	5.25
Europe	1.1	0.71	5.04	2.39	3.35
NENA	1.68	3.83	8.41	6.22	6.39
Oceania	2.74	0.03	6.63	4.87	4.98
South America	4.32	2.43	7.79	5.41	4.59
SS Africa	2.91	2.03	5.57	5.07	4.26
Former USSR	-2.29	-4.44	2.48	0.84	0.71
Canada	1.98	2.44	3.37	1.58	3.26
China	2.23	-0.58	10.8	4.81	6.47
Japan	-1.35	-0.1	5.47	3.1	4.66
U.S.	1.3	1.63	4.1	2.29	2.5

Source: FAO 2004

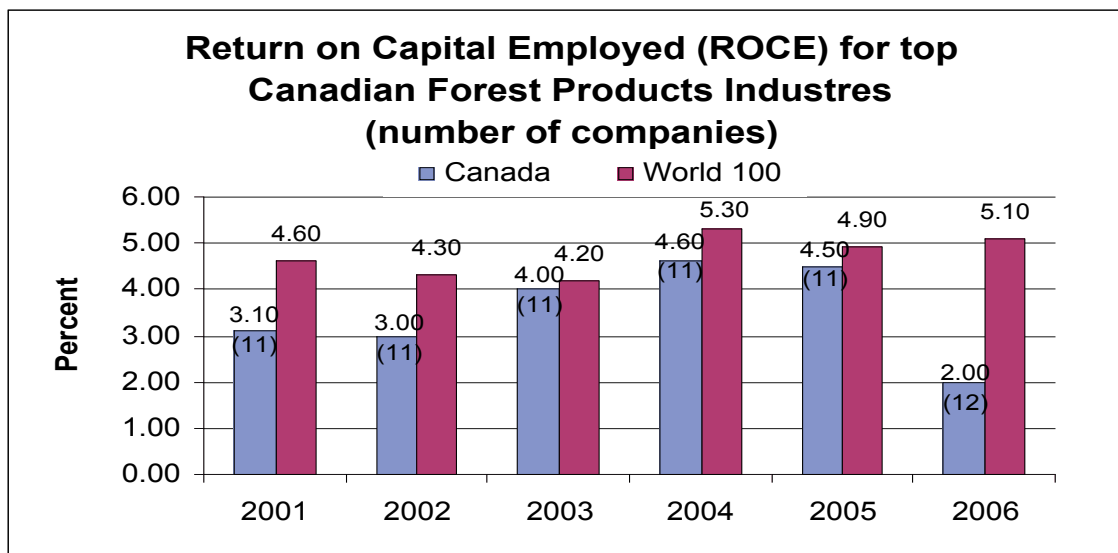
Key: CAC = Central America and Caribbean, ESA = East and South Asia, NENA = Near East and North Africa, SS Africa = Sub-Saharan Africa

### Global Investment Returns

As a whole, returns on capital employed (ROCE) in the forest and paper products sector have been weak for the past decade. ROCE for PriceWaterhouseCoopers' forest and paper products top 100 global firms has been below 6 percent for more than five years, well below the estimated cost of capital (Figure 2). Only 16 of the top 100 returned more than 10 percent on capital employed in 2006. None of these firms operate in Atlantic Canada. The recent trend in ROCE for Canadian firms declined from 4.5 percent in 2005 to 2 percent in 2006.

Financial data for privately held firms and smaller publicly traded firms are more difficult to estimate. A notable exception to this trend is Neenah Paper, which according to Reuters (2007) leads the paper and paper products sector in terms of return on equity and return on investment through the first half of 2007.

Figure 2. Return on Capital Employed



Source: PriceWaterhouseCoopers: Global FPP surveys

In theory, the lack of return in Canada would lead multinational corporations to invest in newer facilities in other locations. In fact, several large paper companies in the region (including Abitibi, JDI Ltd., Fraser Papers, Bowater, UPM Kymmene, and Stora Enso) and several sawmills have made substantial investments in their facilities in recent years, using their own capital or a mix of private and public funds. Provincial governments have extended loan guarantees worth several million dollars to forest products firms in Atlantic Canada as a part of their industrial development efforts, with varying degrees of success. Investment data are incomplete because of confidentiality requirements. Table 3 details some announced investments in the region; there are likely others. In late August, JDI announced that it was postponing an investment in a biomass energy facility in Saint John, New Brunswick, because of poor market conditions.

Table 3. Major Forest Mill Investments in Atlantic Canada, 2006–2007

<i>Date announced</i>	<i>Estimated completion date</i>	<i>Company</i>	<i>Mill name, location</i>	<i>Description</i>	<i>Product / annual capacity Amount invested</i>
July 2005	Q3 2007	Irving Pulp & Paper Ltd.	Irving Pulp and Paper Plant, Saint John, NB	Modernization: environmental investment, power and recovery investment	Pulp / Not available US\$150 million
February 1, 2006	January 1, 2008	AV Nackawic Inc.	AV Nackawic Mill, Nackawic, NB	Grade switch, conversion pulp line	Pulp (paper grade hardwood) / 850 tonnes per day Pulp (dissolving grade) / 600 tonnes per day US\$30 million
May 2006	June 2007	Fraser Papers Inc.	Edmundston Pulp Mill, Edmundston, NB	Modernization: power/recovery investment	Pulp / No capacity increase C\$8.1 million
December 2006	November 2007	Irving Pulp & Paper Ltd.	Saint John West Mill, Saint John, NB	Other capital investment	Pulp / No capacity increase US\$10 million
	October 2004	Stora Enso	Port Hawkesbury, NS	TMP pulp plant	Pulp US\$90 million
June 2007		Marwood	3 locations in NS	Updated sawmill and others	Lumber and siding C\$12.6 million
July 2007		Lewis Mouldings	Weymouth, NS	Facility Expansion door and window trim	Trim C\$1.2 million loan from NS Industrial Expansion Fund

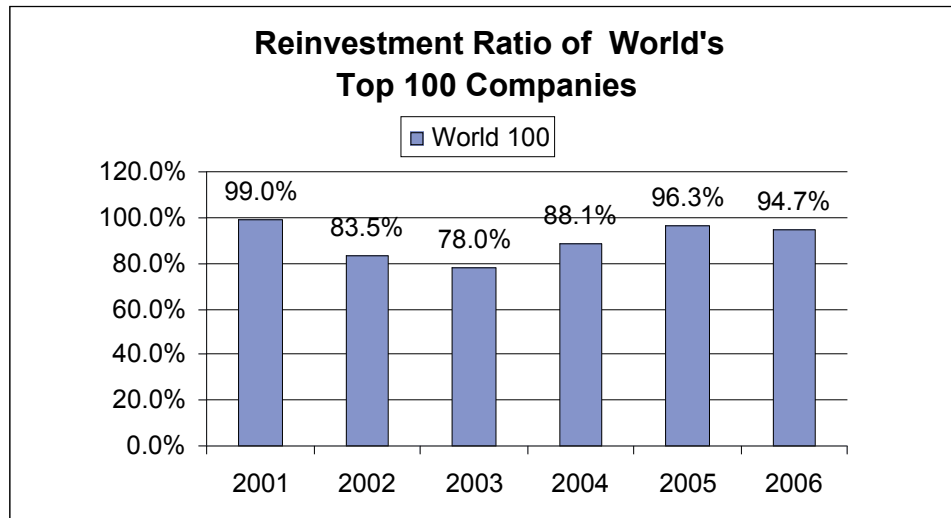
Source: CFS and press reports

### *Reinvestment Ratio*

Reinvestment ratio is capital investment as a percentage of depreciation. For the industry globally, the ratio has been less than 1.0 since 2000. In recent years it has ranged between 0.99 and 0.78 (Figure 3, Table 4). Most of the increase since 2003 is due to major capital investments in the emerging markets. There has been a major disinvestment in North America as a whole. Canada increased its reinvestment ratio from well below 0.5 in 2003 to close to 0.75 in 2006.



Figure 3. Reinvestment Ratio of Top 100 Forest and Paper Products Firms



Source: PriceWaterhouseCoopers: Global FPP surveys

Table 4. Reinvestment Ratio of Top 100 Forest Products Companies

	2001	2002	2003	2004	2005	2006
Depreciation (world)	19.4	20.00	20.50	21.90	21.40	22.60
Capital expenditure (world)	19.2	16.7	16	19.3	20.6	21.4
Reinvestment ratio (world)	99.0%	83.5%	78.0%	88.1%	96.3%	94.7%

Source: PriceWaterhouseCoopers: Global FPP surveys

### Private Equity Influences

An important change in the forest products sector in the past five years is the emergence of nontraditional investors composed of either buyout firms or real estate investment trusts (REITs) and timber investment management organizations (TIMOs). The buyout firms have generally focused on the pulp and paper and packaging industries. Firms such as Cerberus Capital Management, Texas Pacific Group, Apollo Management, and Madison Dearborn Partners have acquired significant holdings in the forest products industry in the past five years. Within the region, the result of this trend has mostly been seen in the purchase of increased positions by hedge funds, such as Third Avenue's recently increased holdings of Abitibi and the recent purchase of Stora Enso's North American operations by Cerberus.

### Private Land Investment Strategy

REITs and TIMOs have also been active in the acquisition and management of forestlands in the region. Brookfield Asset Management, a large Canadian REIT, has acquired both forestlands and processing plants in Canada and the U.S.. Brookfield has close associations with Fraser Paper and the Acadian Timber Income Fund, which acquired Fraser's New Brunswick and Maine freeholds. Wagner Forest Management Ltd. acquired 500,000 acres of Neenah Paper's Nova Scotia freehold in July 2006. Given the realignment of the business model for many large forest products companies, it seems reasonable to expect similar dissociation of industrial freeholds. However, this trend has been complicated by the

change in the tax treatment of income trust funds by the current federal government. At this time, it is not clear whether Canadian timber income funds will be treated as real estate investment trusts, as is the case in the U.S.. Treatment as a REIT might expand the use of this kind of organization for other industrial freeholds in the region and possibly for consolidating private woodlots.

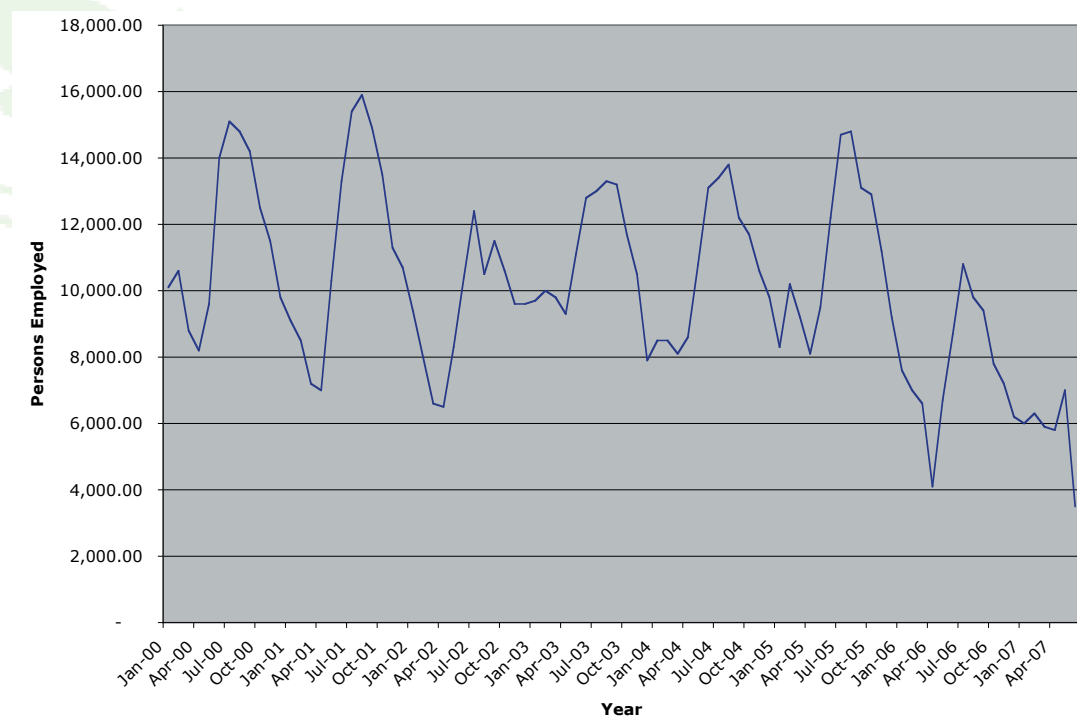
### Employment

Direct employment has declined dramatically throughout the region. Because of confidentiality requirements, not all employment data for all sectors in each province are published. Forestry and logging employment (NAICS 113) is deeply cyclical (Figure 4). Between 2000 and 2005, it reached a seasonal peak between 14,000 and 16,000 jobs in late summer or early fall 2000–2001. In 2006 the peak was only about 11,000, but the trough reached a new low of less than 4,000 in spring 2007. It is too soon to know whether this last number is the result of a data anomaly.

Wood products manufacturing employment (NAICS 321) in New Brunswick fell from about 7,500 to 6,000 between 2000 and April 2007. Paper manufacturing employment (NAICS 3221) in the province fell from about 8,500 in 2001 to about 3,500.

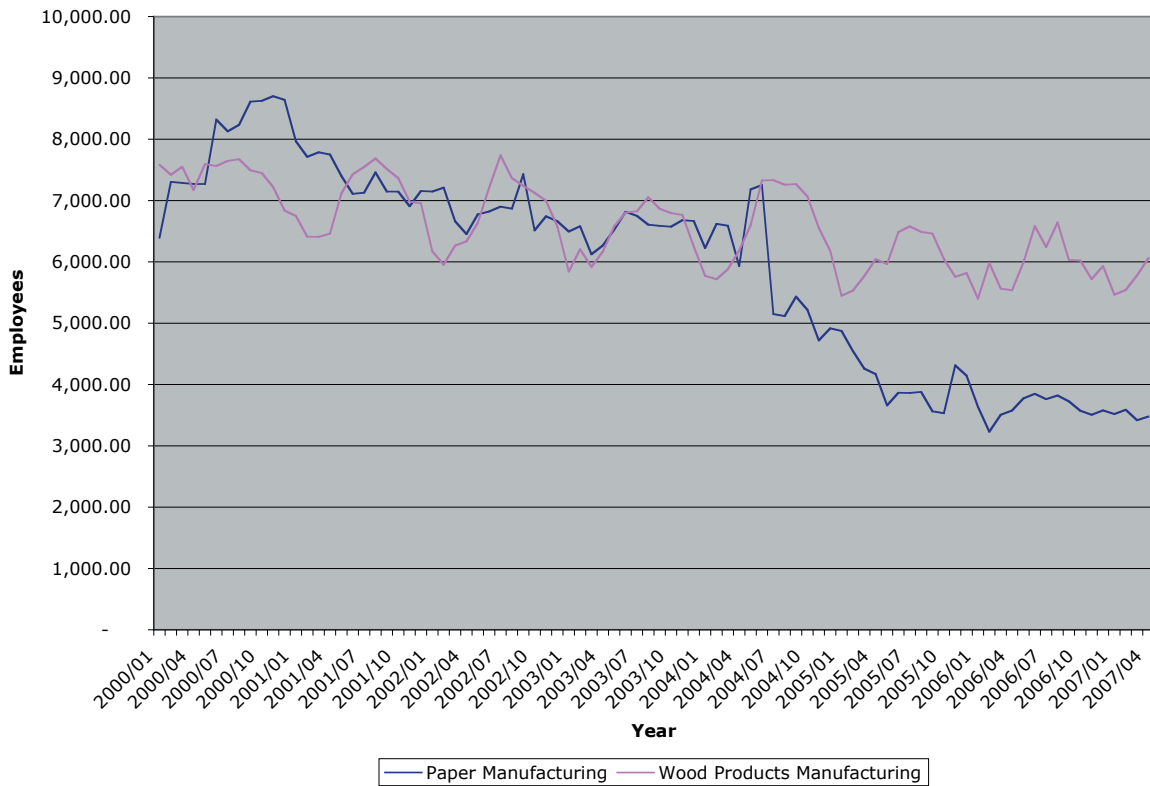
Wood products manufacturing employment (NAICS 321) in Nova Scotia fell from a peak of almost 4,000 in 2000 to about 2,250 in April 2007. This trend line is much more cyclical than the related data from New Brunswick (Figure 5). Paper manufacturing employment (NAICS 3221) in Nova Scotia declined from slightly more than 3,000 in 2000 to approximately 1,700 in April 2007 (Figure 6). Based on these estimates, New Brunswick and Nova Scotia lost 9,550 jobs in wood products and paper manufacturing between 2000 and spring 2007. These figures do not include forestry and logging employment because of its highly cyclical nature.

Figure 4. Direct Forestry and Logging Employment in Atlantic Canada, 2000–2007



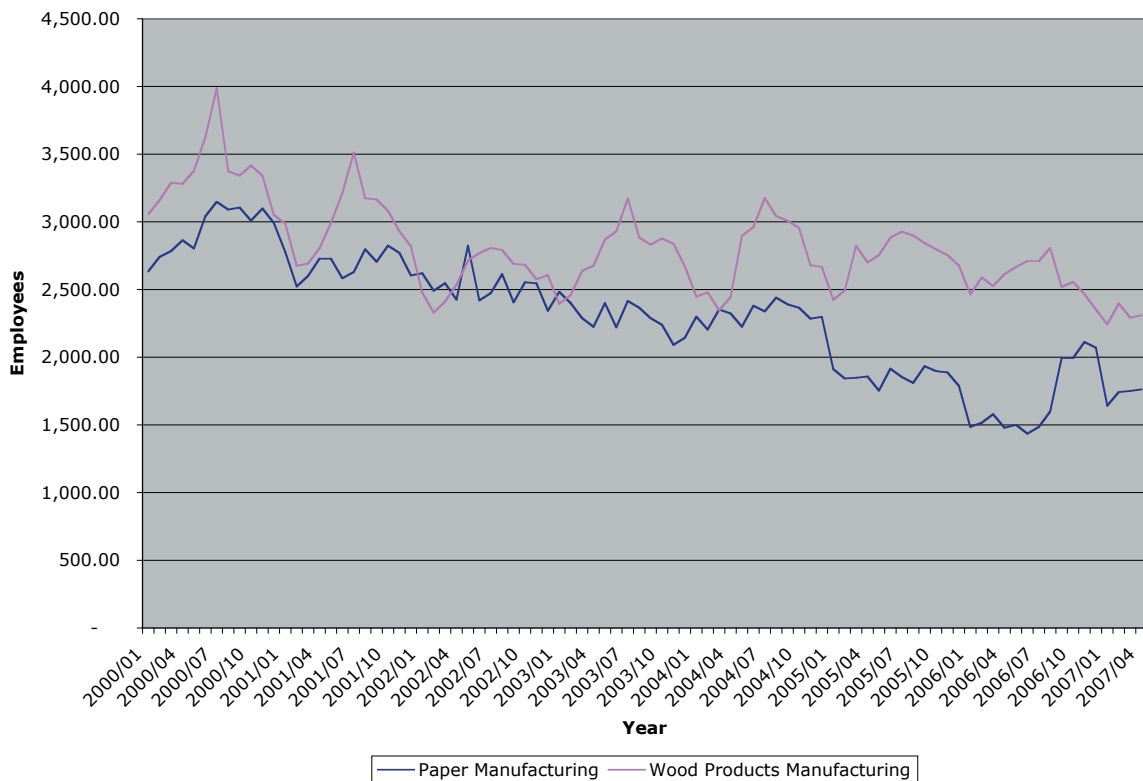
Source: CANSIM Table 281-0023

Figure 5. New Brunswick Paper and Wood Products Manufacturing Employment



Source: CANSIM Table 281-0023

Figure 6. Nova Scotia Paper and Wood Products Manufacturing Employment



Source: CANSIM Table 281-0023

### Interprovincial Trade

There is substantial movement of industrial roundwood and wood chips among the provinces of Atlantic Canada and among New Brunswick, Québec, and Maine. We were able to locate data that quantify this trade for New Brunswick and Nova Scotia but not for Newfoundland and Labrador or Prince Edward Island. There is anecdotal evidence of fibre shipments of some raw hardwood logs from New Brunswick to Scandinavia (specifically, of birch logs by UPM Kymmene) and movement of fibre into Newfoundland from Labrador and the other Atlantic provinces. Similarly, some fibre moves into and out of Prince Edward Island, but we were unable to document its volume.

New Brunswick serves as the hub for most of this trade. Between 2001 and 2005, New Brunswick imported an average of about 1.7 million cubic metres of roundwood and exported an average of 798,000 cubic metres. Maine and Nova Scotia are the primary sources of imports to New Brunswick for roundwood (45 and 38 percent of the total, respectively). New Brunswick imported an average of 1.2 million cubic meters of wood chips during the same period. Québec accounted for approximately one-half of this amount; Nova Scotia and Maine each contributed about one-quarter. On average between 2001 and 2005, New Brunswick imported about 2.9 million cubic metres of wood fibre per year and exported about 1.3 million cubic metres, for a net import of approximately 1.6 million cubic metres.

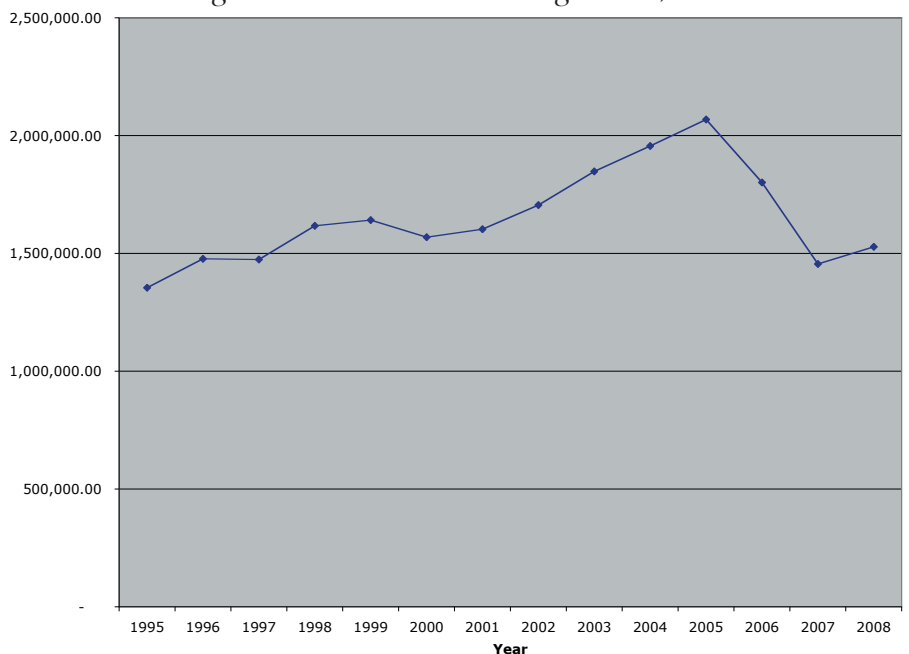
Between 2004 and 2006, Nova Scotia exported approximately 28 percent of its primary forest products harvest (about 1.1 million cubic metres). Approximately two-thirds of this volume went to New Brunswick, and about 17 percent was exported to offshore markets.

## Demographic Change

### Demand for Housing

Demand for softwood lumber from Atlantic Canada is closely tied to the U.S. housing market. In the medium term, two groups will drive U.S. housing demand: baby boomers approaching retirement and immigrants. The Joint Center for Housing Studies at Harvard University (2005: 10) predicts that “the next ten years will see the highest levels of net household growth since the baby boomers swept into the housing market in the 1970s.” Demand for new construction of homes for those about to retire may eventually increase. It will also move south and west, away from Atlantic Canada’s traditional market in the U.S. Northeast. Figure 7 depicts the recent changes in U.S. new home construction.

Figure 7. Total U.S. Housing Starts, 1995–2008



Source: U.S. National Association of Home Builders, 2007

Similarly, new household formation among recent immigrants grew fastest in “new immigrant gateways” (FDIC 2006: 6). Immigrants in traditional gateway metro areas of the U.S. Northeast (including New York City, Jersey City, and the Boston-Worcester-Lawrence-Lowell-Brockton complex) have the lowest rates of foreign-born homeownership. The FDIC study concludes that strong growth in immigrant households, the housing preferences of the graying but active boomer cohort, and the need to replace aging housing stock are expected to sustain the production of as many as 2 million new homes annually during the next ten years.

That projection seems overly optimistic, given a 14-year average of approximately 1.6 million starts (NAHB 2007). The current weakness in new U.S. housing starts can be expected to last at least through 2008 and possibly 2009 as housing prices fall, mortgage availability tightens, and buyers work through the existing supply of existing homes.

Canadian new housing starts declined slightly in spring 2007, to approximately 217,000, according to the Canada Mortgage and Housing Corporation. Despite a relatively strong housing market, Canadian demand is smaller than in the U.S. market.

Demography is also affecting the labour supply available to construct new housing. Annual demand for skilled workers involved in construction exceeds supply in the U.S.. Direct labour now accounts for approximately 30 percent of the cost of a stick-built structure. These factors, combined with the availability of engineered wood products, suggest that panelized and modular construction will gradually gain market share. As it does, the long-term demand for traditional framing lumber will decline and demand for panel components will increase.

#### *Recruitment, Retention, and Training*

The forest products industry in Atlantic Canada has consistently expressed concern about its greying workforce (see, for example, New Brunswick Self-Sufficiency Task Force Report 2007). The facilities that continue to operate will need to attract new employees. The aggregate number of employees in the region in this sector will surely decline, but there will be strong demand for skilled trades and system technicians to operate the complex equipment found throughout the region's mills. A particular concern is for skilled woodworkers. The lack of profitability in the harvesting subsector means that few younger workers and new firms are entering the business.

#### **Technological Change**

Rapid technological change is creating opportunities in all parts of the forest and wood products economy. There are many recent reports on technological change and innovation in the industry. Forintek (2000) has produced a technology roadmap for the lumber and value-added wood products sector. Similar assessments were completed for nanotechnology (Forintek 2005) and for the Manufactured Building Systems Industry (Lavoie and Laytner 2007). Bioproducts Canada (2004) produced an innovation roadmap on biobased feedstocks, fuels, and industrial products. The Canadian Forest Innovation Council (2006) has prioritized the new technologies. In the U.S., the American Forest and Paper Association (2006) completed an ambitious technology roadmap as part of its “Agenda 2020” initiative. Most recently, the Forest Products Association of Canada (2007) published the report of its Forest Products Industry Competitiveness Task Force. Rather than summarizing these reports here, we direct readers to the citations provided in the Literature Cited section.

Much of the innovation in the sawmilling sector focuses on improved labour productivity and reduced waste. The development of engineered wood products is already transforming structural and appearance products. Louisiana Pacific recently reconfigured its OSB facility in Houlton, Maine, to produce oriented-strand lumber. Laminated joists and laminated veneer lumber are increasingly incorporated into new home and small commercial construction. Several firms in New Brunswick, Nova Scotia, and Prince Edward Island are demonstrating the value of new technologies in the value-added sector of the market. For example, in July 2007, a firm in Weymouth, Nova Scotia, announced that it was investing in new technology utilizing a wood joining system for window and door trim, which will create 35 jobs.

Much of the focus has been on the pulp and paper industry, especially with regard to biorefineries and bioproducts. Renewable energy production and refinement of industrial and fine chemicals from wood fibre will undoubtedly provide new value for forest products and the forest products industry. However, there appears to be little movement in this direction from the pulp and paper industry in Atlantic Canada (with the notable exception of AV Nackawic).

### **Green Certification of Forests and Buildings**

One of the most important trends in forestry in the past 50 years is the emergence of market-based mechanisms to assure consumers that wood and paper products have been grown and harvested “sustainably,” with several competing certification standards. The environmental community has implemented several campaigns that focus on large retailers and catalogue producers to adhere to their preferred standards. This presents some interesting challenges for the forest products industry, as well as opportunities for some firms to gain market share and potential preference, depending upon which standard they select. Most of the large firms in the region use the Sustainable Forestry Initiative standard. Some firms in Nova Scotia are pursuing Forest Stewardship Council certification for their woodlands and chain-of-custody certification for some of their products. Private woodlot owners are also pursuing certification. Although there is no documented evidence of higher prices for certified wood, there are certainly costs associated with certification processes. Some woodland owner associations have cost-effectively achieved certification by spreading the expenses across multiple ownerships.

In addition to certified wood and paper initiatives, an emerging “green building” initiative is promoting energy conservation and the use of renewable materials in new homes, municipal buildings, schools, and commercial, retail, and office buildings. As in forest certification, there are competing standards in the green building trade, and some standards favor one forest certification scheme over others. Because local and provincial governments are among the largest purchasers of wood and paper products in the region, they are in a position to promote the use of sustainably produced materials from within the region by specifying certified wood and paper products in their procurement standards.

### **Production and Consumption**

#### *Demand Mix*

The principal driver of demand for forest fibre from Atlantic Canada is construction of new homes and pulp and paper bound for the U.S.. Forest products production is dominated by softwood sawlogs in all provinces except Newfoundland and Labrador. Demand for softwood lumber will eventually increase as the U.S. works its way out of its current housing slump, but the sawmill sector faces challenging

times for the next 18 to 36 months. If panelized construction and the use of engineered wood products increase, as most analysts expect (Lavoie and Laytner 2007), traditional framing lumber will gradually make up a smaller proportion of total demand.

Demand for hardwood sawlogs is more difficult to predict. To the extent that flooring and cabinetry are also tied to new home construction, it is difficult to foresee significant increases in demand in the short term. However, the market for hardwood chips may improve if biomass energy facilities expand. Pulp mills that use hardwood chips for specialty papers and dissolving pulp should stabilize demand in this sector. For example, AV Nackawic and AV Cell (in Atholville, New Brunswick) rely on hardwood for dissolving pulp and bleached hardwood kraft market pulp production. Fraser Papers in Edmundston incorporates a percentage of hardwood chips into its sulfite pulping process to improve bleaching characteristics.

Demand for newsprint continues to decline and is a major concern for several of the region's papermakers, including Corner Brook, Stora Enso, and two Bowater mills. Many firms have changed (or are contemplating changes to) their production mix to minimize exposure to the newsprint market and have converted to specialty papers for packaging and tissue.

#### *Investment Rationale*

Statistics Canada does not publish investment data for Atlantic Canada because of confidentiality requirements. Nationally, research and development spending by the forest industry rose from \$214 million in 2000 to \$548 million in 2004. Forest research and development spending by the federal and provincial governments remained flat during the same period. Most recent investments in the region have focused on improving process efficiency and reducing energy costs. Comparatively less investment has been directed at product diversification and new product development. There have been some recent investments in wood pellet production, but JDI recently announced that it was postponing a previously announced investment in biomass energy production. The provinces, several firms, and private woodlot owners continue to make significant investments in silviculture and forest management. There is a comparatively small but continuing public and private investment in forestry research in the two CFS labs (Fredericton and Corner Brook) and the universities in the region.

#### *Supply Scenarios*

Economically available fibre supplies are tight. Forest industry interests often make the argument that investments in more efficient production facilities require an expanded, secure fibre supply. They argue that intensifying production is the best route to an expanded supply. This approach is controversial in New Brunswick and Nova Scotia, where the environmental community has expressed opposition to expanding forest plantations.

Unlike other regions of Canada, merger or acquisition of plants in the Atlantic region does not necessarily result in consolidation of wood supply. Sustaining even the current levels of wood supply is wholly dependent upon the continuation of significant silvicultural programs and their accompanying costs.

Table 5. Annual Wood Supply Projections for Atlantic Provinces (000m3)

Province	Species type	2010	2050	2100	
Newfoundland and Labrador*	Softwood	2,022	2,022	2,022	
PEI	Softwood	61	315	-	
	Hardwood	160	181	-	
Nova Scotia					
	Crown	Softwood	1,100	2,200	-
		Hardwood	400	490	-
	Industrial Private	Softwood	1,750	2,850	-
Private Woodlot					
		Hardwood	510	530	-
New Brunswick					
	Crown	Softwood	3,495	4,700	4,700
	Hardwood	1,834	2,000	2,000	

\*Crown land industrial tenure. Source: National Forestry Database, Wood Supply in Canada, 2005

## Prices and Markets

### Currency Effects

Because of export dependency, most of the forest products sold in the region are priced in U.S. dollars. The U.S. dollar and Canadian dollar reached parity on September 20, 2007, for the first time in more than 30 years. A stronger Canadian dollar makes Canadian exports relatively more expensive to buyers in the U.S.. The Forest Products Association of Canada has consistently pointed to exchange rates as one of the principal reasons for the declining profitability of the Canadian wood products sector.

### Pulp and Paper

Table 6. Recent Pulp Prices

Date	NBSK \$US	NBSK Europe US\$	BHK Europe US\$	BHK Europe Euros
24 July 2007	825.52	799.26	700.01	507.14
17 Jul 2007	825.52	799	700	507.91
10 July 2007	825.58	798.7	699.89	514.78
3 July 2007	810	796.85	697.95	516.81
26 June 2007	810	791.25	691.5	516.16
19 June 2007	810	790.76	688.55	517.16
12 June 2007	810	785.4	685.66	513.64
5 June 2007	810	779.63	679.31	505.59
29 May 2007	810	778.65	678.09	504.49
22 May 2007	810	778.79	676.37	501.87

Source: Paper Age

North America is the world's largest consumer of pulp and paper products, both in terms of total tons per year, and in terms of consumption per capita. Recent rationalization has reduced the amount of pulp on the market, and pulp prices have responded accordingly (Table 6). The closure of many sawmills means that the supply of chips and sawdust

has declined. Fitch Ratings (2007 b) reports that pulp list prices have increased by \$60 per tonne for bleached softwood kraft and \$40 per tonne of bleached hardwood kraft since the beginning of 2007. Demand for recycled fibre has also increased because of Chinese imports for boxboard production. Paper prices were beginning to increase in July. Fitch reported increases of \$25 per tonne (newsprint) to

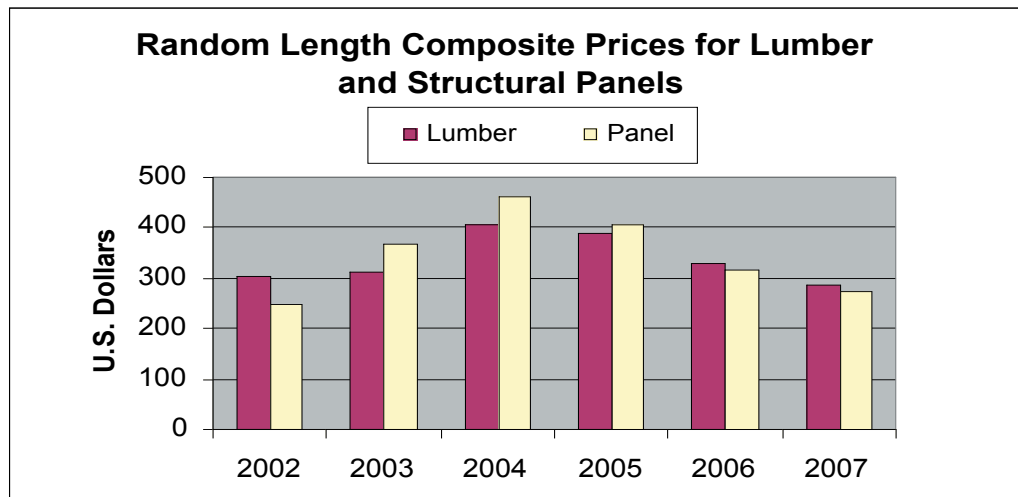


\$60 per tonne for uncoated freesheet and supercalendered papers but noted that the increases were not supported by increased North American demand and “may not stick” (Fitch Ratings 2007b: 2).

*Wood Products Composite Prices*

As a result of the housing pullback, U.S. lumber demand is expected to continue to decline through 2008 and perhaps 2009. The declining demand has forced the Random Lengths composite prices of both lumber and structural panel products downward for the third year since its peak in 2004 (Figure 8).

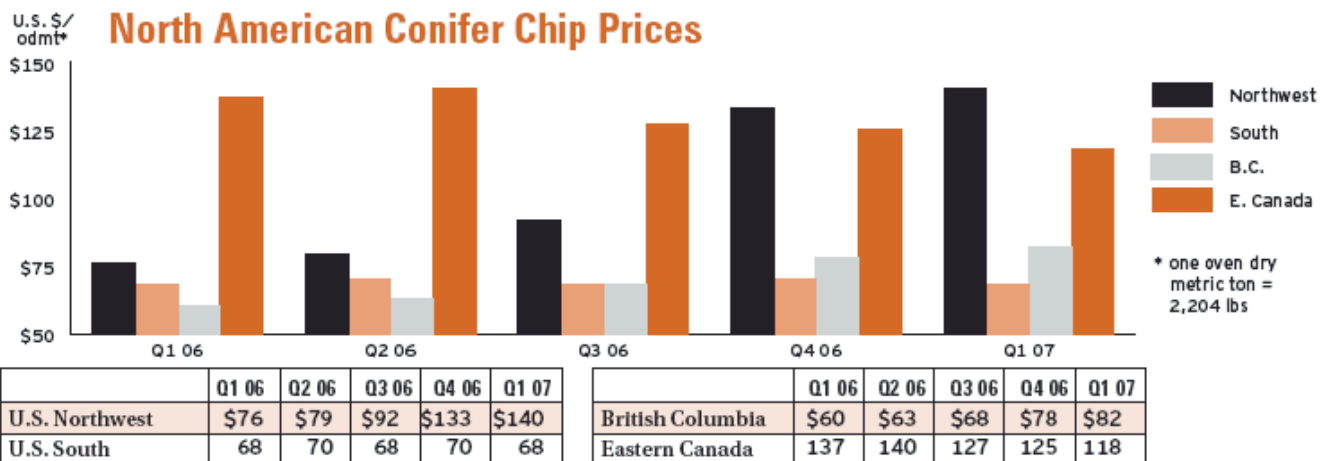
Figure 8. Composite Prices for Lumber and Structural Panels



Source: Random Lengths Inc.

North American conifer chip prices changed dramatically in different regions during 2006. There was an unprecedented increase of 85 percent in the U.S. Northwest, but prices remained stable in the U.S. South. Chip prices remained strong in British Columbia but declined from \$137 to \$118 per tonne in eastern Canada during 2006 (Figure 9).

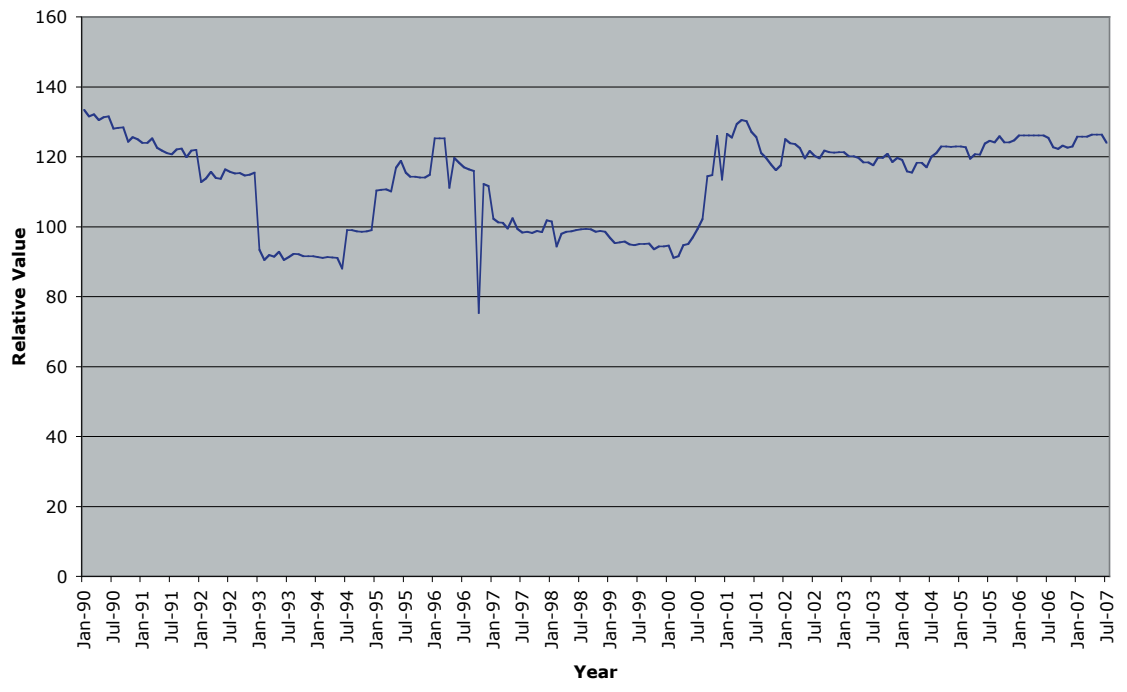
Figure 9. North American Conifer Chip Prices (US\$/ODMT)



Source: North American Wood Fiber Review (Wood Resources International Ltd.)

Figure 10 displays the relative price for pulpwood chips in Atlantic Canada from 1990 to 2007. The index equals 100 in 1997. The long-term trend in pulpwood chip prices increased dramatically in 2000–2001, and prices have remained relatively high since 2002.

Figure 10. Pulpwood Chip Price Index for Atlantic Provinces



Source: CANSIM Table 3290043

### III. Strategic Analysis of Strengths, Weaknesses, Threats, and Opportunities

The following section provides a brief analysis of the strengths, weaknesses, threats, and opportunities that will confront Atlantic Canada's forest products economy in the next five years.

#### Strengths

##### *Forest Management Expertise*

The region is an experienced national and international leader in sustainable forest management. It has particular strengths in computer software systems that combine geographic analysis with growth-and-yield modeling. These tools have become a mainstay in traditional forest management for fibre production, but they also have great potential in managing forests for other outputs and values, including carbon sequestration and watersheds. Forest management is a classic example of a "knowledge industry." Forest management technology and expertise developed in Atlantic Canada are exportable to rapidly developing nations. This is one of the strongest parts of the region's forest economy. Fredericton-based Remsoft Inc. is probably the most widely known example. Its spatially based forest management software products are used throughout the world by forest products manufacturing firms, consultants, and academic institutions.

The region generally has a strong information basis for its analysis of resources through private and public inventory, mapping and remote sensing systems, and forest growth-and-yield models, though there is still opportunity for improvement to ensure that coverage is current, accurate, and complete.

##### *Robust Forest with Diverse Species Composition*

Forest composition in Atlantic Canada is much more diverse than in most other regions. From the boreal forests of northern New Brunswick, Newfoundland, and Labrador to the Acadian forests of Prince Edward Island and Nova Scotia, the region's forests display an array of hardwood and softwood species. This species diversity allows a wider variety of uses and products than is available in most other regions of Canada.

##### *Diverse Ownership Pattern*

Similarly, forest ownerships in Atlantic Canada are much more diverse than in the rest of the nation. As a result, provincial governments have an opportunity for policy experimentation that can promote different strategies in different ownership classes. Private landowners and industrial forest owners in particular are able to adapt more quickly to market-based opportunities and innovation than most governments. As a result, the region may have some comparative advantages over provinces where nearly all forestland is Crown land.

##### *Infrastructure*

The region has a well-established transportation network, including haul roads, commercial highways, manufacturing plants, and shipping facilities. The erosion of the railroad network has left some mills solely dependent upon truck transportation.

### *Experienced Professional and Technical Management Cadre*

The region benefits from an experienced cadre of professional resource managers, mill managers, and technicians. The region's universities and colleges host a variety of programs that produce highly skilled professional resource managers, engineers, and technicians. In addition to the forestry programs listed below (Table 7), there are wood products manufacturing and pulp and paper technician programs in Nova Scotia and New Brunswick.

### *Strong Private-Public Partnerships*

The federal and provincial governments recognize the importance of the forest products sector and have well-established relationships with producer organizations ranging from woodlot owners to multinational corporations. Forestry is an important issue for policy makers, and there is a general willingness to address the needs of the sector.

### *Strong Forest Research and Education Programs*

The region hosts some of the best forest and forest products manufacturing research facilities in Canada. The CFS Atlantic Forestry Centre in Fredericton is a national leader in forest insects and disease research. The University of New Brunswick's Faculty of Forestry and Environmental Management is a leader in research related to forest management, forest ecology, growth-and-yield modeling, and geographic information systems. Its recent research in mapping depth to groundwater has received wide acclaim. The region's technical and community colleges produce skilled equipment operators, field technicians and mill technicians.

Table 7. Forestry Education Programs in Atlantic Canada

<i>Programs</i>	<i>Institution</i>	<i>Location</i>
BScF, BscFE, MSFE, MSF, MFE, MF, MEM, PhD	University of New Brunswick	Fredericton
BScF, MSF	Université de Moncton	Edmundston
Forest Technician Diploma	Maritime College of Forest Technology	Fredericton, Bathurst
Forest Operations Technician Diploma	New Brunswick Community College	Miramichi
Natural Resources Operations Diploma	Nova Scotia Community College	Lunenburg
Forest Technician Diploma	College of the North Atlantic	Corner Brook

### *Highly Integrated Subsectors*

The forest products economy in the region is dominated by highly integrated primary industries. The best-known example is the mutual relationship between sawmilling and pulp and paper manufacturing. "Waste" products from sawmills are an important input into pulping and fibreboard manufacturing. In many cases, the value of the sawmill waste sold for paper production has made the difference between profit and loss for sawmillers. Although the primary sector is highly integrated, the secondary or "value added" wood products industry is more independent and generally less reliant on Crown fibre.

## Weaknesses

### *Limited Basic Research Capacity*

State and federal governments in the U.S. are investing millions of dollars in basic and applied research relating to renewable energy and biotechnologies that focus on forest products. In 2006, for example, the University of Maine announced a US\$10 million Forest Bioproducts Research initiative. Atlantic Canada's efforts in this research sector are limited. Most basic research in this and related fields occurs in central Canada. Within the region, we were able to identify only a single research project related to biorefineries being conducted by the Limerick Centre at UNB, with funding from Paprican in cooperation with AV Nackawic.

### *Reliance on Too Few Products*

Forest products manufacturing in Atlantic Canada is dominated by the pulp and paper and sawmilling subsectors. When demand for paper and lumber is high, the sector is profitable. Because demand is traditionally cyclical, the forest products economy provides a textbook case of a boom-and-bust resource extraction economy. Diversifying products is one important element in moderating the peaks and troughs inherent in this system and should be a principal policy objective of economic development efforts by the federal and provincial governments. To some extent, the value-added wood products sector works against this trend. It continues to be a niche segment that has attracted the focus of economic development efforts from time to time and deserves renewed attention.

### *Reliance upon a Dominant Trade Partner*

The reliance on sawmilling and pulp and paper manufacture is compounded by the region's dependence on exports to a single importer—the U.S.. As a result, Canadian manufacturers are exposed to currency risk and steep changes in housing cycles. The recent announcement of lumber exports to Ireland is a welcome change. According to a representative from Industry Canada, New Brunswick had not exported lumber to Europe for more than ten years because of phytosanitary concerns (Martins, 2007).

### *Currency Risk*

Dependence upon the U.S. export market increases the region's vulnerability to currency-related risk. By November 2007, the Canadian dollar was worth US\$1.08, following an unprecedented three-month change in relative value. The decline of the U.S. dollar exceeded many analysts' expectations. However, it illustrates the vulnerability of Atlantic Canada's exporters to dependence on a dominant trading partner. Forest products firms and trade associations throughout the region are continuing to identify exchange rates as their principal short-term challenge.

### *Relatively Low Biological Productivity*

Because of environmental factors, including climate and soils, many sites in Atlantic Canada produce forest fibre more slowly than warmer sites closer to the equator. Forest managers have overcome this natural disadvantage by selecting superior plant materials and controlling competition for nutrients and water. Some of the best sites in Atlantic Canada are certainly competitive in terms of productivity under management with comparable sites in more favorable climates. But the technologies used to overcome environmental disadvantages are also available to forest managers in other regions.

*Relatively High Fibre Costs*

Generally speaking, total costs, total manufacturing costs, and total fibre costs are higher in eastern Canada than they are in the rest of the country. We have no direct data for the Atlantic provinces. Some consulting firms produce proprietary data that are specific to the region, but they were unavailable for this project. Several provinces have access to proprietary data. The best figures publicly available are a regional analysis that compares eastern Canada (the Atlantic provinces, Québec, and Ontario) with central and western Canada. Data for estimated production costs are presented in Part Two of this report, in Figures 74–76.

*Discretionary Suppliers*

The high proportion of wood purchased at the mill gate from private land in Atlantic Canada means that there is some risk associated with securing a continuous wood supply, unlike the situation in regions dominated by Crown lands. Many landowners can, at least in the short term, stand aside from the market if prices decline or do not meet their expectations. During good market conditions, buyers must expect competition from others for the most desirable species or grades of wood. This business risk has always been a significant and limiting factor for new ventures seeking to become established or expand, and it is a disadvantage not necessarily faced in other provinces.

*Highly Integrated Subsectors*

Fibre supplies in the region are generally tight, given the prices that firms can pay and remain profitable. As a result, new uses and users must compete for fibre supplies. Developing new sectors will necessarily mean either reallocating existing supplies or finding new efficiencies within the current system.

*Lack of Knowledge about Fibre Flows*

A continuing goal for provincial policy makers is to allocate fibre in a manner that maximizes its economic value. From an economic policy perspective, however, it is difficult to estimate intersectoral competition for fibre because we cannot track the flow of fibre from harvest to finished product.

*Relationships among Stakeholders*

Relationships among stakeholders have been stressed by intergroup competition for some time in New Brunswick and Nova Scotia and to a lesser extent in Prince Edward Island and Newfoundland and Labrador. As a result, there is continuing public controversy over forest management in the region. Governments find it easier to act on new policy initiatives when there is an apparent public consensus.

Many of Atlantic Canada's thousands of woodlot owners are considered inactive or uninterested in production forestry. Few have even a rudimentary plan for future operations, and over the past decade, government support for technical or practical education or training has been greatly curtailed by fiscal necessity. Such owners are more likely to hear of controversy than learn about opportunity.

*Lack of Support for Technology Transfer*

Technology transfer to small- and medium-sized wood products manufacturing firms is limited throughout the region. Because many firms do not have the financial resources to participate as members in national research and development institutions, they have less access and exposure to technological innovation. This is a particular problem in the value-added sector in Atlantic Canada.

## Threats

### *Loss of Social License*

Natural resource policy analysts often write of an implied “social license” for forestry. For most of the 20th century, provincial policies allocated Crown licenses to firms that operated mills and provided employment and economic development. Now that employment in the forestry sector and its relative share of contribution to gross domestic product has declined, the basis of the bargain has begun to fray. As Crown forests increase in value for products such as ecosystem services and watershed protection, there will be a gradual renegotiation of the underlying agreement. If the economic interests cannot find ways to meet the public's needs, their access to Crown resources may diminish.

### *Climate Change and Related Agents of Change*

Climate change poses two significant long-term threats to the region's forest products economy: one chronic and one acute. Given an approximate 60-year economic rotation for the region's forests, it seems likely that the seedlings now being planted will face different growing conditions and increased risks by the time they are harvested. In the region's boreal forest, the interaction among spruce budworm cycles, warming temperatures, and the vulnerability of insect-killed stands must be a consideration for forest managers. The mountain pine beetle outbreak in interior British Columbia and Alberta well illustrates the issue.

### *Exotic Insects and Diseases*

The irruption of the brown spruce longhorn beetle in Nova Scotia exemplifies the threats associated with exotic forest pests. In addition to the physical loss of trees and fibre, trade restrictions soon follow. Although Atlantic Canada's ports are an important source of economic development, they also represent a potential threat to forest and agricultural systems without adequate phytosanitary safeguards. A second but often overlooked source of exotic insects and diseases is inadvertent contamination of commercial nursery stock. With softwood silviculture heavily dependent upon planted seedlings, an untimely nursery quarantine could adversely affect some regeneration efforts.

### *Trade Restrictions*

Because Atlantic Canada's forest products economy is heavily dependent upon exports, it is also exposed to threats from trade restrictions. The softwood lumber agreement with the U.S. did not affect Atlantic Canada as much as it affected other parts of Canada. However, it illustrates a general point: the region's forest products economy is vulnerable to trade restrictions imposed for economic or phytosanitary reasons. Prior to the mid-1980s, Europe was the regional lumber industry's principal export market. That trade came to an abrupt end with European Union restrictions to address a perceived threat from the pinewood nematode.

### *Conversion of Private Woodlots to Nonforestry Uses*

Because Canada's forests are overwhelmingly owned by the Crown, relatively little national attention has focused on problems unique to privately owned forests. The diversity of ownerships in Atlantic Canada is generally a strength, but it also subjects the region (as well as southern Ontario and portions of Québec) to some important challenges. If private forestlands, large and small, are not profitable as producers of fibre, some of them will likely be put to other uses. This trend is already apparent in parts of Nova Scotia, western and southern New Brunswick, and adjacent areas of Maine.

## Opportunities

### *Renewable Energy Production*

The potential for forest-based renewable energy production is certainly one of the most widely discussed ideas within the region. It has several obvious advantages as a carbon-neutral, sustainable resource. Many firms in the region already burn hog fuel for internal power generation, and some produce electricity to sell into the regional grid. The region has successful examples of district heating systems, wood pellet producers, and medium-scale commercial energy producers.

New wood pellet manufacturing facilities have been announced in southern and northern New Brunswick, and many more have been proposed. Demand for wood pellets is relatively low within the region and New England and successful pellet operations in Nova Scotia and western Canada are focusing on exporting pellets to Europe.

In promoting the potential for wood pellet production, Jenkins and Albright (2007) argue that there is an ample supply of low-quality wood that is simply left behind in the region's forests after harvesting because it does not meet mill requirements. This is true, but its availability must be considered in the context of harvest and transportation costs. Under current market conditions, it will be challenging to harvest and process this wood profitably.

Large facilities typically burn chips and hog fuel to produce process steam and electricity either for use "within the fence" or for sale to a utility. For example, Nova Scotia Power currently purchases about 75 MW of power from small-scale biomass combustion. Fraser Paper operates a 50 MW cogeneration facility in Edmundston. Corner Brook Pulp and Paper also produces biomass energy for their own consumption and is proposing to expand its production. However, large-scale cogeneration of electricity from wood still seems distant without the explicit inclusion of biomass in utility renewable portfolio standards and movement away from provincial generating monopolies. Several cogeneration facilities are operating in New England and New York because of the policy changes in southern New England that favor "green energy."

One consequence of this expansion is increased competition and prices for biomass chips. Recall one of our first principles—that because of the fully allocated forest, redirecting fibre supplies to new uses means diversion from existing uses. These new markets will be particularly advantageous for forest landowners with low-grade hardwoods to sell, but they will create problems for sawmills and panel plants already coping with razor-thin margins.

In addition to direct combustion, technologies for converting wood to other energy products include pyrolysis (bio-oil) and distillation of wood alcohol for biofuel. Bio-oil is a liquid fuel produced by rapidly heating organic material in an anoxic environment and then quickly cooling it to capture the volatile products. The result is a liquid oil, char, and gas. The liquid can be burned to provide heat or electricity, and it may have potential to produce higher-value chemicals, pharmaceuticals, and food additives (INRS 2005).

An analysis conducted for the New Hampshire Office of Energy and Planning in 2005 concluded that a bio-oil facility using forest-derived whole-tree chips would not be economically feasible without substantial public subsidies. Viable processes have been demonstrated, but no current facility has



successfully marketed bio-oil as a stand-alone product because of its inherent limitations compared with bio-diesel and traditional #2 fuel oil. However, it may have some potential as part of an extended process. Three firms (Ensyn Corp., DynaMotive Energy Systems Corp., and Renewable Oil International) have small- to medium-sized research and demonstration facilities. The New Hampshire Office of Energy and Planning has organized several presentations, including technical and economic analyses that are quite useful (available at <http://www.nh.gov/oep/programs/energy/bioOil.htm>).

#### *Heat-Treated Lumber*

A potential niche market for Atlantic Canada's forest products sector is heat-treated lumber. Consumer resistance to chemical preservative treatment of lumber is creating opportunities for innovation. Although heat treatment is not a new technology, recent requirements for approved phytosanitary shipping materials will create a small but steady demand for heat-treated pallets and wooden shipping containers for exported products. ACOA recently funded a research project with Marwood through its Atlantic Innovation Fund. High-temperature treated wood is being used for the manufacture of various outdoor products, such as fencing, garden furniture, patios, play structures, and paneling. Moreover, because this type of treatment also modifies the colour, it can make an otherwise low-value species look like exotic lumber and increase its value for use in components such as kitchen cabinets and flooring, particularly in European markets.

#### *Biochemicals*

AV Nackawic has begun the process of reconfiguring its hardwood pulp mill into a facility for the production of dissolving pulp, a component used in rayon manufacturing by its parent firm in India. Because of this process conversion, the mill plans to eventually begin production of ethanol and biochemicals. The competitive advantage for this facility is its reliance on hardwood that has a lower lignin and higher cellulose content than softwood. If the process conversion is expanded, this will likely be the first "biorefinery" operating in the region. A smaller facility (AV Cell in Atholville, New Brunswick) is also moving in this direction.

#### *Engineered Wood Products*

Several firms in the region already produce engineered wood products—laminated veneer lumber, oriented-strand lumber, oriented-strand board, and many other wood products that are formed by disaggregating and reconfiguring the fibre. These products have the advantage of being produced to meet specific requirements for strength and resistance to weather and moisture. As a result, they are increasingly used in commercial and light industrial structures and will find increased use in panelized construction.

#### *Nutraceuticals and Pharmaceuticals*

According to our research, two firms in eastern Canada are processing Canada yew (*Taxus canadensis*). One is Chatham Biotec in Riverview and Shippagan, New Brunswick; the other is Bioxel Pharma in Ste. Foy, Québec. Chatham holds a lease on New Brunswick Crown forests. The Crown received less than \$100 in revenue from the lease last year, according to New Brunswick DNR. Chatham is also exploring the possibilities of extracting betulinic acid from fungi that colonize birch trees and has an active program for wild blueberries (*Vaccinium* sp.). The future for these and other products appears promising, but economic development is probably beyond the timeframe of our report. There may be an opportunity for expanded support of research for developing pharmaceuticals from forest products.

### *Carbon Sequestration and Carbon Forestry*

Atlantic Canada has a potential competitive advantage in managing forests for climate mitigation because of its private forestland base. In September 2007, Forecon EcoMarket Solutions, LLC (a forest consulting firm) obtained approval for the first TIMO-owned managed forest carbon offset project in the U.S. on the Chicago Climate Exchange (CCX). The price in October 2007 was slightly less than US\$2 per tonne. If markets for carbon offsets continue to evolve, private forest landowners may be able to generate additional income in some circumstances.

In the Kyoto Protocol process, the Conference of Parties agreed to the limited inclusion of land use, land-use change and forestry (LULUCF). Developed countries with agreed greenhouse gas emissions reduction targets may host afforestation, reforestation, and forest management projects and use carbon uptake by forests within their national greenhouse gas accounting. Canada monitors and reports carbon balances under the Kyoto Protocol but has chosen not to include forest carbon schemes in its national accounting plan because carbon sequestered in forests is at risk from fires and other disturbance.

Forests in Atlantic Canada are not precluded from participating in commercial offset schemes, but most efforts are currently focusing on tropical and semitropical regions. Just as with sustainable forest management and green building construction, several entities offer carbon forest certification standards, which are integral to the trading of carbon credits. Carbon forestry may have potential for forest landowners, but its near-term prospects are unclear.

### *High-Quality Hardwood Lumber and Veneers*

Under appropriate management, some sites in western New Brunswick, Prince Edward Island, and Nova Scotia are capable of producing high-quality hardwoods suitable for furniture and veneer production. Producer prices for hardwoods are much higher than for softwoods. The Wood Products Group Bulletin recently quoted prices for kiln-dried 4/4 maple ranging from US\$935 to \$1,860 per mbf at the mill gate. Comparable prices for kiln-dried spruce-pine-fir at the time was US\$335 to \$345 delivered in Boston. Hardwoods have an important role in the future of the region's forest economy. They are a much smaller component than industries based on softwood, but in a more diversified forest economy, their role will be proportionately greater than it is today. Unfortunately, many hardwood sites were degraded through poor forest management in the 19th and early 20th centuries. We believe there is a long-term opportunity for forest managers to improve hardwood quality on these sites.

### *Low-Quality Hardwood Uses*

Developing useful products from low-quality wood has been a quest for wood products researchers for many decades. Alder in Pacific coastal forests provides a useful example. For decades, red alder (*Alnus rubra*) was considered a "weed tree" by many foresters. Today, advances in sawmilling and assembly technology mean that it is a profitable species for furniture production. Most of the large home improvement retailers in Atlantic Canada import it from Oregon.

Red maple (*Acer rubrum*), the birches (*Betula* sp.), and poplars (*Populus* sp.) are in a similar circumstance in our region. The University of Maine's Advanced Engineered Wood Composites Center is promoting red maple composite lumber. Low-value hardwoods are also a component in some groundwood pulp because of their bleaching characteristics.

Given the current economic climate, several investment research firms suggest that the best overall investments in this sector are probably in forest production rather than manufacture. The supply of fibre is already tight, and it seems likely that forests will become more valuable in the future as a source of renewable fuels or perhaps in situ for carbon credits. If biomass energy production increases, hardwood forest owners may capture an additional benefit if the fibre is purchased based on its BTU value per ton. Hardwood prices tend to move in a similar fashion as softwood prices because much of the demand comes from cabinets and flooring for new home construction. Low-grade hardwood is also used for pallet production. To the extent that it can be used to produce stock that meets phytosanitary requirements, it should find continuing demand.

#### *Increasing Private Woodlot Efficiency*

Private woodlots tend to have higher operating costs per unit of fibre harvested because it is more difficult to obtain efficiencies of scale. The provinces have developed a variety of programs and policies to encourage the viability of woodlots, ranging from regional marketing boards in New Brunswick to a system of silviculture credits in Nova Scotia. But it remains difficult to overcome the fundamental problem of low prices and relatively higher production costs. In the long term, an answer may lie in public support for the public benefits these private lands produce.

For example, in Indiana, The Nature Conservancy has implemented a “forest bank” program (<http://www.nature.org/wherewework/northamerica/states/indiana/news/news1473.html>) that places a conservation easement on a woodlot and then makes annual payments to the owner based on the value of the timber present. A professional forester manages the lands with an emphasis on protection of biodiversity and supervises harvesting and regeneration. In some ways, this program is similar to the absentee owner program that several of the wood products marketing boards operate in New Brunswick, but the forest bank has the advantage of consolidating smaller woodlots into larger operating units. The program has had some success in Indiana but was tried and abandoned in the Clinch River region of the Appalachian Mountains.

Forest landowner cooperatives are increasingly popular in the northeastern U.S. and have had some success in Ontario. Nova Scotia has a well-developed system of cooperatives and regional producer organizations. The groups with a long-term “for profit” orientation have been most successful. Woodlot owner organizations and marketing boards are by necessity in the process of reinventing themselves.

One approach is to find new services that they can provide for their members beyond their traditional focus on fibre management. Depending upon the policy directions that the federal and provincial governments make, there may be opportunities to expand services in carbon forestry and management for other ecosystem services.

Perhaps the greatest opportunity lies in the idea of innovative policy experiments. Because each of the four provinces is unique in its mix of ownerships and species diversity, a wide range of possible approaches are available for improving the economic viability and ecological sustainability of private forests. Greater coordination and cooperation among the Atlantic provinces, Maine, Québec, and Ontario might facilitate the evaluation and transfer of effective ideas.

## IV. Conclusions

The traditional forest products sector in the near future is likely to be smaller in terms of its contribution to the region's economy and number of workers employed than it has been in the past. There are important choices to be made about the nature of the forest and the mix of forest products that will replace it.

We draw three conclusions based on our analysis:

### Diversifying Products and Markets

First, the most important role for governments with regard to economic development and forest policy is to create the conditions that allow competitive firms to diversify their products and markets. A potential opportunity for diversification in the near term is electrical generation from wood fibre. "Green electricity" may have the potential to add a significant revenue stream for pulp and paper mills and some sawmills.

It is likely that a number of firms and utilities in the region have conducted cost-benefit analyses of wood-fired electrical generation. To our knowledge, these are not publicly available. We recommend that the various levels of government undertake a feasibility analysis that includes environmental effects and which could eventually be used to inform public policy decisions.

The viability of biomass-based electrical generation is particularly sensitive to public policy decisions. For example, electricity generated from wood fuel from certified forests has qualified for price premiums under renewable portfolio standards in some northeastern states. Similarly, production of electricity from renewable rather than nonrenewable fuels may assist governments seeking to address greenhouse gas emissions.

Biomass-based electrical production in Atlantic Canada may or may not be economically feasible based on current cost assumptions, but we cannot know until the analysis is completed and the public and elected officials have an opportunity to comprehend the results.

Provision of technical and business management services to small and medium-sized forest products enterprises has often been suggested as an economic development tool. Our interviews for this report found consistent support for expanding this role within the industry and some provincial governments. The most significant barrier appears to be a consistent source of programmatic funding. If one of the objectives of regional economic development for the forestry sector is diversification of products and markets, then additional research, technology transfer, and business management training for these firms should be seriously considered.

### Support for Applied and Basic Research in Alternative Forest Products

A second area for exploration is federal and provincial support for applied and basic research in alternative forest products. The economic development agencies within the region have been willing sponsors of several projects that have led to new products and new jobs. But there is no sustained, self-supporting program for the region. Reliable data on R&D investments in the forest sector are unavailable, but based on anecdotal evidence, we believe that neighboring states and provinces are

making larger investments in applied and basic research related to new products and technologies than are the provinces of Atlantic Canada.

The source of the funds for a sustained research and technology transfer program is a concern. Roberts (2007) and others have advocated a fibre tax to fund research on alternative products and technologies. One source might be a small levy on each cubic metre of fibre harvested from Crown forests. The funds might be diverted from the existing Crown revenue stream rather than as an additional cost to licensees.

### **Policy Options for Private Forestland Conservation**

Third, three of Atlantic Canada's provincial governments (New Brunswick, Nova Scotia, and Prince Edward Island) have good opportunities to design and implement innovative policy options for private forestland conservation because of land tenure patterns. Among the possibilities are financial and technical assistance for production of ecosystem services, multilandowner certification, new approaches to organizing smallholdings to reduce operating cost.

Most current provincial aid programs for woodlot owners focus on maintaining fibre production through silviculture. The availability of carbon offset payments for sustainable woodlot management has recently become a reality. The California Air Resources Board adopted a registry for forestry greenhouse gas protocols in October 2007 (California Environmental Protection Agency Air Resources Board 2007). The Chicago Climate Exchange is also marketing carbon offset projects from sustainably managed forests. It will take some time to develop the institutions necessary for a similar effort in Atlantic Canada, but it is an opportunity that deserves serious consideration.

The U.S. Environmental Protection Agency and several states have initiated water quality trading programs that apply a "cap and trade" approach to water pollution control (<http://www.epa.gov/OWOW/watershed/trading.htm>). This approach might be applied to forest landowners who occupy watersheds that provide surface drinking water to municipalities. Technical assistance from agency wildlife biologists for forest owners has been available for many years from some governments. Payments for maintenance or enhancement of habitat for species of concern are certainly possible. Providing these or other services through woodlot owner cooperatives or regional marketing boards might provide additional revenue streams for these institutions.

In addition to the forest bank program mentioned earlier, there may be the potential for an expanded role for land trusts using conservation easements to protect working forests adjacent to urban growth zones. Each of the provinces already has experience with land trusts. Most of the activity thus far has focused on protecting habitat for species of concern. The same concept can be applied more broadly to maintaining working forests that provide ecosystem services as well as fibre.

The forests of Atlantic Canada have never been more important than they are today because of their continuing contribution to the economy and their increasing importance for environmental sustainability. The forest products sector in Atlantic Canada is in the midst of one of its most important restructurings in its 300-year history. We remain cautiously optimistic about its future because of the forest's growing value for a variety of uses beyond the traditional industries of lumber and pulp and paper manufacturing. Successful reinvention of the sector depends on several changes that must come from governments and the firms themselves.

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## Individuals Consulted During the ACOA-CIFPAC Study

We spoke with or corresponded with the individuals below regarding the status and future of the forest products industry and related programs during this study. Some consultations were formal interviews or email requests specifically referencing the ACOA study. Others were more general conversations about the status of the regional forest products economy and the policy directions we might consider.

Mark Arsenaault, NB Forest Products Assn.  
Bill Anderson, CFS  
Jeff Butler, Butler Consulting  
George Bruemmer, CFS Fibre Centre  
Roberta Clowater, CPAWS NB  
Mary Lou Cotter, NB Dept. of Finance  
Jenny Dunlap, NB DNR  
Gary Forward, NL DNR  
Scott Gregor, Flakeboard Ltd.  
Nairn Hay, Fundy Model Forest  
John Hector (through Bill Anderson) CFS  
Patrick Lacroix, J.D. Irving Ltd.  
George Jenkins, UNB Wood Tech Centre  
Alain Joseph, Dalhousie University  
Peter Milley, Halifax Global  
Yonghao Ni, Limmerick Centre, UNB  
Terry Noble, Fraser Papers & NB Forest Products Assn.  
Fred Nott, Wood Products Group  
Paul O'Driscoll, NB Chamber of Commerce  
Wendy Osborne, NB Chamber of Commerce  
Jim Richard, Business New Brunswick  
Don Roberts, CIBC World Markets  
Bob Stanton, NB DNR  
Steve Talbot, Forest Products Assn. of Nova Scotia  
Doug Thompson, Wisconsin Chapter, The Nature Conservancy  
Barry Tupper, Forintek  
Barry Wilson, Indiana Chapter, The Nature Conservancy  
Susan Wood, Biocap Foundation  
Stephen Wyatt, UdeM Edmundston