For Whom The Tree Falls: Restructuring of the Global Forest Industry*

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There was no such entity as a global forest industry before 1960. Apart from the USSR, there were only two commercial forest regions: northern Europe and northern North America, based on softwood forests. There was no other viable source of wood fibre for large-scale industry, so no incentive or reason to move elsewhere. Companies originating in the United States, Canada, Scandinavia, and northwestern Europe marketed lumber, pulp, newsprint, and paper elsewhere, but most of their produce was sold in established consumer markets of Europe and North America.

Four conditions have gradually altered that situation:

(1) the decline in traditional softwood forests, especially in North America;

(2) the development of new pulping technologies, together with new tree species in southern regions, giving rise to a wholly new forest industry in southeast Asia, parts of Africa, Latin America, and the southern United States;

(3) the growth of Japanese paper-making companies dependent on off-shore fibre sources and recycled wastepaper; and the adoption of the Japanese model by other countries; and

(4) the expansion of consumer markets in Asia.

In this paper, I will discuss these four conditions, the restructuring of the industry in response to them, and some of their social effects. In brief overview, I argue that Asian and some Latin American countries are becoming self-sufficient in pulp and paper, though at a severe social and ecological cost; tropical forests are being logged not so much for their trees as for their land-base, which is being replanted with new species suitable for

* This paper is based on a presentation to the joint meetings of the Canadian Political Science Association and the Canadian Sociology and Anthropology Association, Victoria, June 1990.

pulpwood; and there are contradictory trends of increasing global concentration and decreasing control by traditional forest companies.

These arguments are all by the way of situating the dilemmas we experience in British Columbia within a larger context. The implied argument throughout is that much of the debate over forestry in B.C. is based on the false assumption that the industry will continue indefinitely as the major economic activity of the region.

Decline of traditional softwoods

From about the middle of the nineteenth century to the end of the 1970s, the making of wood products from softwood forests was a central economic activity in Northern Europe and North America. In the mid-1980s, nearly three quarters of all industrial wood (72 per cent) was still grown in the northern temperate climates. The United States and Canada produced a third of this; Europe, about 20 per cent; the U.S.S.R., about 18 per cent. The remainder (28 per cent) was produced in China (6 per cent), other Asia-Pacific regions (6 per cent), Brazil (4 per cent), and elsewhere in smaller proportions.[1]

North American forests, however, are in decline. They have been overcut and inadequately replanted. Since traditional softwoods take between 80 and 400 years to reach maturity, private investors are not eager to invest in reforestation. Instead, they have invested in the development of technologies to utilize tree species hitherto unsuitable for pulping and construction, and superior to softwoods in growth time and overall management costs.

Sweden has not suffered the same decline because its governments instituted reforestation and afforestation programmes at the turn of the century. The forest cover there is now double the level of 1900.[2] However, with expanding markets, discussed below, domestic fibre sources are no longer adequate, and Swedish companies are seeking new fibre sources. This is likewise true of Finland, which has had less reforestation and is short of domestic fibre sources.[3] In addition, much of the European forest has been affected by acid rain.

[1] FAO, *1985 Yearbook of Forest Products*, Geneva.

[2] Jan Remrod, "Sweden's forests: a growing resource," *World Wood* 32(6) (April 1988): s-4, s-5.; Ove Andreason, "Future Forest Management Trends in Sweden," *The Forestry Chronicle* (February 1978): 29-33.

[3] Jussi Raumolin, "Introduction to comparative studies between Finland and Canada," in J. Raumolin (ed.), "Natural Resources Exploitation and Problems of Staples-Based Industrialization in Finland and Canada," *FENNIA* 163:2, 387-94.

New fibre sources and new producing regions

The new producing regions include northern New Zealand; Tasmania in Australia; Indonesia, Malaysia, Thailand, and some other parts of Southeast Asia; parts of Africa; Portugal; Spain; Brazil; and Chile; with some potential in Argentina and Venezuela; plus — a big plus — the southern United States. They may yet include the boreal forests of Canada. What these countries and regions produce are hardwoods, both tropical and temperate varieties, especially including eucalyptus; various new pine species; plant fibres, especially kenaf; sugar bagasse; and various other vegetable fibre sources.

Companies in New Zealand, Australia, and the southern United States developed the radiata pine (known as Monterey in the United States) during the 1960s and 1970s. In New Zealand, native forests have been burned and bulldozed to make way for radiata pine plantations. These can be grown in relatively short cycles (about thirty years) and have high productivity per hectare. During the 1980s, one million hectares per year — much of it in pine — have been planted in the southern United States.[4] Chile is the most promising source of new radiata pine fibres, with superior growing conditions and extensive afforestation projects already under way, and a reported 100,000 hectares planted by the late 1970s. Caribbean pine is becoming a major new fibre source in Central and South America. Ellioti pine is being grown in South Africa and Brazil. In Canada, and now in Sweden, lodgepole or jack pine is being harvested.

Tropical hardwoods have become major sources of wood fibre for pulp, paper, and paperboard only since the mid-1970s. In 1971, when the Paper Industry Corporation of the Philippines (PICOP) was constructed in Mindanao,[5] the utilization of local hardwoods was largely experimental. Since then, with genetic experimentation and extensive trials on all tropical woods in the Philippines, it has been established that local woods, either alone or in combination with softwoods sourced elsewhere, are viable sources for high grade papers and paper-boards. Similar experiments have been conducted in other tropical regions — Brazil, Cameroons, Indonesia, and elsewhere — and plantations have been established. Most of these trees can be grown in under ten years, and the yield per hectare is greater than for softwoods. Yields from intensively managed plantations in the

[4] Roger Sedjo, "The Expanding Role of Plantation Forestry in the Pacific Basin," paper presented to a national conference on "Prospects for Australian Plantations," Canberra, Australia, 21-25 August 1989, 2.

[5] Cecil MacDonald, "Tropics could be major fiber source." *Pulp and Paper International* 25(7) (July 1983): 26-28.

tropics are estimated to be up to ten times greater than those in temperate zones.[6] Further, in some regions — notably northern Brazil — the plantation acreage is enormous; in one case, 1.6 million hectares.

These plantations are not tropical forests in the fashion designed by nature. Those forests are expensive to log because of their density and the extraordinarily rich mixture of woods, where many are unsuitable for pulping. More economical from the perspective of large logging operations are plantation forests, where the jungle variety is eliminated and only those trees which can be transformed into high-grade pulps are seeded. The view of the vice-president of Indah Kiat, a major pulpmill in southern Sumatra, provides a succinct expression of this:

> We have 65,000 ha now; we are now in the process of getting concessions for another 65,000. Basically we are looking for forest which can be clear cut and replaced with eucalyptus and acacia.[7]

Australian eucalyptus trees have been planted on other continents since the late eighteenth century, usually for decorative purposes. Plantations were seeded in the Mediterranean basin at the end of the last century, intended to produce construction wood. Pulping technology changed from sulfite to sulfate methods over the 1960s, and then the range of options increased to include several chemical and thermal mechanical methods in the 1970s and 1980s. The new techniques allowed companies to utilize a wider range of fibres. Eucalypts were found to be ideal sources. Their advantages included resistance to insects and fungi, and growth cycles of between ten and twenty years. They produce over twice as much pulp wood as pine, and are easier to cut and transport. Several harvests can be obtained from each stump. Companies introduced plantations in warm climates well served by fresh water. Seven pulpmills have been constructed in Portugal since 1960, using eucalypts as their fibre source.[8] Eucalyptus plantations have also been established in Chile, Morocco, Spain, and other warm countries. The *eucalyptus grandis* can be harvested in seven years for pulpwood, and the stumps then sprout new stems to be harvested again on seven-year cycles.[9] *Eucalyptus globlus* is now touted by industry experts as the best fibre source for computer papers.

[6] R. C. Kellison and B. J. Zobel, "Technological Advances to Improve the Wood Supply for the Pulp and Paper Industry in Developing Countries," in FAO, *Proceedings*, 1987, 136-44.

[7] *Pulp and Paper International* (January 1988): 41.

[8] Lars Kardell, Eliel Steen and Antonio Fabiao, "Eucalyptus in Portugal: a Threat or a Promise," *Ambio* 15(1) (1986): 643-50.

[9] Ed Williston, "The industry in the 1990s: where technology is headed," *World Wood* 30(1) (February 1989): 20-21.

In Brazil, productivity per hectare, per year, for the Aracruz pulpmill, is about fifteen times greater than in Scandinavia and northern North America. Brazil's eucalyptus plantations and land are already the base for three major pulpmills, with more in construction and planning. Half the output goes to the export market, and Brazilian manufacturers anticipate continued growth because, they say, "eucalyptus is now a desired fiber worldwide," and:

> The forestry resources [have] a rapid growing rate when compared with the Northern Hemisphere, offer low wood cost, high productivity per unit area, great land spaces ready for reforestation, and biomass resources as an energy source. The pulp demand in the international markets along with increasing prices and low labor costs are promoting a leading technology for eucalyptus pulp and paper manufacture as well as more efficient mills. . . . There is the possibility to transform a part of the foreign debt loans to risk capital, and the participation of interested groups in existing and new projects.[10]

Hardwoods grown in northern regions have also become potential fibre sources. The aspen of the Canadian boreal forest is now susceptible to full-scale logging. Even a decade ago, logging this region was considered uneconomical.[11]

All of the new plantation projects, and the large boreal forests, are attractive to large companies. The investment in plantations yields crops quickly, and in this respect alone is preferable to investments in reforestation of softwood regions. The boreal forests are simply another rich resource provided by nature.

There are some new and rediscovered fibre sources that do not require high capital investments and huge mills. Some countries are beginning to discover their advantages, among which are greater self-sufficiency in pulps and less reliance on foreign investment.

For example, a tropical plant called kenaf has fibre characteristics similar to those of softwoods. It requires about eighteen weeks to reach maturity on flat land in tropical or warm temperate regions. Its disadvantages are that it has a limited harvesting period and cannot be stockpiled for a mill, and it shares with other plants the uncertainties of seasonal production. It would become economical, then, only if mills were located adjacent to both resource and ports, and some of the uncertainties could be eliminated.

[10] Alberto Fernandez Sagarra, Director FICEPA, Sao Paulo SP, Brazil, in *TAPPI* (December 1988): 25.

[11] See, for discussion, Michael M'Gonigle, "Borealis Nix: The Political Economy of the Pulp Mill Bonanza in Canada's Northern Forests," paper delivered to the Canadian Political Science Association/Canadian Anthropology and Sociology Association joint sessions, Learned Societies of Canada, Victoria, 27 May 1990.

Australian researchers are engaged in seeking solutions.[12] While economic calculations made by these researchers assume large mills and export markets, small countries have a different reckoning for the advantages of kenaf. It can be grown in a fraction of the time needed by pines, and provides the cheapest long-fibred component to blend with tropical hardwoods, straw, or bagasse pulps.

New fibre sources also include synthetics and sugar bagasse. Synthetics are not yet highly developed sources, and experimentation is still in early stages, but several mills have been constructed, using them to produce various grades of paper.[13] Sugar bagasse is the raw material for over 100 (relatively small) mills, in Taiwan, Cuba, Colombia, and Indonesia, Peru, and Mexico, and others are being constructed in India and elsewhere. It has been a problematic source for various technical reasons, but new mechanical pulping techniques promise to make it a major new source of pulp fibre.

The technology for using agricultural residues has an ancient history, but its development was delayed when North American forests began to be logged.[14] Straws from rice and wheat production have again become potential sources of pulp in developing countries. These can be milled without expensive machinery in countries where the raw materials are available. There has been a rise in the world's non-wood fibre pulping capacity from just under 7 per cent in 1970 to over 9 per cent in 1990.[15] Increases in the proportion of non-wood fibres used in developing countries were expected by FAO in 1983 to double within three years, and to increase substantially in Eastern Europe, Italy, and Spain. Between 1976 and 1982, their annual rate of increase was 3.8 per cent in contrast to an average annual increase of 1.9 per cent for woodpulp.[16] According to researchers in India:

[12] I. M. Wood and J. F. Angus, "Kenaf Versus Forests as a Source of Paper Pulp," in *Australian Forestry* 39(1) (1976): 23-39.

[13] Vladimir M. Wolpert, "Symposium on synthetic pulp and paper gives details on all known processes," *PPI* 18(7) (July 1976). See also: George E. Boyhan, Yong T. Kao, and Luigi Terziotti, "Newsprint from Bagasse — can it be done?" *Pulp and Paper International* 17(11) (October 1975): 44-47.

[14] However, some production continued through the century. In the Netherlands, almost half of the paper production (400,000 tons) was from straw until labour costs became prohibitive. See: S. R. D. Guha, "Raw Materials for Paper," *Indian Pulp and Paper*, April-May 1977: 7-15, and "Nonwood pulp's gradual challenge," *Pulp and Paper International* 25(13) (December 1983): 58-60.

[15] Hugh O'Brian, "The non-wood leader takes the lead," *Pulp and Paper International* 30(10) (October 1988): 84.

[16] "Nonwood pulp's gradual challenge," *Pulp and Paper International* 25(13) (December 1983): 58-60.

Hardwoods can only be used in large paper mills which require considerable investment and foreign exchange for import of several items of machinery. Agricultural residues like bagasse, rice straw, wheat straw and jute sticks could, however, be used in small plants requiring low capital investment and no foreign exchange as machinery required are at present produced indigenously.[17]

In India, where only 11 per cent of the country retains any forest, bamboo has provided a major source of pulping fibres in the recent past. It will no doubt continue to do so, but the available resources are already allocated, and the demand for newsprint and other papers in these countries is growing beyond the capacity of bamboo resources. This provides the impetus for development of straw and other agricultural residues as fibre sources for pulp. China is the leading user of non-wood fibre pulp.

It is not only tropical and underdeveloped countries that are discovering the advantages of non-wood fibres. Mills using straws as raw materials have been constructed in Spain, Italy, Hungary, Bulgaria, and Romania. There are proposals to build mills in the United States and Western Europe.[18] However, in the advanced industrial countries, the impediment to development of straw resources is high labour costs involved in straw collection and preparation.

Finally, and no longer insignificant in the scale of fibre sources, waste-paper and recycled newsprint are becoming major sources. They have provided 40 to 50 per cent of Japan's newsprint fibre sources for some time.[19] The FAO estimates a rise in consumption of waste paper from forty-nine million tons (26 per cent of total fibrous raw materials) in 1984 to eighty-four million tons (34 percent) in 1995.[20] With new legislation in the United States demanding that newspapers utilize recycled paper, de-inking facilities and new mills based on recycled fibres are coming on stream. These mills need not be located close to forests: they are better

[17] R. N. Madan, "A Summary of Investigations carried out at the Cellulose and Paper Branch on suitability of agricultural residues for pulp, paper and board." *Indian Pulp and Paper* 30(4) (December 1975-January 1976): 15-21. See also: Joseph E. Atchison, "Present status and future potential for utilization of Nonwood Plant Fibres — A Worldwide Review," *Indian Pulp and Paper* 28(8) (February 1974): 10-17.

[18] Hugh O'Brian, "The Non-wood leader takes the lead," in *Pulp and Paper International* 30(10) (October 1988).

[19] In a discussion note to the FAO *Proceedings*, 1987, p. 175, I. Ushiba says, "the collection ratio and utilization rate of waste paper in Japan are already nearly 50 percent, and we can say that a certain saturation has been reached. We think that waste paper imports from the United States and other countries will remain relatively easy."

[20] Julio Molleda, "The Implications for Raw Material Supply," FAO *Proceedings*, 1987, 159-62.

situated close to large industrial centres. The developing countries are not the beneficiaries of this, since it is the industrial countries that have potentially copious supplies of waste paper. World markets are not yet well established.

Japan and other Asian paper producers

Japan demonstrated that it was possible to create a huge pulp and paper industry with relatively little domestic fibre, by sourcing supplies elsewhere. The growth of the Japanese paper industry after 1960 relied on the availability of logs, wood-chips, and raw pulp sourced in nearby Asian countries, New Zealand, Russia, and North America, plus recycled newsprint from domestic sources.

It also demonstrated that American companies did not have the monopoly on economic imperialism, and even America itself, rich in resources compared to most other regions of the world, could become a resource reservoir for another country's industry. The major supplier of softwood logs to Japan since the mid-1970s has been the United States, providing about half of the total softwood log imports. The U.S.S.R. has provided about 35 per cent, with New Zealand, Canada, Indonesia, the Philippines, Malaysia, Taiwan, and Chile all supplying smaller amounts.[21]

Japanese imports of wood pulps, which is the next step up from raw logs and woodchips, nearly doubled between 1973 and 1983. The suppliers were the United States, New Zealand, Canada, Sweden, and, by the late 1970s, South Africa and Brazil. These wood pulps are converted into paper and paperboard products sufficient both to meet Japan's domestic demand and to permit it to export.[22]

Japan also produces lumber, plywood, and veneer, primarily for its domestic market. The major suppliers of hardwood logs for these purposes have traditionally been Malaysia, Indonesia, and the Philippines. Export restrictions were imposed during the early 1980s by Indonesia and the Philippines, and since 1983, Malaysia has captured about 73 per cent of the Japanese market. Papua-New Guinea and the British Solomon Islands became new sources in Asia, but the major new sources were North America, New Zealand, and the U.S.S.R.

[21] Data given here are from *Trends in Japanese Imports of Selected Forest Products, by Supplier*, based on computer tapes obtained from the Organization of Economic Cooperation and Development, published by the Agricultural Research Center, College of Agriculture and Home Economics, Washington State University, Pullman, Research Bulletin 0986, 1986.

[22] Japan Forest Technical Association (JFTA), *Forestry and wood industry in Japan*. Nippon Mokuzai Bichiku: Japan, 1985.

Until the late 1970s, Japanese companies procured their raw materials elsewhere mainly through merchant activities. But as supplies became scarcer and North American companies began looking for alternative supplies, Japanese companies began to invest elsewhere.

Cenibra, established in the Minas Gerais state of Brazil in 1977, is a joint venture between the state-owned Brazilian mining, minerals and industrial giant, Companhia Vale do Rio Doce, and a consortium called Japan-Brazil Pulp and Paper Resources Development (JBP) made up of 18 Japanese papermakers and administered by the Japanese engineering and sales company, C. Itoh, together with the Japanese government agency, the Overseas Economic Cooperation Fund.[23] Despite the shaky Brazilian economy and interest rates upward of 700 per cent, Cenibra, with cheap wood resources, low costs, and growing demand for eucalyptus pulp, is expanding its share of export markets. The Japanese companies take half the output of the mills, manufacturing it into high-grade papers in Japan. As well, C. Itoh has started expanding sales from this mill to China.

Mitsubishi formed a joint-venture with Forestal Colcurra of Chile in 1987, to export chips to Japanese producers, but Japanese investment in Chile lags behind American and New Zealand investments there. There are several joint-venture arrangements between Japanese companies and either governments or private groups in Indonesia, providing both pulps and plywood for the Japanese market, which is the major market for Indonesia. The Japan Paper Association announced, in 1988, that it would grow eucalyptus trees in Thailand under a joint-venture arrangement with the Thai government. Plans call for the construction of five woodchip plants, and a plantation of 200,000 hectares within five years. The consortium includes Oji Paper.[24]

Japanese companies have also invested in North America. Among the main investment companies is Daishowa, Japan's second largest paper and paperboard manufacturer. This company's strategy is to create joint-venture pulpmills with American companies that already have extensive harvesting rights in Canada and the United States. Among the Canadian mills with these arrangements are two at Quesnel, one a joint venture with West Fraser (U.S.); the other, a joint venture that includes Marubini (Japan) and Weldwood (itself owned by Champion International, U.S.). The mills provide a guaranteed market for the logs and chips from sawmills owned by the joint-venture companies, and the pulp produced in Canada is then shipped to parent companies in Japan for utilization in the manu-

[23] *Pulp and Paper International* (April 1987): 42.

[24] *Pulp and Paper Week*, 11 July 1988, 10.

facture of finished papers and paperboard. Direct investment in North America increased during the early 1980s, when North American companies were suffering through a sharp recession lasting nearly two years. In addition to greenfield mills planned for the boreal forests of Canada, and the joint-venture mills that link Daishowa to American company harvesting rights in British Columbia, Daishowa acquired a James River mill in Washington State, and Reed International's North American Paper Group in 1988. The U.S. acquisitions are not intended to supplement Japan's supply of pulp: they are expected to provide the inroad on the American domestic market for newsprint.

Table 1 shows the listing of the top forty companies ranked by sales in 1988 by *Pulp and Paper International.* While American companies remained dominant throughout, the listing in the late 1980s shows Oji, Jujo, Sanyo-Kokusaku, Honshu, and Daishowa among the top twenty-five, and Rengo and Taio among the next fifteen. It should be noted that unlike the American and European companies, few Japanese firms are reported to have locations in numerous countries. This is partly a function of inadequate reporting. More important, it suggests that more Japanese activity is directed primarily toward obtaining raw material, while American activity is directed toward establishing production units elsewhere; and that much of Japanese investment takes form within consortia and intricate joint ventures in developing countries. Even with inadequate reporting, these ranks indicate the relative size of companies that have emerged only since the mid-1970s.

Following the Japanese model, South Korean paper manufacturing became established on the same principles. The Korean companies are not yet in the global marketplace, but they have substantially reduced Korea's imports of paper, and increased Korea's fibre imports from elsewhere. Other Asian NICs are adopting the same model, and simultaneously attempting to curtail logging in their own territories. The Taiwanese company, Yuen Foong Yu, for example, is one of the applicants to build a pulp mill in northern Alberta.

Total Asian newsprint capacity is expected to grow by some 90,000 tons by 1992, with new mills throughout the region, in Korea (Chonju), China, and Malaysia as well as Indonesia and Japan. ASEAN countries became producers and exporters between the mid-1950s and late 1970s.[25] Indonesia, formerly a net importer, is now exporting some 25,000 tons per year,

[25] Roger A. Sedjo, "The Expanding Role of Plantation Forestry In The Pacific Basin," paper presented to national conference on "Prospects for Australian Plantations," Canberra, Australia, 21-25 August 1989.

and new capacity is on line. Indonesia's first major green-jungle pulpmill, Indah Kiat Pulp and Paper Riau at Perwang in central Sumatra, was established in 1984. Its partners are Chung Hwa of Taiwan, which provided the mill equipment; Yuen Foong Yu, the big Taiwanese papermaker; and an Indonesian consortium, the Sinar Mas Group, which already has interests in banking, palm oil and rubber, petrochemicals, and construction. The same Indonesian group has invested in three other mills and has in total over half of the holdings in Indonesian higher-grade paper capacity. The fibre source for this production is mixed tropical hardwoods, and expansion of the Indonesian capacity, as noted above, is tied to clear-cutting the native forest and replacing it with eucalyptus and acacia.[26] The Indonesian industry anticipates supplanting Japan as the world's top producer of paper and paperboard, drawing on the resources of neighbours and new producing regions.

Tied supply for Asian companies (from mills with joint venture ownership and market contracts) will provide most of the 1.3 million tons imported to the region by 1992. This includes the joint venture between the Singapore Newspaper Services and CIP Gold River project, the Howe Sound Canfor-Oji joint venture, and the proposed China-Westar project, all in B.C. and scheduled for start-up by 1992.

Global market expansion

After about 1960, new consumer demand in Asia and developing countries elsewhere promised new markets. Japan and nine developing countries (Singapore, Malaysia, Thailand, Indonesia, Philippines, Korea, Taiwan, Hong Kong, and China), have 4.4 times the population of Western Europe, and about 30 per cent of the world's total population. Japan accounted for 64 per cent of the region's total consumption of paper in 1987, but consumption growth between 1983 and 1987 in Japan, at 10 per cent, was dwarfed by a growth rate of 25 per cent in the other nine Asian countries.[27] However, these new markets are not served by traditional producers of finished paper or lumber; the traditional producers are increasingly reduced to the role of raw materials suppliers, and even in that role, they face competition.

In the early 1980s, when the forest industry went into a prolonged slump, there was substantial mill over-capacity in the softwood regions.

[26] *Pulp and Paper International* (February 1988): 45.

[27] The Asian data are from David Patterson, "Asia: consumption growth fuelled mainly by new domestic production," in *Pulp and Paper International* 31(2) (February 1989): 55-57.

Companies located along the northwest coast of both the United States and Canada sought overseas markets for unprocessed logs. They claimed they could obtain better prices in Japan for logs than in North America for finished lumber. The global log market has since increased. Canadian producers are now selling logs to Japan, China, and the United States. They are also selling increasing quantities of wood-chips and pulp, but their sales of lumber have not increased.

Since 1980, considerable new mill capacity has been created, and overcapacity for pulp, newsprint, and paper is clearly evident. World newsprint capacity between 1981 and 1987 grew by four million tons, or 14 per cent. Anticipated increased capacity between 1987 and 1992 is 18 per cent. Current estimates by industry analysts show continuing excess capacity to at least 1992. In both pulp and paper/paperboard, mill capacities considerably exceed current consumption rates.[28]

However, over the long run, the anticipated increase in consumption explains the persistent construction of new mills. World consumption of all papers grew by some thirty million tons between 1981 and 1987. Of the total 1987 amount, North America accounted for about 45 per cent; Western Europe, about 22 per cent; Japan, 10 per cent; "controlled economies," 8 per cent; and all others, 15 per cent. The relative proportions were fairly constant over the 1980s,[29] but industry planners anticipate a rise in world consumption of newsprint by 14 per cent between 1987 and 1992. Earlier fears of declining consumption as electronic media became dominant have proved groundless so far; indeed, in the industrial countries there has been an increased demand for paper coincident with the growth of the small computer market.[30] As the European Community market unifies and grows, the demand for advertising paper is expected to expand beyond the capacities of current European producers. There, as in Japan, there is a growth in production based on off-shore sourcing of supplies.

[28] Robert Johnson, "Supply will outstrip demand to 1992," *Pulp and Paper International* 31(2) (February 1989): 47-57. His estimates show an increased consumption by 1992 of 34.7 million tons, but a capacity increase to 38.5 million tons, from which he concludes that by the end of 1989, operating rates will begin to slide, and some newsprint producers which have invested heavily in new machines will have excess capacity. See also: Berndt Brunow, "Western Europe: supply will exceed demand by 1.5 million tons by 1990," in *Pulp and Paper International* 31(2) (February 1989): 51-55. Total mill capacity for pulp in 1987 was 168,627 thousand tons; production and consumption were roughly 155,820 tons each. Total mill capacity for paper and paperboard in that year was 235,611 thousand tons; production was 215,611 thousand tons, and consumption was 214,366 thousand tons.

[29] Data in this section are from Robert Johnson, "Supply will outstrip demand to 1992," *PPI* 32(2) (February 1989): 47-51.

[30] Roger Hurwitz, "Patterns of Media Use in Developed and Developing Countries," in FAO, *Proceedings*, 1989, 89-101.

Restructuring of the industry

The organization of forestry in the 1960s, with Nordic countries providing the raw material for European paper-makers, and Canada providing the raw material for United States paper-makers, is still in place, as data on fibres above indicates, but no longer does it have the same global context. The growth of pulp and paper producers around the world has fundamentally altered the structure of the industry. Swedish, Finnish, American, and Canadian companies are internationalizing their operations, buying into established mills or creating joint-venture "greenfield" mills wherever they can obtain new fibre resources.

The established companies and consuming nations have tried several options to procure new supplies. Originally, they did what resource-seeking buyers have always done — produced the raw material (i.e., logs) elsewhere, once technologies were in place to utilize them. Most countries have tried to resist this exploitation, though log-export bans have not always been either possible or enforceable. The second option is to build sawmills and pulpmills near the potential resource base, and, in the case of the new tree species, invest in plantations. These new mills are typically joint-ventures with governments or with private capital in the developing regions, with "tied-market" conditions whereby the larger part of the output is sold to the parent paper-producer in the home country. Occasionally, the joint-venture mills become large enough, or the plantation base appears sufficiently promising, that the new mills develop independent markets. Rarely do they produce more than crude pulp, but there are notable exceptions.

New companies have become major players. In addition to the Japanese and other Asian companies, the most notable is Fletcher Challenge of New Zealand. The original company began experimenting with exotic pines in the 1960s and burned off old-growth forests in order to plant radiata pine in the 1970s. Starting as a relatively small player in the forest industry, Fletcher Challenge (formally established as such in 1981) acquired several other companies in New Zealand before becoming a global player. It owned Tasman Pulp and Paper, New Zealand Forest Products, and Carter Holt Harvey by the late 1970s.[31] In 1983 FC acquired Crown Zellerbach Canada. In 1986, it purchased half of the Papeles Bio-Bio newsprint mill in Chile (later increasing its holdings to 100 per cent). In 1987, it bought into B.C. Forest Products, and subsequently acquired 72 per cent of the

[31] A critical company biography is given by Bruce Jesson, in *The Fletcher Challenge. Wealth and Power in New Zealand* (Pokeno, N.Z.: Jesson, 1980).

shares. In 1988, it acquired 50 per cent of the holdings in Australia's only newsprint producer, Australian Newsprint Mills.

The move to Canada provided Fletcher Challenge with a large softwood forest reservoir. Like Daishowa, Fletcher Challenge took advantage of its relatively fluid financial condition while Canadian and American companies were in straitened circumstances in the early 1980s, to make this move. Its holdings in B.C. include 72 per cent of all of the former B.C. Forest Products timber and mills, together with the former Crown Zellerbach timber and mills. The move to Chile, where large radiata pine plantations were already scheduled to reach maturity at the same time as the identical plantations in New Zealand, averted competition. Both New Zealand and Chile are export-oriented and have small domestic markets, and both are aiming at the Asian markets. The purchase in Chile was made through debt swap financing. Through Carter Holt Harvey as well as in its own name, it acquired both plantations and other mills. Lumber, plywood, and pulpmills are either in construction or planned, and one of these may involve Daishowa as a partner.

In 1988, Fletcher Challenge moved into Brazil, obtaining half the shares of the Papel de Imprensa S.A. (Pisa) mill through debt swap financing.[32] Some of its B.C.-produced newsprint could be allocated to Brazil so that FC might optimize capacity in the softwood region while preparing for additional capacity in Brazil. Having supplies in diverse regions puts this company in a market-control position. It also allows it to avoid stoppages and failed shipments due to strikes, political events, natural disasters, or other impediments that affect market supplies from single-region companies.

By 1988, Fletcher Challenge had become the largest producer of market pulp, the second largest newsprint producer, the third largest lumber producer, and, with all forms of forest production combined, the fourth largest forest company in the world. It owns or has harvesting rights on 3,386,250 hectares (13,074 square miles) of land in Canada, the U.S.A., Australia, New Zealand, Chile, and Brazil.[33]

Canadian and American companies (these are virtually indistinguishable) have either been displaced, or they have, themselves, internationalized their holdings. Weyerhaeuser, International Paper, Georgia-Pacific, and James River have retained their dominant positions by investing in

[32] *Pulp and Paper International* 30(8) (August 1988), p. 7, provides details on the Brazilian acquisition. *Appita* 41(5) (September 1988), pp. 349-50, provides an overview of all holdings.

[33] Toronto Stock Exchange *Review*, March 1989: Fletcher Challenge Limited.

new plantations in warm climates and linking up with capital elsewhere. They have also been active in take-overs of their weaker competitors, several of which have disappeared from the ranks over the past few years. Great Northern Nekoosa (U.S.), ranked sixteenth in 1988, was subsequently taken over by Georgia-Pacific (U.S.).

Abitibi and Bowater entered a joint venture with the Venezuelan government and major Venezuelan publishers (the company has 67 per cent; Venezuela, 18 per cent; and the publishers, 15 per cent of the shares) to build a greenfield newsprint mill pear Cuidad Guyana, based on Caribbean pine, with output to be marketed by the Canadian partners. This was put on hold in 1990 because of market conditions. Scott Paper, together with Shell and Citibank, took over the Papeles Sudamerica Nacimiento eucalyptus kraft mill in Chile in 1988.

Noranda linked up with North Broken Hill Peko of Australia (which moved from rank eighty-seven in 1987, to forty-seven in 1988) in a new company, Wesley Vale, to produce plantation eucalyptus-based pulp in Tasmania. Although rebuffed by a strong environmentalist lobby on its first round in 1988, the joint venture has taken on a second life now that the Australian and Tasmanian governments have concluded that the proposed plant will be safe for the marine environment.[34] Kimberley-Clark established a joint venture with private groups in Sumatra, Indonesia.

These companies still have extensive forest harvesting rights in softwood regions of North America, and several have private lands in the United States. This base continues to be their strong suit, but their futures lie in the new plantations either off-shore or in the southern United States. In the United States, a shift from the northwestern to southern regions is clearly taking place. In Canada, there is growth based on the remaining softwood forests and in the new hardwood forests, but most of this growth is occasioned by foreign direct investment driven by a search for raw materials; there is no real growth in manufacturing capacity beyond basic pulpmills.

As noted above, the Nordic countries have not deforested their own lands. Reforestation and afforestation projects at the turn of the century in Sweden, Norway, and Finland have continued to provide them with second-growth fibre supplies. Until the 1960s, they were peripheral staples producers, similar to Canada. However, with the unification of Europe underway, Swedish and Finnish companies began to diversify their holdings in Europe. The Finnish company, Kymmene, and the Swedish company, Stora, have established large-scale production units for printing and

[34] As reported in *Paper*, 22 August 1989, 13.

writing papers within the E.C. Kymmene has attempted to obtain fibre supplies from southern United States to supplement Finnish sources. Stora has obtained eucalyptus plantations in Portugal, and has expanded as well to Brazil and North America. It is a major shareholder in the Aracruz mill in Brazil.

The huge mills built by these international companies are capital-intensive.[35] They rely on cheap wood raw materials, but the risk to capital in a notoriously cyclic pulp market is considerable. Two analysts favourable to large concentrations of capital note:

> To emphasize the importance of capital costs, we may say that only the interest charges for such a huge investment during the two to three year period would equal the total investment costs of a competitive newsprint machine to be built in Scandinavia. The main message here is that the industry needs much more of a risk-taking capacity than we have been used to so far. Since the markets are still growing, we will see larger and larger international groups being formed.[36]

Mergers and joint ventures became more frequent in the mid- to late-1980s than at earlier times, and more of these crossed continents than ever before. In addition to acquisitions by established companies, new mills are being constructed which combine these pools of capital with new groupings within developing regions, and with state equity in most countries. The net result is greater concentration of total holdings in the established softwood forest regions, an expansion of holdings by established companies elsewhere; but, overall, a wider spectrum of capital sources included in the joint ventures, and a much greater participation level for groups that had no holdings in forestry just two decades ago.

At the present time, eight companies control about 40 per cent of the American paper market. This is more concentrated than was the case a decade ago, but it is not as concentrated as most manufacturing industries, and with the new participants elsewhere, new fibre sources and greater self-sufficiency in developing countries, the industry is not moving toward global concentration yet: it is restructuring and stretching, but the overall context has fundamentally altered traditional positions.

[35] Heikki J. W. Salonen and Pekka Niku, "The Future of the Forest Products Industry: A Worldwide Perspective," in Gerard F. Schreuder (ed.), *Global Issues and Outlook in Pulp and Paper*, (Seattle: Washington Press, 1988), 285-300. These analysts estimate that to achieve a 10 to 12 per cent return on investment in a pulpmill similar to the Aracruz or Cenibra in Brazil (where Stora has holdings) would require an investment of U.S. $2,000 per annual ton and operating costs of U.S. $240 to $280 ton with a current (1988) international pulp price level.

[36] Salonen and Niku, 296.

Social impacts, selected regions

Both tropical and temperate zone rain-forests are being rapidly depleted. Their wildlife and oxygen-generating capacities are disappearing, and human societies dependent on them for sustenance are suffering either cultural (and sometimes physical) death, or dislocation.

I cannot adequately address environmental impacts both because I am not a forest ecologist, and therefore am too reliant on secondary sources; and because the forest ecologists have not yet produced a consensus on impacts of clearcutting tropical forests and replanting the areas with eucalypts and acacias, or of planting monoculture pines. The impacts on fisheries and water of pulpmill effluents are only now becoming topics of serious research. Still under debate are the impacts on soil of exotic plantations and the capacity of soils to sustain numerous rotations of fast-growing mono-crops. Where marginal lands are utilized, agriculture and tropical forests are not displaced, and issues related to gene pools may not be as acute as they are when these plantations supplant existing agro-forestry reserves. But it is too soon to know for sure what the effects will be, and, of course, by the time the effects are known it will probably be too late. One may take it for granted that the companies assure the world that all is well.

For developing countries that have created some manufacturing capacities, there are benefits that cannot be dismissed. Countries such as Brazil and Indonesia are becoming self-sufficient in products they used to import, and they are gaining export dollars and employment in new mills. Indonesia has now become the supplier of 70 per cent of global market demand for tropical plywood. For Brazil, Venezuela, and, in future, Argentina, there are debt-swap deals that benefit the buyers more than the impoverished sellers, but in their oppressed financial condition the sellers are eager to unload their debt. In most developing countries, governments retain equity and sometimes have the controlling shares in new mills and plantations, usually because public funds are essential for start-up costs and foreign investors require some backing for their investments. The international funding agencies such as the World Bank, FAO, and private banks are uniformly opposed to government ownership, except where its purpose is to provide start-up funds, and its end result is privatization; there is always, then, a trade-off between the desire to be autonomous and the need for funds. The agencies facilitate foreign investment in all of their policies, including policies for financing infrastructure.[37]

[37] Both FAO and the World Bank commissioned numerous reports and sponsored conferences during the 1970s on the tropical wood trade potential. One example is Kenji Takeuchi, *Tropical Hardwood Trade in the Asia-Pacific Region* (Baltimore:

For other countries, there is little to rejoice about: Malaysia, for example, has lost most of its forest cover through straight sales of logs to Japan, Korea, and Taiwan: it has not become a manufacturing region. One might say the same of Canada, which has less manufacturing capacity for paper and paperboard than Japan, and exports logs, woodchips, and pulp to Asian manufacturers. The northwestern states of Oregon and Washington have suffered considerable economic hardship as their industry moves to southern states, and their logs to Asia.

Where tropical forests are clearcut, the habitat for all indigenous species is wiped out. Animals, insects, plants, and people are either killed or obliged to flee the area. Everywhere in tropical rain-forests, native peoples have been pushed aside; sometimes subjected to involuntary out-migrations, other times to genocide. To be fair, these events have rarely been the direct result of forestry. Much of the destruction of tropical forests is due not to forestry but to use of trees for fuel, and to mining, hydro-electric dam construction, tragically unsuitable resettlement programs, over-population, poor agricultural practices, ranching, and wars.[38] But the beneficiaries, ultimately, are the forest companies that move in to the land now deemed too poor for agriculture, and already clearcut of its tropical cover.

In Indonesia and Malaysia, both transmigration and logging are displacing the hill tribal peoples. The Penan of Sarawak gained world attention for the brief span of a week's newspapers, when they formed human barricades across logging roads in 1988 and again in the following year. Their traditional hunting and agricultural land has been destroyed, and they have been relocated in make-shift camps. FAO statistics suggest that Malaysia could lose all of its forests by the turn of the century; Southeast Asia as a whole has lost nearly 40 per cent of its forest since 1950.[39] Plantations do not provide a forest cover for hunting and swidden agriculture tribespeople, and none of the World Bank, FAO, and other grand projects

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World Bank Staff Occasional Papers no. 17, 1974) (distributed by the Johns Hopkins University Press). This, like many of its kind, ignores all potential ecological and social defects of deforestation in tropical areas, while exploring the potential markets for tropical hardwoods.

[38] Regarding the Brazilian case, see Jacqueline Tracey, *Cattle Ranching in the Amazon* (M.A. thesis, Faculty of Forestry, UBC, 1990). Tracey's investigation found, *inter alia*, that Brazilian beef is not exported to North America because of import bans (thus the "hamburger" thesis is not valid). Cattle ranching appears to be an interim activity that assures Brazil control of the northern territory, maintains the landed oligarchy, temporarily relocates impoverished peasants, sustains the military, and accommodates external capital.

[39] *World Wood*, October 1987, 39-40.

for afforestation are designed to protect the subsistence of the poor people who are displaced by plantations.

In Thailand, the hill tribespeople and other shifting cultivators have been blamed for the massive deforestation of watershed regions. An estimated 500,000 tribespeople practise shifting cultivation, and the results include soil erosion and sedimentation of downstream rivers; and reduction in ability of watershed areas to absorb rainfall and release it gradually. But tribespeople are unlikely to be wholly responsible for the reduction in forest cover from 53 per cent of the total land area in 1961 to 29 per cent in 1985. Forest exports became major components of Thailand's economy in the early 1980s, and by 1985 there were over 600 logging concessions covering a vast area.[40]

Despite persistent attempts by the government to reforest the land, even watershed areas have been logged and abandoned. The government lacks consistent land use policies, has provided inadequate funding for the Royal Forest Department, and there is no effective enforcement program to deal with encroachment and illegal logging. After high death tolls due to massive flooding in Thailand, logging was banned in February 1989. This is too late for many tribespeople, and it also does not help the neighbouring countries of Burma, Laos, Malaysia, and Indonesia, from which Thailand now wishes to import logs. Plans for a new chip mill and a greenfield market pulpmill were announced in November 1988, and these are likely to go ahead: ownership will be 60 per cent Thai, and 40 per cent Nisshu-Iwai Sumitomo of Japan, and the fibre source: plantation eucalyptus.

There are are also social impacts in the northern softwood regions, where employment has steadily declined. Mechanization and automation have allowed companies to increase production and productivity per worker with declining labour demand. Lonnstedt estimates a job loss in Swedish forestry of more than 3,000 per annum after 1980.[41] Data for British Columbia alone suggest even higher rates in North America's traditional forest regions.[42] Community decline attends mill modernization. It is also the consequence of changing markets: Oregon and Washington states

[40] Anat Arbhabhirama, et al., *Thailand Natural Resources Profile* (Singapore: Oxford University Press, 1988), 142-78.

[41] Lars Lonnstedt, "Stability of Forestry and Stability of Regions: Contradictory Goals? The Swedish Case," *Canadian Journal of Forest Resources* 14: 707-11.

[42] Statistics Canada, *Canadian Forest Statistics*, cat no. 25-202, 1986, shows an overall decline in employment between 1979 and 1986 from 96,841 to 74,306. See also Marchak, *Green Gold: The Forest Industry in British Columbia* (Vancouver: UBC Press, 1983), for data from 1961 to 1979.

TABLE 1

Top 40 Pulp and Paper Companies, 1988, as listed by Pulp and Paper International *(September, 1989).*

Rank by sales, all products	*Company*	*No. of countries*
1	Weyerhaeuser (US)	4
2	International Paper (US)	18
3	Georgia-Pacific (US)	3
4	Fletcher-Challenge (NZ)	6
5	James River (US)	10
6	Stora (Sweden)	11
7	Kimberley-Clark (US)	21
8	Champion International (US)	3
9	Scott (US)	21
10	Oji Paper (Japan)	3
11	Mead (US)	8
12	Boise Cascade (US)	2
13	Jujo (Japan)	1
14	Noranda (Canada)	2
15	Stone Container (US)	1
16	Great Northern Nekoosa (US)	1
17	Sanyo-Kokusaku (Japan)	1
18	Svenska Cellulosa (Sweden)	15
19	Honshu (Japan)	2
20	MoDo (Sweden)	6
21	Abitibi-Price (Canada)	2
22	Union Camp (US)	4
23	MacMillan Bloedel (Canada)	2
24	Daishowa (Japan)	1
25	Kymmene (Finland)	4
26	Jefferson Smurfit Group (Ireland)	12
27	Canadian-Pacific FP (Canada)	2
28	Enso-gutzeit (Finland)	6
29	Rauma-Repola (Finland)	2
30	Buhrmann-Tetterode (Netherlands)	2
31	Feldmuhle (FRG)	3
32	Amcor (Australia)	2
33	Domtar (Canada)	1
34	Westvaco (US)	2
35	Rengo (Japan)	1
36	PWA (FRG)	4
37	Consolidated-Bathurst (Canada)	4
38	Wiggins Teape (UK)	11
39	Metsa-Seria (Finland)	6
40	Taio Paper (Japan)	1

Note: Some companies (e.g., Noranda) are not consolidated; their subsidiaries (e.g., MacMillan Bloedel) are listed separately. Countries include only those where company has pulp, paper, and converting operations under the corporate name of the parent.

have suffered continuing and dramatic decline in community stability and overall employment with the rise in log exports and decline in manufacturing over the 1980s.[43] The exodus of companies from single-employer towns is the death knell for numerous old communities along the northern Pacific coast.

In Japan, as well, rural forest towns are casualties of the restructuring. Small woodlot owners and community cooperatives are unable to meet the required costs for replanting, silviculture, management, and logging at a price below the cost of imported logs from North America. Japanese economists argue that the imported logs are cheaper, despite transportation, because North American resources are so greatly undervalued, and so little regenerated.[44] Japanese rural communities dependent on the domestic log market are suffering depopulation and economic decline.

The technologies and fibre sources of the past century favoured huge, mass-production operations that only large companies could mount. If patterns in other industries prevail, the large corporations that already dominate the forest industry in northern countries would establish operations in southern regions, becoming global in both production and markets. The giant corporations have the capital and established markets, and they have the usual allies: the World Bank, FAO, and the private banks.

But the usual pattern may not prevail here. First, some of the developing countries have managed to gain a precarious foothold; several of the northern companies have lost ground while new companies have displaced them in markets. Japan's model has been copied, and other countries have built forest industries with scarcely any indigenous supplies of wood.

Secondly, while huge pools of capital are required for the enormous plantations and greenfield mills, some of the new fibre sources and technologies coming on stream are potentially utilizable by relatively small companies and public agencies of relatively poor countries. Some of the new technologies and sources are less polluting and less environmentally damaging than the old ones. And there is, now, a much larger population concerned with the impacts of forestry on environment and society, together with a larger core of specialized foresters and others whose knowledge is being made available to non-corporate groups.

[43] See Y. Iwai, "The Movement of the Lumbering Industry in U.S.A. and its Influence on Japanese Forest Industry," IUFRO, The Current State of Japanese Forestry, June, Tokyo: The Japanese Forest Economic Society, 1989: 12-22.

[44] Iwai, 1989; and M. Patricia Marchak, "Global Markets in Forest Products: Sociological Impacts on Kyoto Prefecture and British Columbia Interior Forest Regions," forthcoming in *Journal of Business Administration* 20(1).

Conclusion

British Columbia has long enjoyed the riches derived from a lush temperate rainforest. Its softwoods have commanded high prices on world markets where only the nearby northwestern states and the Scandinavians could seriously compete. Within the past decade, however, the entire industry has changed. Tropical and sub-tropical regions can now produce fibres suitable for wood and paper products that were formerly produced only from northern softwood forests. As well, non-wood fibre sources are becoming significant in production of certain paper products. New markets controlled by different pools of capital have emerged, and global corporations are now established. The ownership structure of the industry has undergone dramatic changes. Environmental concerns are beginning to affect the industry. In B.C. and the northwestern United States, the softwood forest has suffered depletion, and in the new global context there are few economic incentives to replant it.

The intention of this paper was to situate the B.C. industry in this larger context. This appears to be essential for further policy-making and debate. At the present time, much of the debate rests on the assumption that the forest industry will continue well into the future as the economic base for this regional society. The data provided here contradict that assumption. If there is to be regeneration of the northern forest, the reason for replanting will have to be either the development of new industries for which the new fibres are not competitive; or public demand for other, and not specifically economic, benefits of forests.