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EXCISING THE COMMON WEALTH?
A STUDY OF PUBLIC SECTOR INTERVENTION IN THE BRITISH
COLUMBIA FOREST SECTOR 1980 - 1996.

by

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A Dissertation Submitted in Partial Fulfillment of the
Requirements for the Degree of

DOCTOR OF PHILOSOPHY

In the Department of Geography

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ABSTRACT

British Columbia brought a tremendous natural forest endowment into the Canadian Confederation in the 1870s. The Fulton Commission estimated there to be between 200 and 240 billion board feet of accessible timber in the province at the time. Total volume by 1937 was estimated to be 254.5 billion board feet. When British Columbia's Land Act of 1896 carefully defined Crown timberland and reserved more than 91% of such lands from sale, a public-sector model had been adopted for the development of this resource.

The dissertation uses a historic approach to examine the magnitude and tempo of change in public forest policy development in the province. It proposes that the magnitude of change – especially with respect to economic value of the resource -- along with a narrow focus by the public landowner on exploitation, discouraged the development of links between forest exploitation and the standard of living of the province's residents especially in rural resource based communities. This study also contends that the evolution of a scientific and technical foundation for the development of coastal forests and forest resources may also have suffered because of the focus of the public-land owner.

The impact of government interventions and further changes in forest policy intensified in the 1990s. Measures like the Timber Supply Review from 1992-1996; changes in the target rate of timber pricing to finance the creation of Forest Renewal BC; and the implementation of the Forest Practice Code in 1994, were serious public sector interventions in the forest economy. They resulted in severe economic shocks to the provincial forest economy.

The structure of the coastal forest responded. Companies like Weldwood left the coast, the shareholders of MacMillan Bloedel Ltd. divided and sold the company to Weyerhaeuser Canada and Pacifica Papers while Fletcher Challenge

Canada was purchased by *Norse Skog* after it had spun off solid wood operations to a new company named TimberWest. TimberWest subsequently bought Pacific Forest Products. With the consent of the Minister of Forests, Pacific's Crown tenures were transferred to Western Forest Products.

These changes negatively impacted many coastal communities. Especially vulnerable were the "instant" resource-dependent towns like Ucluelet, Gold River, Port Alice and Port McNeill on Vancouver Island. These towns had been created during the late 1960s through the early 1970s and are tied, in an economic sense, very closely to the health of the company or companies controlling the timber tenures in their area. As the financial fortunes of many coastal companies declined, so did socio-economic conditions in these forest dependent communities.

Using a case study of the Kingcome Timber Supply Area, the dissertation examines the flow of economic forest values associated with the depletion of the mature forest. An outflow of resource values from the sub-regional to the provincial and national economies linked directly forest tenure, pricing and tax policy is identified. To compensate the sub-region for forest depletion, the idea of a timber income stabilization fund is developed. It is suggested that the present value of the timber income stabilization fund be used as a basis for capitalizing a regional community model forest.

Examiners:

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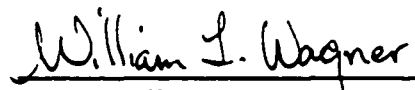
Dedication

This dissertation is dedicated to professionals that were not able to complete their work before being called from this life. Specifically, it is dedicated to Dr. Dan Welsh, Canadian Forest Service, and to Cecily L. Vold, R.P.F., British Columbia Forest Service.

Dr. Welsh helped me understand that we, as professionals, manage forests for people not for trees. Dr. Welsh helped me see that alternative forms of organizational structure, some found in the Canadian Model Forest Network he helped found, will lead to sustainable forestry.

Cecily Vold marveled at the beauty and complexity of the natural world. Through art, she helped me understand that I am not separate from nature. As a professional, she taught me to question established precedents and dogma.

I will miss the insight that these two people shared so generously. Society will miss their talents at a time when their talents are at a premium.


William L. Wagner

Chapter 1 - Introduction

“The usual effect of the attempts of government to encourage consumption is merely to prevent saving; that is to promote unproductive consumption at the expense of reproductive and diminish the national wealth by the very means which were intended to increase it.”

John Stuart Mill, 1827

Along Canada’s Pacific Rim, human institutions, resource-dependent communities, forests and the land are trapped in increasingly swift and swirling currents of change. British Columbia brought a tremendous natural forest endowment into the Canadian Confederation in the 1870s. The Fulton Commission estimated there to be between 200 and 240 billion board feet of accessible timber in the province at the time. By 1937, total volume was estimated to be 254.5 billion board feet (Mulholland, 1937). By 1955, the volume estimate had increased to 760 billion board feet (Sloan, 1956: 211).

When British Columbia’s Land Act of 1896 carefully defined Crown timberland and reserved more than 91% of such lands from sale, a public-sector model had been adopted for the development of this increasingly valuable resource. Public ownership implied that critical linkages between the natural forest resource endowment, public-sector management policies, and the standard of living of the people of the province were to be forged.

The dissertation uses a historic approach to examine the development of forest policies impacting these linkages and the increasingly political nature of policy formation in the province.

- The dissertation proposes that the magnitude of change – especially with respect to economic value of the resource – along with a narrow

focus by the public landowner on exploitation, discouraged the development of links between forest exploitation and the standard of living of the province's residents in rural resource based communities.

Collectively, it is argued that the interventions have the potential of "running-down" and destroying the forest resource and, in the process, leaving the rural forest constituency destitute.

- This study also contends that the evolution of a scientific and technical foundation for the sustainable development of coastal forests and forest resources may also have suffered because of the focus of the public landowner on exploitation and the creation of both a forest-products industry and markets for that industry.

A partial result of the lack of a scientific foundation is the erosion of public confidence in both government and professional forestry (Bliss, 2000).

- It is further argued that the lack of clearly defined fiscal and ecological management objectives with respect to the forest and its constituency may have led to an oversight in public sector fiscal accountability.

This omission seems to have permitted it to engage in expensive and intrusive public-sector interventions in the market economy. Some of the interventions, for example, portions of the Forest Practices Code, also appear to be based on plausibility arguments rather than science.

Approach

Public land management and taxes are probably the most thoroughly reviewed and analyzed topics in the literature of natural resources. Hyde and Boyd (1989) observe that withholding land from private ownership, along with

taxes, are the most important and intrusive of all market interventions by the public sector.

The dissertation makes no attempt to repeat this literature or to be comprehensive in its review. Rather, a few unresolved public forestland issues are presented with the intent of improving the quality of analysis and the level of interchange regarding each. These are:

- Markets and the American Softwood Lumber Dispute
- The Effectiveness of the Ministry of Forests
- Resource Depletion and Regional Income
- Building a Sustainable Forest Sector

British Columbia's Forest Policy

Forest policy has acted as rudder and stabilizers in navigating the sector through the torrent of change that has occurred over the last century. The Land Act of 1896 established the precedent of government ownership of timberlands in British Columbia and created the requirement for the development of policies and regulations for use of the administration of government-owned forest resources. Unfortunately, the Act could not embed intelligence and wisdom in the future policies and regulations required in transforming the natural forest endowment into an economic engine for growth and renewal in British Columbia.

Because public forests cover most of the usable land throughout the province, forest policy has been, and is, critical in the pattern of economic and social development. Since the province's forests are widely distributed, policies directed at forest development predetermine the pattern of access development, infrastructure and economic development. Yet, many of these policies worked as catalysts, bringing about inadvertent and frequently adverse change. The "falldown" effect brought on by the rapid conversion of older and larger first

growth to younger and smaller second growth through the application of even-flow cut-control regulations is one example.

Also, often the situations and conditions for embarking on a policy direction were transformed by change, negating the original requirement for the policy instrument. For example, management of British Columbia's public forestlands may have been an afterthought of the 1896 amendment to the Land Act. It was to be 16 years before the Forest Act of 1912 established a bureaucracy to oversee the public's forested estate. Yet the primary reason for the 1896 amendment no longer existed in 1912. By 1912, both timber and timberland had gained in economic value so that markets could have been used as an alternative to public sector intervention in the forest sector (Ainscough, 1976; Cail, 1974).

Progressive Conservation Movement

Prior to the 1912 legislation, a number of reform groups, largely in the United States and collectively termed the American Progressive Conservation Movement, were beginning to reach their apex of power and prestige (Gillis and Roach, 1986). The lack of planning, foresight, and purpose in natural resources development distressed the leaders of this early conservation movement. They believed unregulated economic competition was wasteful and unproductive. Leaders of the movement like Theodore Roosevelt and Gifford Pinchot in the United States and W.R. Ross and A.C. Flumerfelt in British Columbia, argued that economic planning and "scientific management" should replace competition in order to build a future prosperity based in material abundance.

Although the movement did not sponsor a theory of resource ownership and distribution, it did call for orderly resource use and development. The Progressives believed that scientific and technical tools were required for the conservation of natural resources while resource ownership was more in the realm of socio-political science. Scientific and technical principles applied to

resource development by public-spirited professionals would lead to policies and practices that were in the general interest. Thus, the major emphasis of the American movement lay in efficiency – “in a rational and scientific method of making basic technological decisions through a single, central authority” (Hayes, 1959: 271). Ideally, this central authority would use technical policies and regulations as a substitute for competitive markets.

Implicit in the Progressive idea was efficiency: forest resource development and management should result in no significant difference between incremental costs to the producer and incremental costs to society; thus private costs should equal social costs. Costs in this economic sense refer to the value of resources used in the process of developing and producing goods or services. Value is the benefit the resources would provide society in their best alternative use. Opportunity cost is the difference between the value of resources used in the production of a good and the value of the resource that could be provided to society if used in its highest alternative use.

According to Samuel P. Hayes; “The deepest significance of the conservation movement lay in its political implications: how should resource decisions be made and by whom?” If conflict resolutions were to be by “... partisan politics, through compromise among competing groups, or through judicial decision ... such methods would defeat the inner spirit...” of the Progressives. “Instead, experts, using technical and scientific methods, should decide all matters of development and utilization of resources, all problems of allocation of funds” (1959: 271).

Federal Progressive Forestry

Conservation of natural resources was also a major political issue at the federal level in Canada from the 1890s up to World War I. A change of government brought the Liberal party led by Wilfrid Laurier to power in 1896.

His Minister of the Interior was Clifford Sifton. Sifton listened to the American conservation ideas and thought government should act as the dynamic leader for private enterprise, using regulation to guide businessmen to serve the greater public interest. He worked diligently to create a “central authority” in the Ministry of the Interior to administer the Dominion forestlands.

Yet, in July of 1899 when the Laurier government issued an Order-in-Council concerning forestry on Dominion lands, it effectively divided responsibility for forest management between two separate offices: the Forestry Branch and the Timber and Grazing Branch. This occurred at a time when Gifford Pinchot was emphasizing to Elihu Stewart, the superintendent of forestry for the Dominion from 1899 to 1907, the importance of uniting all aspects of Dominion forestry policy under one organization (Gillis and Roach, 1986). The Forestry Branch was responsible for fire fighting and for managing the forest reserve system up until transfer of natural resources from federal to provincial administration in 1930. The Timber and Grazing Branch was responsible for leasing Dominion land for timber production. Gillis and Roach comment on the effectiveness of this split in responsibility with respect to conservation:

The Forestry Branch used the regulations to make lumbering conform to its own ideals of efficient utilization that would still ensure continued productivity and regeneration. In practice, however, the Timber Branch controlled all the significant logging operations. This branch simply pointed out to loggers that, under the regulations, they must follow direction from Timber Branch officers – and that, if no directions were given, the loggers could do as they pleased. The Timber Branch saw the foresters’ regulations and objectives as just so much unproved theory that “practical men” should ignore (1986: 171).

Canada's Forest Reserves and National Parks Act of 1911 further divided federal forestry administration. The Act created another branch and established a separate Parks Service. The result of the Act was to further reduce the effectiveness of the Forestry Branch when the responsibility for the preservation of wildlife was transferred to the new branch along with other changes further restricting the Forest Branch in dealing with the federal timber berths or leases. The federal government had divided forest management among three federal organizations, causing administrative fragmentation that worked as a barrier to forest conservation at the federal level.

The British Columbia Experiment

As relative latecomers in the North American forest conservation movement, forestry leaders in British Columbia were able to learn from the federal experience. They used it as a justification to not only attempt to limit industrial excesses on provincial forestlands but also concentrate authority over all forestry activity on Crown lands in one branch.

With the completion of the Report of the Royal Commission of 1909-10 and the passage of the Forest Act in 1912 and the establishment of Forest Branch, a new era of forestry was supposedly spawned in British Columbia. These first foresters had a quest. According to W.R. Ross, the "epoch of reckless devastation" of the provincial forest resource had ended. In a second reading of a 1914 amendment to the Forest Act Ross stated:

(The Forest Act) was not only for ourselves and for the needs of this day and this generation, but also, and no less, for our children's children and for all posterity - that we may hand down to them their vast heritage of forest wealth, unexhausted and unimpaired (1914: 24).

Despite the rhetoric, in less than 14 years Ross's Progressive vision had been totally undermined. Steven Gray (1989), a doctoral candidate in Canadian History from Simon Fraser University, writing on British Columbian forest policy and administration during the formative years of 1912 through 1928 concluded that Crown forest ownership had not led to positive and responsible resource management. In the four areas Gray examined – forest protection, log exports, timber allocation and royalties – he determined that “government showed a striking inability, if not unwillingness, to use its potential advantage as owner of the timber resource (Gray, 1989: 24).

Indeed, Crown ownership had not led to positive and responsible state intervention. Rather, business interests had been able to shape public policy to their own private needs. Gray finished his study with the observation that “the people were to benefit from the forest resource, not through meddlesome restrictions, regulations and taxes, but by allowing private enterprise free rein (Gray, 1989: 46).

The Dilemma of Public Forestry

Forest management in British Columbia illustrates the basic dilemma confronting public-sector natural resources management. The Progressives correctly recognized that professional management had to have substantial autonomy from the political forces characterizing democratic society. Yet the achievement of such autonomy is a highly political process. Often this political process compromises both independent professionalism and the quality of professional management decisions. Generally, the Progressive idea of management by experts quickly gave way to the forces of interest-group politics. Gray stated:

Regardless of the political stripe of the government, and despite the growth in size and sophistication of the forestry bureaucracy, the capitalists in the

forest industry were able to assert their short-term private economic priorities over those longer-term resource management goals of professional foresters (1989: 24-25).

Public policy is a political matter. In British Columbia, because of the overwhelming proportion of public forests, forest policy is not only political but also critical to the social and economic health of the province. Until quite recently, the failure of the Progressive prescription in forest decision-making did not give rise to any more radical approaches to land tenure allocation in British Columbia. Wilson gave some insight as to the major reasons:

The power to define societal thinking about any particular policy issue is never widely dispersed; certain groups always control the processes by which the terms and boundaries of debate are defined. In this instance, those interests most intensely involved in exploitation of the resource -- forest capital, forest labour, and the government forest bureaucracy -- dominated debate, managing to define both the salience of the issue and appropriate means of dealing with it (1987/88: 6).

Possibly the triumvirate of forest capital, labour and bureaucracy also worked to obscure the socio-economic issues related to forest exploitation. A review of the Forest Act, Ministry of Forests Act and various forest regulations reveals a paucity of forest policies in place to assure that the people or constituency of forest-dependent areas benefit significantly from the economic utilization of forest resources. For example, one of the purposes of the Forest Renewal Act of 1994 is to "strengthen communities" while one of the purposes of the Association of British Columbia Professional Foresters under the Foresters Act is to "uphold the public interest in the practice of professional forestry." The Acts do not define the meaning of "strengthen communities" and leaves the term "public interest" undefined.

This is not the case in the United States. Since 1908 when the National Forest Revenue Act provided that 25% of the gross receipts received by a National Forest would be returned to counties for the benefit of roads and school within the counties in which the National Forest is situated, the federal government has been revenue-sharing. The Act was amended in 1976 so that gross receipts include credits that timber purchasers receive for silviculture and building roads (Bray and Lee, 1991). While the reasons for the 1908 Act are more related to the fact that federal land is exempt from local property tax than any concern over a resource dependent community's well-being, revenue-sharing with local areas has been federal forest policy for more than 90 years.

Public Forests

In 1910, 1945, 1956, and again in 1976 four British Columbia Commissions of Inquiry into forest policy recommended the continuation of the government ownership of timberlands. They offered different rationales for this recommendation because conditions and situations were constantly changing. In January 1912, when W.R. Ross, Minister of Lands, defended continued government ownership of the forest resource, he argued that "the perpetuation of the timber supply requires an investment stretching over generations and that sort of investment has hitherto been too long for the private owner" (Roach, 1984). While both Commissions examining forest-related issues in 1945 and 1956 endorsed government ownership of timberland, the 1945 Commission recommended that it be expanded on the Coast through expropriation of "denuded forest lands" (Sloan, 1945: 143). Commenting on his 1945 recommendations, Sloan wrote in 1956:

Public opinion would not, in 1945, in my belief, support a policy of continued (timber) liquidation, nor repudiation of existing (timber cutting) contracts. Neither would a recommendation that Crown timberlands be

permanently alienated have met with general public approval at that time (1956:43).

The 1956 Commission used the continuation and expansion of sustained-yield policy as the major argument for retaining government ownership of the forest resource.

Peter Pearse, Chairman of the Royal Commission Inquiring on Timber Rights and Forest Policy, recommended in 1976 "... no change in the general policy of retaining Crown title to unalienated forest land." He observed:

From the industry's point of view Crown ownership, and sale of timber as it is harvested, means that the public bears the enormous cost of carrying the forest inventory, so that the capital required to enter and operate in the industry is substantially reduced, as are the financial risks involved (1976: 57).

He then gave the following two reasons for his recommendation

First, it (government ownership) enables the Crown to protect and enhance the values of forestland that do not produce financial gains to private owners. Second, public ownership provides the government with powerful means of shaping the pattern and pace of economic development in the province (1976: 57).

Pearse's first reason for retaining government forest ownership accommodated the fact that some natural resources create goods and services, such as wildlife and water values, that have a certain public element not valued in markets. He assumed that government would be in a better position of protecting these values than private forest landowners. His second argument was based in the assumption that central planning is superior to competitive markets for determining the pace and place of economic development.

These arguments were not new. They were first put forward by the Progressive Conservation Movement. Yet it is a rather different position for a forest economist like Pearse to embrace. It is interesting to note that Pearse devotes little discussion to the types of criteria -- especially socio-economic criteria -- these could have been used to direct the pace and place of the development in the province. In discussing government acceptance of direct responsibility for proper use and management of resources where it retains title, he stated:

(P)olicymakers should decide this issue pragmatically. The governing criterion should be the most effective way of accomplishing the desired results for each task, as long as other objectives are not obstructed (1976:58).

This is unfortunate, as these criteria could have formed the mold for recasting the links between the public forest resource, public forest sector management, and the forest constituency at a very critical time in forest policy development in British Columbia.

Market Failure

In the cases where there are significant differences between the costs to the individual or firm and those accruing to society, a market failure is said to exist. Markets fail for a number of reasons. First, the market may be non-competitive. For example, a few buyers or sellers, by changing their demand or supply of goods and services, can influence price and dominate the market. This was the case of timber resources on the coast of British Columbia at the turn of the century.

Another reason markets fail is that producing a good or service create externalities. Externalities are the costs or benefits of a transaction between a knowledgeable and willing buyer and seller incurred or received by members of

society but not taken into account by the parties to the transaction (Lipsey, Purvis, and Steiner, 1985). Examples of externalities are usually associated with pollution, congestion, intergenerational and common property issues.

Boyd and Hyde (1989) use a forest road to give a site-specific example of externalities. The road is initially built to access timber and transport logs but recreationists along with others that may need to access areas near the road may use it also. Road construction, maintenance and closure could have adverse effects on downstream users by increasing sedimentation in the watercourse downslope of the road -- sometimes severely. Thus, the exchange of logs for a market price has production impacts or benefits and costs external to the transaction.

Boyd and Hyde (1989) argue that only a public intervention in road activities or joint management of timber, recreation and down-stream uses by a single landholder could bring about the socially efficient road. All incremental costs and benefits would then be borne by one owner -- be it the government, the community, or a company. Pearse (1976) used similar "externalities" arguments in recommending the retention of timberlands in government ownership in 1976.

In either scenario, that of single private owner or of a public sector intervention through policy or regulation, the market could still fail. In spite of the fact that a single landholder constructs and manages the road or of the intent of public sector regulations, there may not be adequate information to know the costs and benefits of the road project. In this case, regulations could easily set the cost of the road to the producer much higher than its real social cost. Thus, the market may fail by either inadequate information or an inappropriate intervention or both.

Public Sector Intervention and Market Failure

Combinations of three economic arguments have historically been advanced to justify public-sector intervention and regulation in the market economy. These justifications have been nested around allocation, distribution, and stabilization issues. The allocation argument states that when a freely operating market fails to arrive near a socially efficient price-quality position, the public sector may choose to intervene in the market with regulations. This was the type of argument that H.R. Ross was making in 1914 when he called for the retention of forestland in government ownership "... that we may hand down to them their vast heritage of forest wealth, unexhausted and unimpaired."

The distributive and stability arguments imply that there is a commitment to some standard of living or level of economic activity. Distributive benefits are apportioned to remove whatever prevented or distinguished non-performing or participating groups from those of the rest of the economy. Stabilization arguments involve dampening the cyclic nature of the forest sector of the economy. For example, even flow timber-harvesting policies like annual allowable-cut determinations attempt to moderate the boom and bust nature of coastal region natural-resource extraction and conversion.

In an economic sense, the 1896 decision to retain forest and land ownership in the public sector was a huge market intervention – an intervention of the most intrusive nature. Boyd and Hyde (1989: 282) effectively argue that the economic impacts of public ownership and non-neutral taxes – property and capital gains - - are greater than the sum of all the other market distortions rooted in public intervention that they examined in the American forest sector. When assets like forests come under the control of the public sector, the structure of rights whereby those assets may be used is altered. In place of a system of voluntary exchange and competitive pricing, access to the asset often becomes dependent

on the exercise of power and on other forms of non-price competition. There is a real possibility that part or all of the value of the asset being allocated may be dissipated in a scramble for its acquisition.

Interventions resulting in skewed income distributions also can cause market failure. While resource misallocation either wastes resources or causes their social product to be lower than could be expected through market allocation, income distribution is more concerned with who gets the largest share of the net social product. To forest constituents like rural communities, income distribution is quite important, especially if that income is related to the ability of an area to produce forest products and the ability of the area to continue to produce forest products is diminished by the use.

In the competitive market economy, the distribution of income derived from the development of forest resources would be related to the nature of the transaction process. All buyers would have equal access to the product or service being transacted. In British Columbia, on the other hand, access to timber has been determined through a rather complicated system of timber tenure arrangements. Access to these arrangements has historically been achieved through political rather than market processes (Pearse, 1976). More than 85% of the timber harvested in the province is from the major timber tenures attained by political processes. In these major tenures, rather than competitive market prices, the stumpage rate set by the government's timber valuation system is the selling price.

If the value of the timber is under-appraised, then the share of the market value going to the government is relatively low, while the share available to the buyer is relatively high. Since the government is in a monopoly position with respect to timber supply, the opposite is also true. Further, if there are net externalities arising from resource allocation policies then these public

intervention failures could significantly effect the structure of the forest sector of the economy (Wibe and Jones, 1992).

Market Failure and Forest Exploitation

It is a common practice for nations to use the natural endowment of public timber resources to finance economic growth. Unfortunately, there is a lengthening record of some resource-dependent economies engaging in resource exploitation without employing a process that makes a reasonable allowance for resources used (Repetto, 1989). In many developing nations, this has proven to be a very unwise strategy. The economic benefits of timber harvesting in many emerging economies have often been overstated and the resulting net domestic benefits of forest depletion have been surprisingly small compared to the gross economic value of timber products being exported (Repetto, 1988).

Noble and Dirzo (1997) argue that a large fraction of forest clearing arises from pressures that are external to the forested system being exploited. They argue that throughout the world, there has been a history of undervaluing the local forest resource. Further, these low economic values encourage land managers to ignore or liquidate the existing natural capital of the forest. Exploiters either replace the natural capital with agricultural systems or economic activities that appear to yield better and more timely returns. Often exploiters high-grade and leave the forest until it again develops some economic value. Often this practice has been called “cut and run”, which has been used to describe forest exploitation in both Canada and the United States before World War II (Langille, 1915; Lower, 1938; Sloan, 1945; Swift, 1983).

Noble and Dirzo suggest forest resource under-valuation and depletion¹ may be aggravated in countries where immediate needs dominate future

¹ The Food and Agriculture Organization (1993) identifies two types of deforestation: (a) conversion of forest to other wooded land cover and (b) conversion of forest to non-wooded area such as water body or agriculture. Throughout the rest of this dissertation, the first type of deforestation will be referred to as depletion.

considerations: areas where population growth strips away any improvement in general economic wealth or where national debt makes any improvement in per-capita wealth improbable. They observed that the forest under-valuation scenario could be made worse by inappropriate public interventions.

They used an example of trade bans with the objective of attempting to discourage poor forest practices. Noble and Dirzo simulated the impacts of a log export ban in Indonesia. Once-exportable saw and plywood quality logs became less valuable and internal domestic consumption increased. The rate of deforestation did not change. The total economic value associated with forest harvesting and management declined. Their work suggested that any public sector intervention that serves to reduce the value of the forest resource to the producing country may hasten deforestation or depletion.

Repetto and Noble and Dirzo concentrated their attention on developing countries. It is, therefore, not clear what role, if any, under-valuation and inappropriate public-sector market interventions play in more mature developed economies like Canada and the United States. Often in these more mature economies, not only the decision to intervene in the market economy but the determination of the level of intervention occur through partisan political processes (Gardner, 1985). Using political rather than market estimation techniques in a "planned forest economy" like British Columbia produces an ideal environment for the creation of market failures. Political processes are notoriously poor substitutes for the market and often create externalities leading to market failure (Binkley, 1997; Deacon and Johnson, 1985; Gardner, 1983; Mead, 1966; Mead and McKillop, 1976; Wibe and Jones, 1992;). Even in the case where the technical valuation of an intervention to society is used as a basis for decision-making, erroneous solutions could result in market failure because of information limitations or errors in the application of technique.

Changing British Columbia Public Forest Policies

Since 1987, there have been a host of forest policy changes introduced by the government of British Columbia that affect the manner in which the forest economy of the province functions. These fall into three categories:

1. Land allocation initiatives - these include land-use planning, Indian treaty negotiations, the provincial land-use strategy and the community forest pilots projects;
2. Forest management initiatives - these include the Timber Supply Review – ongoing for 36 Timber Supply Areas and 35 Tree Farm Licenses, timber-pricing changes, and the Forest Practices Code Act, and;
3. Transition and mitigation initiatives - these include the Softwood Lumber Agreement with the US, the Forest Renewal Plan, the Forest Jobs Commission and the Jobs and Timber Accord.

Paradoxically, these different forest policy directions, institutional arrangements and institutions seem to have created as many problems as they have resolved. The sheer magnitude of change is almost overwhelming and often contradictory. Forest Renewal British Columbia (FRBC), for example, was financed by an increase in stumpage, the rate the government charges for its timber. Repetto (1988) and Noble and Dirzo (1997) suggest that if the increase in stumpage resulted in forests gaining in value then the improvement in value would delay depletion. Unfortunately, research suggests that the creation of FRBC was a transfer of assets from the private sector to the public sector that resulted in increased costs of timber production with no net gain in forest value (Binkley and Zhang, 1998). The first round of the timber supply review, on the

other hand, has effectively reduced the conventional harvest in the province by 5.1%, thus reducing revenues (MoF, 2000).

Since the introduction of the last round of these initiatives in 1996, a kind of policy-caused paralysis has occurred in the forest sector. There has been almost a constant cry from both the industrial and environmental elements of the forestry sector. They claim that these initiatives are too little, too much, poorly conceived, and are damaging both to the environment and the economy

Clearly, these policies are having an affect on the forest sector of the province. The coastal forest sector has faced serious financial difficulties since the unraveling of some the Asian economies during the 1990s. As a whole, the British Columbia Forest Industry lost about \$1.057 billion in 1998 compared to \$132 million in 1997 on top of \$290-million loss in 1996 (PricewaterhouseCoopers a, 2000). As coastal firms like Canadian Forest Products Ltd., International Forest Products Ltd., Doman Industries Ltd., and MacMillan Bloedel Ltd. (now Weyerhaeuser Canada) waged the battle of the red bottom line, the provincial government was intervening or continuing to tinker with the structure of the private forest sector.

A most significant intervention was the increase in stumpage and the creation of Forest Renewal BC in 1994. Another intervention, this time by the Federal government, was the signing and implementation of a Memorandum of Understanding with the United States with regard to the export of softwood lumber -- effectively closing the American lumber market to access by coastal firms. Also in 1996, the provincial government granted \$21 million to the then Evans Forest Products Ltd. located in Golden and eased Forest Practices Code "green-up" guidelines to help the company find a short-term economic supply of wood.

In 1997, on the coast, the government again intervened in the private sector. Repap Enterprises had scuttled Repap BC and turned it over to its creditors, Toronto-Dominion and Royal Banks. Renamed Skeena Cellulose Inc., the government negotiated a plan for the rescue of the Repap BC pulp mill and its “new” company. The province initially put in \$74 million while the banks put in another \$96 million (Financial Post, September 13, 1997). By October, the provincial government’s 25% share had cost \$176 million. In November, the government bought Royal Bank’s share of Skeena for another \$35 million. The government established another \$65 million program for small and medium-sized businesses from Forest Renewal BC impacted by the Skeena Cellulose situation in February 1998. By March 1998, public sector intervention in the Skeena Cellulose issue had cost \$329 million. The province now owned a 52.5% interest in the company (The Vancouver Province, March 15, 1998). Yet, Skeena Cellulose had not become more productive nor has its resource supply been assured and it is in about the same economic and physical condition as it was when the government intervened.

What does this subsidy mean to competing companies, those that do not receive government aid? To really assess the effectiveness of this type of intervention, not only the impact of the subsidy on the receiving firm requires assessment but also the impacts on competitors and the confidence of investors.

Meanwhile the restructuring of the province’s coastal forest sector through mergers, sales and acquisitions continued. In 1997, Fletcher Challenge Canada Ltd. sold its interests in TimberWest Forest Ltd. to TimberWest Timber Trust Ltd. Pacific Forest Products Ltd. was sold by Avenor Inc. with private timberlands going to TimberWest Timber Trust Ltd. and public timber tenures going to Doman Industries Ltd. Avenor Inc.’s Gold River operation passed to Bowater Inc. as part of a bigger deal. Meanwhile, Harmac Pacific Ltd. was taken over by

Pope and Talbot, Inc. In April 1998, MacMillan Bloedel Ltd. announced the sale of its Powell River and Port Alberni paper mills.

And the story goes on. In 1999, Northwood Pulp and Timber was acquired by Canadian Forest Products Limited. Tembec Inc. of Quebec acquired Crestbrook Forest Industries after Crestbrook had sold its share of Alberta Pacific Ltd. in Alberta. Later in the year, Weyerhaeuser Canada acquired Macmillan Bloedel Ltd. In 2000, Fletcher Challenge Ltd. was acquired by *Norske Skogindustrier* ASA, a Norwegian pulp and paper producer.

On other fronts, certain members of the coastal forest industry have taken legal action against the provincial government. MacMillan Bloedel Ltd. (Weyerhaeuser Canada), TimberWest Forest Products Ltd. (now TimberWest Timber Trust), and International Forest Products Ltd. have all filed complaints concerning changes in royalty rates on timber licenses, a kind of timber tenure created around the turn of the century. MacMillan Bloedel Ltd. also filed for compensation for lands and timber that had been removed from its timber tenure for recent park initiatives. TimberWest and MacMillan Bloedel applied and were successful in removing their private lands from their respective Tree Farm Licences.

Stumpage, the rate that the Government charges for harvesting timber, is also being contested by the private sector. Husby Forest Products Ltd. has filed suit against the government because it is "setting stumpage rates that deliberately and knowingly cause a loss" (Vancouver Province, October 1, 1997). Stumpage returns in British Columbia had climbed to a record \$603 million for the first three months of 1997 while logging volumes declined (Vancouver Sun, May 1, 1997).

In order to relieve financial pressure on industry, the government has offered to reduce the amount it charges for stumpage by \$293 million – a number

that has questionable parentage. Coastal and Interior manufacturers, regions with fundamental historic geographic differences, have been arguing over the formula in timber stumpage fees (Financial Post, March 5, 1998) and agreed to \$8.1/\$3.5 per cubic meter ratio in stumpage reduction between Coast and Interior.

A Forest in Crisis

Although somewhat constrained by past forest activities and policies, the provincial government possesses broad authority across the entire public and private forest system to regulate forest practices and determine rate of cut, stumpage, royalties and rents. It can be argued that this broad authority has allowed inappropriate public sector interventions into the market and thus created an emerging crisis in British Columbia's forest sector. The public sector has continued, in spite of a lack of empirical analysis of the implications of recent policies, to intervene. Many of these interventions have taken the form of changes in regulatory institutions. These often increase costs and may have considerable impact on the competitiveness and structure of the forest sector.

If the root causes of the intervention failure are founded, as is often argued, in limited fibre supply caused by forest depletion, it is not clear what the effects of public sector interventions aimed at supporting displaced forest workers can be. If the causes are technical or socio-economic, the crisis can be averted. For instance, the lack of a scientific basis for sustainable forest management, that understanding can be obtained. If the lack of a forest constituency sharing significantly in the responsibilities and benefits of forest management are leading away from sustainability, policies can be developed to change management direction. Surely, if depletion is the cause, as is often the case in developing countries, then any public policy that results in a move away from economic efficiency will "diminish the provincial wealth."

Yet it is not clear what is driving the change in the structure of the forest sector of the provincial economy. There is little doubt that the public sector interventions have had significant economic implications for provincial firms competing in the world forest sector. This is particularly true if these interventions occurred during a time when some researchers are suggesting that the global forestry sector is undergoing a basic structural change (Best, 1998; Harou, 1991; Marchak, 1994; and Wilson, 1998). If a result of an intervention reduces the ability of a firm to compete or causes investor confidence in the firm to erode, then firms not subject to that political jurisdiction will have an improved competitive position (Porter, 1990).

Also, the wisdom of holding forestland, especially such a large proportion, in the provincial public domain is now seriously being questioned in British Columbia (Binkley, 1997; Stephens, 1998; and Zhang, 1996). Binkley, for example, argues that government has not used economic efficiency criteria in resource allocation. Binkley concluded that by concentrating timber management efforts on the best areas and sites the Ministry of Forests could simultaneously increase the volume of timber and other outputs. Other industrial groups argue that reform in tenure and pricing arrangements are more critical than reform in ownership (COFI, 1999; PWC, 2000). Yet the primary questions need to be resolved. Is the public natural forest resource wealth being wasted and dissipated? Are public forest policies resulting in skewed income distributions permitting some areas to grow and prosper at the expense of other more resource-dependent areas? If so, what alternatives exist to mitigate the wasting of the resource asset and the skewed income distribution?

Study Objectives

The objective of this study is to determine the scale of the regional income impacts of applying current timber tenure and pricing policies in a case study of the Kingcome Timber Supply Area for the period 1984 through 1994. The

research in the second and third chapters is a literature review and builds the historical framework of institutional development in British Columbia's coastal forest exploitation. It defines the major interventions in policy and their impacts on the forests and the forest constituency of coastal British Columbia. The fourth chapter builds the case for scientific forestry while the fifth chapter is the case study to estimate the amounts and values of timber resources used over a 10-year period in the Kingcome Timber Supply Area. The objective is to determine if exploitation has indeed led towards the depletion of the forest in the area of concern.

The historical context also may illuminate certain precedents - such as the overwhelming amount of forestlands retained under public control - that could be used to clarify and explain important features of the current suite of institutions and institutional arrangements in the forestry sector. For example, servicing foreign markets has been one fundamental pillar on which British Columbia's forest products industry was formed (Cohen, 1990). Precedents may have been interwoven with the framework required to develop the export forestry sector that might have appeared quite reasonable in 1950 but may constitute a public sector subsidy in 1998.

Finally, because of the importance of the forest sector to the economy of British Columbia, more serious attention needs to be paid to the costs as well as to the benefits of public sector interventions. In the final chapter, once an approximation of the severity of the problem or problems has been determined, discussion will focus on a possible solution path to the apparent crisis in British Columbia's coastal forests.

Chapter 2 - The Institutional Basis for Provincial Forestry

The forest is as beautiful as it is useful....Perhaps no other natural agent has done so much for the human race and has been so recklessly used and so little understood.

Gifford Pinchot,

A Primer of Forestry. Part I. The Forest, 1889

To begin to understand the relationship of coastal British Columbia's people with their natural resources, we ought to consider the larger geography of ecologic, economic, social and political activities. For the last 200 or so years, expanding global economic and political forces have had an increasing influence on the forests along the coastal margin of Western North America. As a consequence, it now seems that those forces, rather than the people, both Native and those of Euro-Asian decent, are far more influential and gain a larger share of the natural wealth than those that call these forests home. This chapter briefly discusses the natural forest wealth of the North Pacific coastal forest and traces key points in the development of policies and institutions designed for its exploitation in British Columbia.

Reaching from the redwoods of California to the large stands of spruce and hemlock on Kodiak Island, the coastal temperate rain forests of North America are characterized by the interaction between land and sea. Here marine, estuarine, fresh water and terrestrial elements have combined to build some of the most diverse and productive ecologies in the temperate world.

In coastal British Columbia, the forest began its return to the valleys and steep mountain slopes of the Pacific coast as the Cordilleran ice sheet began its retreat. It was a much different forest from that discovered by European explorers some ten to twelve thousand years later (Pielou, 1991). Evidence

indicates that it was not one continuous forest but had evolved as a patchwork of different types somewhat related to the region's three climatic gradients: north to south, west to east and sea level to mountaintop. The bio-historic record suggests that these forest systems occurred at various scales and in a constantly changing state of biophysical turmoil (Brubaker, 1992; Hebda, 1983; Hebda, 1997). Yet, by the time contact with European culture occurred, this mosaic of vegetative communities held concentrations of some of the most massive reservoirs of forest fibre ever constructed by Nature -- the West Coast rain forest.

One of the better recent sources of information on the West Coast rain forest is The Rain Forests of Home: Profile of a North American Bio-region. The book was published in 1997 from a series of research papers presented at an August 1994 conference in Whistler, British Columbia. Editors P.K. Schoonmaker, B. von Hagen and E.C. Wolf produced a book that is a unified description of the characteristics, history, culture, economy and ecology of the region. The Rain Forests of Home is referred to for a general description of the region.

One of the more insightful chapters on the ecology of the area in the book is titled "Environmental History" by R. Hebda and C. Whitlock. They describe "(T)he coastal forests as snapshots in time of a long and changing series of ecosystems shaped by many processes ranging from global climate change to local human disturbance (1997: 227)."

The history of the coastal rain forest is the reason why it is where it is and looks the way it does. Biodiversity is more than numbers, it is uniqueness; ecological uniqueness is a product of history. By understanding history, we gain valuable insight into how ecosystems function over ages, measured not in years and decades, but in centuries and millennia. From this understanding we may learn how to interact with the forest in a sustainable manner (1997: 227).

While not all of the West-coast rain forest was ice-bound during the Fraser glaciation, the Cordilleran ice reached its southernmost limits 15,000 to 14,000 years ago when ice lobes extended south into the Puget lowland and the Strait of Juan de Fuca (Hicock *et al.*, 1982). Thus, most of the coastal forest area of British Columbia was covered with a thick layer of ice during this time.

From 12,000 to 6,000 years ago, perihelion or the point in Earth's orbit when it is closest to the sun, occurred in summer rather than winter as it does today. Thus, Hebda and Whitlock estimate summer radiation on the coastal rain forest was 8 to 10 % higher 9000 years ago than at present, so temperatures were higher and effective moisture (moisture that is available for plant use) was lower. It is ironic that students of climatic warming are predicting increases in regional temperatures by 4 to 5° Celsius. Thus, regional warming is not a new event in the coastal forest. What is new is the type of response that can be expected from the current vegetative mosaic as the forest 9,000 years ago has no modern equivalent or analog (Whitlock, 1992).

The first forest invader over much of the coastal deglaciated terrain was lodgepole pine and it persisted for some 2000 years over a coastal area extending from southeastern Alaska to Washington State (Heusser, 1985; Hebda 1995; Whitlock, 1992). About 10,000 years ago, at least in southeastern British Columbia and coastal northern Washington, lodgepole pine was joined by Sitka spruce, Douglas-fir, western hemlock and red alder. After about 5,500 years ago summer drought became less intense because of decreasing temperature and increasing precipitation (Whitlock, 1992). By about 4,000 years ago, modern vegetation patterns were established (Hebda and Mathewes, 1984).

Today's Natural Forest

One of the most outstanding features of the forest vegetation of coastal British Columbia is the nearly total dominance of coniferous species. Less than

3% of all forestland in all age classes was composed predominantly of deciduous species in the Kingcome Timber Supply Area in 1984 (MoF, 1984). Franklin and Dyrness (1973) observed that usually deciduous hardwood or mixed hardwood-coniferous species are the major constituents in nearly all other forests in temperate zone regions of the world. They noted that coniferous species tend to be concentrated on more stressful habitats or function primarily as pioneer or seral species that give way to a hardwood-dominated forest in time. The coastal Northwestern American forest is either a representation of the former or an exception to the general observation for forests occurring in temperate zones. Nevertheless, the Pacific coast forest is the most heavily wooded area on Earth and produces the largest-sized conifer trees in the world.

Vancouver Island forests are typical of mesic temperate coniferous forests of the Pacific Coast. Some of the dominant endemic species of Pacific forests are Sitka spruce, *Picea sitchensis*; western red cedar, *Thuja plicata*; lodgepole pine, *Pinus contorta*; Douglas-fir, *Pseudotsuga menziesii*; western hemlock, *Tsuga heterophylla*; balsam fir, *Abies amabilis*; yellow cedar, *Chamaecyparis nootkatensis*; and mountain hemlock, *Tsuga mertensiana*. Important characteristics of these coniferous forests are the size and longevity of the major species (Table 2-1). Productivity of these forests is comparable to forest stands in other temperate regions but sustained growth and long life spans result in huge accumulations of biomass (Fujimori, 1971).

The long life spans of the individual species coupled with the rate of change in species composition over the last 6000 years suggest that Vancouver Island forest communities are not in equilibrium with either themselves or their habitat. Evidence indicates that overall species composition and relative abundance have not been stable through time. For example, the last major regional adjustment in vegetation began about 4,000 years ago (Hebda and Mathewes, 1984) when western red cedar began to achieve relative importance in the composition and

structure in the Island's forests. This is just a little more than three tree generations and hardly enough time for genetic adaptation to occur.

Table 2-1: Ages and Dimensions for Selected Species of Forest Trees on Vancouver Island

(Adapted from Waring and Franklin, 1979)

Species	Maximum Age (Years)	Average Life-span (Years)	Typical DBH (cm)	Maximum DBH (cm)	Typical HT (m)
<i>Abies amabilis</i>	600	400	100	206	40 - 55
<i>Chamaecyparis nootkatensis</i>	3,500	1,000	100-150	297	35
<i>Picea sitchensis</i>	750	500	180 - 230	525	70 -75
<i>Pseudotsuga menziesii</i>	1200	750	150-220	434	70-80
<i>Thuja plicata</i>	1200	1000	150 - 300	631	60
<i>Tsuga heterophylla</i>	500	400	90 - 120	260	50 - 65
<i>Tsuga mertensiana</i>	800	400	75 - 100	221	35

The almost complete domination of the coastal forests by conifers and the longevity and size of these trees have important ecological implications as forests are exploited and converted to "managed" forests. Three other features of the major species of Vancouver Island forests are also worth noting. These are the development and growth of conifer foliage, the species' adaptation to the nitrogen cycle and the importance of effective moisture regime on the growth and disturbance patterns of these forests. Under current natural conditions, Pacific conifer forests develop leaf biomass and surface area much more slowly than coniferous and hardwood forests in the eastern part of the continent (Marks and Bormann, 1972). Also, available nitrogen is almost always limiting to

growth once the conifer stands have developed closed canopies (Mahendrappa *et al.*, 1984). Effective moisture not only can stress the individual plant community; precipitation and temperature regulate indirectly the disturbance regimes of wind and fire over the forest landscape. If the coastal forest is to be exploited, and it has been for thousands of years, these factors all have important implications for its management. The goal of forestry in British Columbia, until the middle 1980s, was to bring the forest under management. This implied the control of exploitation of the natural forest endowment and the development of a second forest.

Implications for Management

Long and Turner (1975) working in the northwest with plantation and natural stands of Douglas-fir found that foliage biomass in a 42- year-old untreated plantation was comparable to the development of a 73-year-old naturally established stand. Their research noted that crown stabilization occurs some 60 years after stand establishment in natural stands of Douglas-fir. They thought that higher initial density of planting and an earlier subsequent crown closure led to crown stabilization. They indicated that silvicultural treatment could remove some 30 years from the cycle of physical development in natural Douglas-fir stands.

Nitrogen also plays a critical role in the productivity of West Coast forests, with nitrogen fertilization frequently producing significant, occasionally spectacular, but often variable growth responses. Volume gains from nitrogen average 16% to 26% in coastal Oregon, Washington and British Columbia (Miller *et al.*, 1986). These two factors alone – foliar biomass production and response to nitrogen --suggest that some of Vancouver Island forest species are quite malleable and different levels of productivity can be achieved by applying cultural practices.

Yet it should be remembered that the development of modern forest vegetation communities did not occur until the last few thousand years. A number of research workers contend that paleoecologic data from the coastal forest and elsewhere suggest that these modern communities are loose associations composed of species independently adjusting their ranges to environmental changes on various time scales (Davis, 1981; Schoonmaker and Foster, 1991; Whitlock, 1992).

James Woodman, Director of the Atmospheric Impact Research Program at North Carolina State University, argued in 1987 that higher carbon dioxide concentrations would compensate for higher temperatures and less rainfall in future coastal Douglas-fir and western hemlock forests. He also suggested that the humid temperate climatic regime of the northern Pacific coast acts as a buffer for these forests against climatic change. The opposite is quite likely true. Western coastal forests are probably very vulnerable to climatic shifts induced by global warming. This is because one of the most important environmental variables affecting the composition and function of these forests is the effective moisture regime, a function of temperature and precipitation during the summer periods. Further, the two most catastrophic forest disturbances in coastal forests - windstorm and wildfire - are also climatically driven.

Woodman (1987: 278) argued that "the doubling of CO₂ will have little effect on Douglas-fir and hemlock because, by the time of altered climate, there will be changes in management of these species but the stewardship changes will be related more to the maturing of forest management science than to climatic change." He proposed that the greatest technological change likely to influence future management is embodied in the concept of "site-specific management prescriptions". These customized plans, coupled with his observation that few managers in industry or government make major decisions based on time periods of more than 10 years, led him to predict:

The financial climate they (managers) must deal with daily is much more volatile and more likely to affect their company's survival and health than any predicted climate change in 80 to 100 years! They must continually make major short- and long-term decisions in a changing financial climate using incomplete information about the future. Thus, it is most unlikely that a prediction of major climate change would have much influence on any major forest management decisions being made today (1987: 280).

Franklin *et al.* (1991) and many other paleoecologists disagree (Hebda, 1997; Schoonmaker and Foster, 1991; Whitlock, 1992). Franklin *et al.* proposed "that altered disturbance regimes, including intensities and frequencies of wildfires, storms, and outbreaks of pests and pathogens, would produce much more rapid changes in forest conditions than the direct effects of increased temperature and moisture stress... Forest management would either exacerbate or reduce the effects of climate change on the productivity and biological diversity of northwestern forestscapes" (1991: 235).

Early Forest Exploitation

The beginnings of the exploitation of British Columbia's coastal forests predated the European exploration of the coast by thousands of years. Indigenous use started about 5000 years ago, built for another 2500 years, then leveled off to rates observed at contact with the European explorers. During the period of indigenous use, there is considerable evidence of continuing change in forest composition with western red cedar gaining significantly in importance as a leading species in the flora about 2500 years ago. The species and size of the trees of the region gave native people a material for food, clothing and building. Importantly, it also offered them materials for artistic expression and massive woodworking (Hebda and Mathewes, 1984). In contrast to the native view of forest exploitation, the Europeans arrived with a markedly different cultural

vision. To them, the natural world was capital that humans were ordained to use for self-advancement and the accumulation of personal wealth.

The literature on the exploitation of the coastal forest and the development of policy instruments to accommodate that exploitation is robust¹. For the early periods, probably the most enlightening from the point of view of this study is Robert Cail's Land, Man and the Law: The Disposal of Crown Lands in British Columbia, 1871-1913. Cail points out that by the end of the Colonial Era, three factors had constantly influenced the colonial administration's framing of legislation for the disposition of lands: the encouragement of settlement; the desire to prevent speculation in public lands; and the administration's desperate need to provide an adequate revenue with which to administer the large undeveloped territory that was to become British Columbia. After Confederation, various provincial governments were to deal with these three issues quite differently. It was speculation and the need for income that brought forest issues onto the public agenda.

The development of British Columbia's land policy from 1871 to 1905 was not spectacular in the sense of activity. But it reinforced many forest tenure and pricing policy precedents that had already been established in the Dominion, particularly public ownership of the forested resource with access to forest resources granted by political processes rather than through the market. Further, policy had set aside a number of public forestland questions -- not the least in importance being the development of a scientific basis for forest resource development -- for resolution somewhere in the future.

¹ Other sources used for this section were Stephen Gray's 1989 "The Government's Timber Business: Forest Policy and Administration in British Columbia, 1912 - 1928.", Thomas Roach's 1984 "Stewards of the People Wealth", Joseph Lawrence's 1957 Master's thesis from University of British Columbia Markets and Capital: A History of the Lumber Industry of British Columbia (1778 - 1952) and G.W. Taylor's 1975 Timber: History of the Forest Industry in BC.

While the saga of forest exploitation on the province's coast was one of struggle with geographic isolation, inadequate transportation facilities, undependable markets and insufficient capital, it also was heavily intertwined with the political reality of the moment. The Land Act of 1896 carefully defined public timberlands in both the coastal and interior context. It forbade the further granting in fee simple of timberland, thus establishing the principle of public forestland ownership in British Columbia. Further, the act modified the timber licensing arrangements by creating Special Timber Licences carrying a term of four years and an area of thousand acres. The next year, 1897, the government initiated another significant change in the province's Land Act. It placed the onus of proving that a location was free from all encumbrances before title was issued on the settler. The year 1897, then, marks the first point in time when standing timber on public land had value in the eyes of the government (Gillis and Roach, 1986).

Another policy direction of the time and one that would have immense future consequences had to do with restriction on the export of logs. Legislation in 1901 required that all timber cut from Crown lands to be manufactured into products in the province. The Timber Manufacture Act of 1906 further required that any timber cut from lands granted by the Crown after the effective date of the legislation also be manufactured into products in the province.

At the turn of the century, the provincial Government sources of revenue were limited. Aware of the American's interest in the provincial forest assets, the government attempted to make the timber licence program more attractive to potential timber buyers (Taylor, 1975). While the government had restricted log exports, it still required American capital to help develop the fledgling forest sector.

In 1905 the government extended the term of the Special Timber Licence (STL) from four to twenty-one years. More significant, the licence was made transferable and renewable. It became a form of property. For the cost of building a mill and operating it six months a year, the lawmakers in Victoria offered timber licences to the market. They had renewable terms of 21 years, a small royalty fee for timber of \$.50 per thousand board feet (MBF), and a small per acre rental charge. A further inducement for timber speculation was the expectation that the value of timber would increase some \$2.00 per MBF upon completion of the Panama Canal (Lawrence, 1957).

By 1907, the STL program had begun to severely limit loggers' access to remaining operable coastal forest stands. Loggers were required to compete with the mill owners and speculators in a shrinking standing timber market. To further the logger's dilemma, the provincial government had restricted the export of logs. So the mill owners now, more or less, controlled the only market for the loggers' product. Although the mill owners did have access to forms of tenure other than STLs, they tended to side with the loggers because cutting the forest required special expertise not normally required to mill lumber. The majority of STLs were held by owners that were speculating on their increase in value. Further, these owners demanded that the licences be made valid indefinitely. They wanted to decrease the risk of losing their equity and wanted to make the licences more acceptable to banks as loan collateral.

Thus by 1907, provincial political tinkering and public sector intervention had become features of the provincial government's relationship with the forest sector. Importantly, some of the tinkering established precedents that became embedded in forest law. For example, government had clearly established the principle of public ownership of timberlands. Virtually the whole forested estate, 95% of British Columbia, would be available for timber extraction under this model. Forest management and harvest would be bound with the same

processes and limitations confronting the public sector in the manner that it undertakes its activities. The need to know about and manage public forests would compete with the critical political issues of public health, education and welfare for Treasury Board appropriation during the annual budget cycle. Immediate political problems would need to be addressed while most forest issues would wait until they became political issues.

In 1907, a political crisis was emerging from the changes in Special Timber Licences. Loggers' access to standing timber was severely curtailed while the forest speculators were demanding protection for their investments in Special Timber Licences. The apparent losers were to be the public landowner and the logger. All that remained was for the government of the day to quiet the concerns of the Logger's Association over the concentration of cutting rights in the hands of the mill owners and speculators. To do this, like governments of today, it commissioned a study (Roach, 1984).

The First Royal Commission

To remain in power, government had to resolve the issues around logger and speculator demands. Roach (1984) emphasizes that the Royal Commission of 1910 (Fulton Commission) was employed as a means of avoiding the unpleasant consequences of a confrontation with important components of the forest community prior to a decisive election. The Fulton Commission was obligated to dampen the STL issue and did so with the following recommendation to government:

The conclusion arrived at by your Commissioners was that extension of the tenure of special licences, under proper safeguards, would not work to the disadvantage of the Province. A strong argument in favor of the change and one that had considerable weight with us was that it would tend to the conservation of the Crown forest (1910: 49).

The Commission suggested that no new STL be issued; but those already in place would be allowed extension and transfer rights. With this sensitive issue put aside for later Royal Commissions (and, ultimately, in 2001-02, for the courts) the Commission examined some of the broader problems facing the province's forest community.

Forests as Capital

While the Commission was focussed on some the contemporary issues in 1911, the Prairie trade had begun to decline. This along with other economic factors of the time (San Francisco had rebuilt) caused lumber and shingle prices in the province to slump. Loggers were less concerned about their access to available timber and more interested in finding an economic alternative to logging. These factors worked to remove some pressure from the Commission. It then began to examine problems of the forest industry from a different view. For instance, it proposed that all income from forests should be treated as capital and placed in a special fund. The fund could not be used. The Commission's recommendation reads as follows:

Your Commissioners regard the income from royalty on timber as differing essentially from any other form of revenue in the Province. Such receipts should be regarded as capital – not as current revenue. We have no hesitation in recommending that the amount so received, large as it may appear, should be expended by the Government for the protection, conservation and restoration of our timber resources. With our present knowledge regarding re-forestation, to treat these receipts as other than capital would be utterly unsound in principle and might produce disastrous results in the ultimate impairment of the public estate (1910: 72).

Under this concept, the Government would employ only the interest accruing yearly until the fund grew large enough that withdrawal would not

materially reduce the balance. Unfortunately, the idea was not written into the Forest Act of 1912. Still, there clearly was a first early attempt to define forests as capital and to place public forest ownership and management on a firm financial basis, removed from the political prerogative of the day.

The Final Report of the Royal Commission on Inquiry on Timber and Forestry was presented to the provincial legislature in early 1911. It included significant recommendations concerning "the conservation of the Crown forests". When the Forest Act was presented in January 1912, W.R. Ross, Minister of Lands, defended the continued government ownership of the forest resource because of potential income. He argued that "the perpetuation of the timber supply requires an investment stretching over generations and that sort of investment has hitherto been too long for the private owner" (Roach, 1984: 21). The Act also included the establishment of the Forest Branch in the Ministry of Lands, the creation of Forest Reserves, and the design of new timber tenures. The bill was enacted February 27, 1912.

Thomas Roach referred to the Forest Branch as "the stewards of the people's wealth." He commented:

Emerging out of a period of growing forest utilization and speculative abuse, the BC Forest Branch faced formidable obstacles. Its success was based upon astute assimilation of scientific and administrative principles developed elsewhere, the broad mandate provided by the 1912 Forest Act, and the determination and strength of character possessed by the province's first foresters (Roach 1984: 14).

Overton Price, a consultant working for William Ross, wrote in American Forests in 1914:

This infant organization spent last year \$350,000 and took in “royalties” about \$3,000,000...the forest branch also developed a thriving little timber sale business, which last year comprised \$238,000 worth of timber sold and a further \$147,000 worth advertised for sale (1914: 273).

Importantly Price discussed the new Timber Royalty Bill introduced by Lands Minister Ross:

This act provides that royalties, now fifty cents, shall go up by fifty per cent on January 1, 1915, and there remain for five years. Then, in 1920, comes a readjustment, under which the government first determines the average mill run price of lumber for the last three years, and adds to the royalty for next five-year period one-fourth of the excess above \$18.00 per thousand feet. At the end of every five years for six five-year periods the same process is renewed. This means straight profit sharing between the public and the lumbermen (1914: 278).

While the notion of the forest as capital and placement of forest management on firm financial footing was rejected, the vision of the forest as a “political tree of plenty” was adopted. Associated with this vision was another: the public would share the proceeds of exploitation with the exploiter – the lumber industry.

Stephen Gray (1989) examined the provincial government’s timber business from 1912 through to the early 1930s. He summarized this period with the following observation:

Regardless of the political stripe of the government, and despite the growth in size and sophistication of the forestry bureaucracy, the capitalists in the forest industry were able to assert their short-term private economic priorities over those longer-term resource management goals of

professional foresters. During these early years of British Columbia's forest industry development there was ultimately little political or economic scope for advanced forestry or for a "people's share" in the allegedly highly competitive and unstable enterprise (1989: 24-25)

Wilson (1987/88) wrote on forest conservation in the province over the period 1935-85. Commenting on possible timber shortages during the 1930s and 40s, he stated:

Fears concerning the possibility of timber shortages began to crystallize as British Columbia emerged from the depression. It is difficult to gauge the breadth or depth of popular concern, but available evidence suggests that doubts about the future timber supply were widespread by the early 1940s (1987/88: 7 and 8).

F.D. Mulholland (1937), a provincial forester, assembled The Forest Resources of British Columbia, which provided a factual basis for the concern over timber supply. In his study he acknowledged that:

On the coast not only is reforestation unsatisfactory, but the rapid expansion of industries is making it apparent that it will be impossible to avoid a conflict between the desire of private interests to utilize all the mature stands as quickly as markets can be found for the timber, and the public interest which requires that great basic industries dependent upon natural resources should be regulated on a permanent basis (1937: 53).

It is interesting to note one of the major reasons that Mulholland gave for regulating forest industries had to do with permanent communities. He stated:

Until recently public indifference to forestry would almost lead one to believe that America has been regarded as a place for temporary residence while its treasures were rifled as quickly as possible; that there would

always be somewhere else for the “pioneers” to go, leaving a trail of devastated forest behind them. Even so, where the denuded land could be put to other uses and a sound social structure could still be built up; but where, as in British Columbia, four-fifths of the productive land is suitable only for forestry, permanent communities can only be maintained upon permanent industries sustained by the yield of well-managed forests (1937:10).

Wilson also noted the importance of the Forest Service in spearheading the rising public concern. Using Mulholland’s inventory as evidence, two Chief foresters, Ernest C. Manning and C.D. Orchard, picked up the banner of the need for sustained yield in the provincial forests. Thus, during the Second World War Gordon McG. Sloan was appointed sole Commissioner of the Royal Commission of Inquiry Relating to Forest Resources in British Columbia. The Commission was established on December 31, 1943. The Commissioner’s mandate was to report to the Lieutenant Governor on the condition of the “forest resources of the Province and all matters generally relating to or connected with the forest resources of the Province.” He commented on the general state of forest finance in the province:

Millions upon millions of dollars have been drained from our forests into the general revenue to help pay for governmental activities and services wholly unconnected with the protection and development of the primary source of our Provincial wealth.

If our forest administration were adequately financed to fulfil properly its function of protection, conservation, management and development of our forest resources then any surplus forest revenues could be absorbed into the general revenue. But such has never been and is not now the case. Our

forest administration for years has not been adequately financed (Sloan, 1945: 111)

Sloan was subsequently appointed commissioner to a second Commission that came into force January 7, 1955. It was formed based on the recommendations of the 1945 Report of the First Commission. The 1956 Report was more of a “hindsight” review and follow-up. Still, the 1956 Report is an excellent snapshot of the forest resource at a time when the forest industry was consolidating with acquisitions and mergers. In his 1956 Report, Sloan revisited the primary issue formulated in 1943-45:

Our forest industries have been living on an expenditure of forest capital that has taken hundreds of years to accumulate at no cost to industry. The time has now come when we have to plan to live on forest interest and maintain our capital unimpaired (1945: 128).

In this context, Sloan in his 1956 Report asked:

Were we to continue to follow a system of unrestrained and unregulated forest exploitation, regarding the forest as a mine to be exhausted of its wealth, or were we to move to a system based on the concept of sustained yield, wherein the forest was to be considered as a perpetually renewable asset like any other vegetable crop? (1956: 3).

The answer to this question had already been suggested in his 1945 Report:

...manage our forests so that all our forestland is sustaining a perpetual yield of timber to the fullest extent of its productive capacity. When that is accomplished all benefits, direct and indirect, of a sustained-yield management policy will be realized; providing, of course, that the

multiple purpose of our forests is recognized as an aim as important as balancing cut and increment (1945: 127).

It does appear that both Commissioners Fulton and Sloan recognized the need to protect the capital value of the Province's public forests. Yet, the partial and potentially politically expedient implementation of Commissioner Fulton's recommendations had resulted in a forest resource that Commissioner Sloan characterized as being in " a slowly descending spiral" – it was being depleted. Commenting upon the rate of use of Douglas-fir, Commissioner Sloan, in an analysis of the 1937 estimated volume of accessible fir, stated:

...in the eight years since Mr. Mulholland's report (1937 forest inventory) our accessible stands of Douglas-fir have suffered about 65 per cent depletion and less than five years will see the complete disappearance of mature virgin stands of that species on the coast (1945: 31-32).

The fact that Douglas-fir, supplying the material for 49.93 per cent of our average annual cut on the Coast comprises only 24 per cent of our total Coast stand and will be cut out...long before the new fir forests can supply that proportion of the cut, means the logger must turn, in an increasing degree, to other available and marketable species (1945: 35).

Commissioner Sloan raised an issue associated with over-cutting and that was the concentration of cutting rights. He noted that an analysis of the ownership of the various cutting rights in 1944 demonstrated that 58 individuals or companies, or 2% of the total number of those licensed to cut, controlled 51.7% of the total areas included in the various tenures. On the Coast, 24 out of 677 logging operators produced over 60% of the volume of the cut. Concentration of cutting rights coupled with forest depletion had begun to emerge as issues in British Columbia forest policy. Further, this concentration of cutting rights was

one of the major considerations causing Commissioner Sloan to recommend the establishment of private working circles in the public forest.

Clearly, the Fulton Commission's attempts to find a solution to the STL controversy coupled with partial implementation of its recommendations by government had been unsuccessful in curtailing forest depletion. To deal with the depletion issues and meet the objective of "sustaining a perpetual yield", Commissioner Sloan made recommendations in nine areas: three in research and education, three in forest practices and silviculture, and three in forest administration and planning.

Sloan's review of past forest alienation indicated that millions of hectares of highly productive land on the Coast were in private hands in various forms of timber tenure - permanently, as in Crown grants, or temporarily, as in tenures like STLs.

...it seems to me an inescapable conclusion that the great part of the alienated timber resources of this Province are controlled by a comparatively few men. The success of any future forest policy designed to place our forests under a system of planned management must depend, to a degree, upon the extent to which these holders co-operate with the Crown in a mutual endeavour to reach that objective (1945: 81).

If these lands were not brought into Commissioner Sloan's program of sustained-yield management, his stated objectives would not be met. In reviewing the 1945 situation in 1956, Commissioner Sloan stated that four courses were possible:

One, to admit an inability to meet the challenge and to continue on a liquidation basis. Two, cancel or refuse to renew all temporary tenures, which would mean a repudiation of existing contracts and renewal rights.

Three, to devise a form of contract where the holder of private lands or of temporary tenures agrees to manage these lands on a sustained-yield basis and surrender the right to liquidate as he pleased, provided the government allocate contiguous and suitable areas of Crown Timber so that the total combined areas, when on sustained yield, would provide a substantial proportion of the raw material required by him to maintain his production - title to the whole area to remain in the Crown, except acreage previously held in fee, and the management of the total area to be subject to Crown control. Or, four, to depart from a long continued policy and convert by outright sale the temporary tenures when cut over into some form of permanent title, to which might be added Crown areas sold or alienated on some permanent basis to make up sustained-yield units (1956:42-43).

In 1945, Commissioner Sloan had thought that public opinion would not support the adoption of propositions one, two or four. That left the partnership concept as the rational selection for a future forest policy. The government accepted this recommendation and implemented it, in part, by amendments to the Forest Act in 1947, that provided for the establishment of two types of forest tenures: private and public working circles. In 1956, these land units were called Forest Management Licences (FMUs) and Public Sustained Yield Units (PSYUs). By that year, the province had awarded some 12 FMLs: one in the Interior and 11 on the Coast. Another 18, with 8 on the Coast, had been reserved subject to the approval of the working plan. As of December 1956, 10 public working circles had been established on the Coast and 23 in the Interior.

The major objective of the FML (later to be renamed Tree Farm Licence) was to enable private owners of forestland and tenures to maintain sustained-yield management on their own land by adding sufficient Crown land to make

economic units. Yet, by 1954, only 5% of the 5.5 million acres of private land had been committed to FML.

This was to quickly change. When Commissioner Sloan filed his report in 1956 that recommended the continuation of the FML, the BC Forest Service signed FML 20 and 21 with MacMillan Bloedel Ltd. It also signed FML 22 with BC Forest Products Ltd. All three of these FMLs included significant portions of private lands (BCFS, 1955).

An important recommendation that was not incorporated into forest policy had to do with the temporary tenures like STLs. Most of these were held in private working circles and would revert to the Crown when logged. The Act included no provision for their inclusion into the new private working circles when cut. So for the most part, there was little incentive to harvest this tenure. These licences would remain part of the unregulated cut. They would not be included in the adjoining FML and would not be subject to sustained -yield management.

Another recommendation and one that might have put forestry on a more secure financial foundation and surely would have eased the selection and establishment of the new forest management licences, was for the establishment of an independent forestry commission. The chief reason that Commissioner Sloan recommended its establishment was the long-range planning required to change from "...our present system of forest liquidation and depletion to one of sustained-yield management." As Sloan emphasized, forest planning examines decisions in a time frame of generations.

This kind of planning has as its concomitant, long-range financing. The present system of annual appropriations from the general revenue, for which the Forest Service must compete with other spending departments of Government, is subject to vagaries in general business activity, the

exigencies of short-term financing, and the uncertainty of money supply due to temporal variations in governmental receipts available for departmental allocation. These factors, coupled with recurrent periods of transitory demands for increased expenditures in social and economic fields, unrelated to forestry, have in the past and will in the future, retard if not frustrate any long-term policy of forest management (1945: 149).

In order to move forest policy out of "...bondage to the system of Treasury control," Sloan recommended the establishment of a commission with two main purposes². First, it would formulate and administer a long-term system of planned forest management and forest industry regulation. Second, it would supply the machinery for long-range financing divorced from the system of annual departmental appropriation from general revenue. He visualized the commission's jurisdiction to extend over all aspects of forestry, extractive operations and conversion industries, and to include "...multiple forest uses that are an essential part of forest management." He also recommended including research and the placing of the Forest Service under the commission.

The provincial government in 1945 did not implement Sloan's organizational vision and instead of recycling the "commission" recommendation in the 1956 Inquiry, Commissioner Sloan commented:

It has been made abundantly clear over the years since then that succeeding Governments are reluctant to liquidate their own prerogatives by delegating to an independent Commission the controls I thought in 1945 such a Commission should exercise over our forest resource (1956: 575).

² Commissioner Sloan took this quote from the testimony of Dr. George F. Drummond, Professor of Economics, UBC. Professor Drummond also testified that, "The relation of forest income to the depletion or replenishment of forest resources is not the Treasury's concern. The only concern of the Treasury is the annual appropriation that may be voted or allotted to the Forestry Branch; it becomes just another departmental commitment."

In Commissioner Sloan's words is the crux of the present problem of forest-resource management on public land and, possibly, its epitaph – the unwillingness of the Government to liquidate or even temporarily yield its forest prerogative.

Roots

The adoption of some of the recommendations of the 1945 Sloan Commission and the subsequent endorsement by the 1956 Sloan Commission brought a majority of the forest resources of the province, private and public, under sustained-yield management. The Forest Act of 1947 empowered the Minister of Lands "...to enter into agreement with any person, whereby specified areas of Crown lands are reserved in perpetuity for the use of that person provided he so manages the forests that a sustained yield output will be assured."

The FMLs would also prove to be effective instruments for the development of the Coastal forest by foreign investors and corporations. While the boom period from 1901 to 1907 created controversy related to the allocation and apportionment of wood supply, it paled by the 1950s standard. In the early period, the government was partitioning values that were in the neighborhood of 640 acres and thousands of dollars. Now government was apportioning public values in terms of 10,000s of acres and millions of dollars.

During the 1950s over 400 "serious" enquiry's for FMLs had been received (Sloan, 1956). By the middle of the 1960s 41 FMLs had been issued. Again, as with the STL staking of the early 1900s, the Forest Service did not use competitive market arrangements in allocating the FMLs. Instead, while some later licences were let to induce the licensee to practice sustained-yield forestry on private land, most licenses were issued to supply timber for specific mills or were issued conditional on construction of a mill (Ainscough, 1976). Clearly,

then, the goal of practicing sustained-yield forestry with FMLs had become secondary to the goal of attracting investment in forest manufacturing. The FMLs were successful in attracting investment capital. They were so successful that one writer of the period commented:

Out of all the schemes, strategies, and inducements that the government of British Columbia has offered to lure capital to invest in the forests of the province, none has been so effective as the concept of sustained-yield as administered by a Forest Management or Tree Farm Licence (Taylor, 1975: 163).

The success of the tenure in arresting forest depletion on lands being administered under sustained-yield arrangements was another question.

A New Industrial Order

From 1919 to 1946, despite growing world markets, no new pulp mills were built in the province. Older coastal mills at Port Alice and Woodfibre had serviced the rayon industry while Ocean Falls and Powell River produced newsprint. After the war, Bloedel, Stewart, and Welch Ltd. formed a pulp division and started a mill in Port Alberni to use sawmill waste from its Port Alberni and Great Central Lake sawmills. This mill was to be the first integrated forest operation in the province. At about the same time, H.R. MacMillan Export began plans for a mill at Harmac to integrate operations from the MacMillan sawmills. Neither sawmill nor pulpmill at Harmac based its timber supply on a FML; they were initially to be sustained by Crown grant forests initially acquired by eastern lumbermen in 1887 (Taylor, 1975). Yet, the construction of these mills signaled that an enormous change was occurring in the structure of the Coastal forest industry.

The integration of pulp and paper with sawmills, plywood, and veneer became the trend in industrial organization in the forest sector. Once integrated the organization moved backward into timber supply. In 1951, H.R MacMillan Export Co. merged with Bloedel, Stewart and Welch Ltd. forming MacMillan and Bloedel Ltd. In 1959 MacMillan and Bloedel amalgamated with the Powell River Company and gained access to its extensive holdings of public timber tenures, making MacMillan Bloedel Ltd. the largest integrated forest products company in British Columbia. The company began to see the advantages of the FML. For example, in order to fulfill commitment for a FML, MacMillan Bloedel Ltd. added a Kraft machine to its facilities in Port Alberni (Shaw, 1962).

The FMLs were the catalyst that initiated a number of corporate backward moves into supply. The story of the emergence of BC Forest Products Ltd. as a major company in the province is more complex than that of MacMillan, Bloedel, and Powell River Ltd. but the results were the same -- a large vertically integrated firm.

At the end of 1966, the Chief Forester, L.F. Swannell, expressed a general satisfaction with the progress of sustained-yield forest management policy. By this time, FMLs had been renamed Tree Farm Licences (TFLs) while the public working circles were now referred to as Public Sustained Yield Units (PSYUs). Production value of the forest sector rose to a record \$1,037,000,000 with pulp and paper showing the greatest increase. Forest revenue for 1966 was \$50,862,886 while Forest Service expenses were held to \$23, 936,267. All public forests in the Coastal areas of southern British Columbia were practicing sustained-yield forestry in either TFLs or PSYUs. There were 17 Tree-Farm Licences³ in the Vancouver Forest District and six in the Prince Rupert Forest District. The TFLs in the Vancouver Forest District had a combined area of

³ The Tree Farm Licence was also called the Private Sustained Yield Unit along with its earlier name of Forest Management Licence.

3,613,635 productive acres with an allowable cut of 330,344,000 cubic feet. There were 6 PSYUs in the Vancouver Forest District with a total productive area of 5,126,826 acres and annual committed cut of 151,476,00 cubic feet (BCFS, 1966).

Yet, not everyone was happy with the situation in the woods.

PSYUs

Until the middle of the 1940s a large number of independent loggers had supplied many of the major manufacturing firms that were now being rationalized in the quest for TFLs. In principle, the independent logger could find access to timber in the PSYUs through the Timber Sale Licence system. In actuality, the Timber Sale Licensing system was complicated by a number of different types and various administrative policies such as "quotas" for established licensees. At the same time, the number of independent sawmills was being decreased through mergers and acquisitions by the larger integrated firms that had a timber supply in private working circles. By 1956, Sloan observed

...in the last decade the number of large and small free and independent loggers has been steadily declining. At one time on the Coast there were in addition to the relatively small independent loggers, a number of very large companies which were engaged, either wholly or in most part, in extensive woods operations cutting for the open market. They no longer exist. Logging is now, to a major degree, a subsidiary function of integrated companies and other conversion units, using their own crews or contractors to cut private timber, timber sales, and forest management licences (1956: 157).

As envisioned by the Fulton Commission, the Timber Sale Licence authorized the cutting of a prescribed tract of timber without any required

further authorizations. Other forms of Timber Sale Licences had evolved over time. One kind conveyed the right to cut a prescribed tract but the licensee was required to obtain authorizations, termed cutting permits, before operations could begin on any part of the licensed area. Another type did not convey timber in any area but rather conveyed the right to an annual harvest volume. This type of Timber Sale Licence was used increasingly in the government's move toward sustainable management. Also, an informal "quota" system had been implemented that gave established operators a preferred position in obtaining timber, eroding the competitive nature of Timber Sale Licences on PSYUs (Pearse, 1974). In practice the informal "quota" policy involved treating each licensee operating in a Sustained Yield Unit as eligible to apply for additional sales based on the past rate of cutting in the Unit.

Close Utilization Quotas

The regulated cut in PSYUs was originally calculated to a certain standard of utilization set in the early part of the century. New sawmilling technology plus the expansion of the pulp industry permitted a utilization strategy that was quite different. In the 1960s, the Forest Service began to encourage the adoption of the more intensive "close utilization" standard. Adopting this new standard had a significant impact on sustainable yields. The PSYUs contained a large portion of small and defective timber that under the old standard was not counted in the allowable cut estimation. The revised annual rate of cut that could be maintained according to Forest Service sustained-yield criteria was increased up to 50% in some of the coastal PSYUs.

In 1966, the government offered a strong incentive for adoption of the new standard and at the same time allocated much of the additional harvest that had been created by adoption of the new utilization standard. Quota positions of licensees that elected to log to close utilization were automatically increased by

one third. In 1972, this was further increased to one-half on the Coast. As was becoming a practice, this extra cut was not allocated through competitive bidding but was directly distributed by the Forest Service to the established licensees that adhered to close utilization in proportion to their quota position (Pearse, 1976: A19).

In 1967, the Forest Service formalized the quotas on PSYUs and introduced the Timber Sale Harvesting Licence. These licences did not specify any geographic area in a PSYU. They usually had a term of 10 years and they committed the Forest Service to make an annual volume of timber available within a certain PSYU. The licensee had to apply for cutting permits as logging progressed over successive tracts of land. In practice the Forest Service let these licences only to licensees with established "quota" positions, many owning sawmills. Indeed, initial "quota" positions had often been initially determined by the requirements of licensees' mills (Pearse, 1974). When these mills became the property of large integrated firms, the "quota" was also transferred. Thus the large integrated mill, often with access to a TFL, frequently controlled significant amounts of "quota" in PSYUs.

By 1974, 76% of the volume from the Coastal PSYUs was bound in "quotas" associated with Timber Sale Harvesting Licences while 24% was associated with Timber Sale Licences. Some of these Timber Sale Licences had been awarded in a manner similar to the Timber Sale Harvesting Licence - by "quota." The economic condition of the forest sector in 1974, like 1966, seemed to look good. British Columbia public forests were still making money for the public landlord. They netted \$68 million in 1974 but that was down \$128 million from the year before (BCFS, 1974; BCFS, 1973).

By 1974, MacMillan Bloedel Ltd. and BC Forest Products Ltd. "owned" 21.6% of the government's committed annual cut, 29.2% of the Crown grant

acreage outside TFLs and 29.2% of the acreage of Old Temporary Tenures outside of TFLs. In turn, the two companies controlled 13.8% of the provincial total production in lumber, 39.9% of the pulp production, 68.8% of the paper production and 17.9% of the plywood and veneer production (Pearse, 1976).

The concentration of cutting rights and the shrinking number of transactions signaled problems with public stumpage appraisal systems. Unfortunately, the signal did not oblige the Legislative Assembly to act. In 1962, the BC Forest Service had testified before The Select Standing Committee of Forestry:

The tendency toward the integration of what were originally separate and distinct logging and sawmilling industries has weakened the Vancouver log market. The log market is still functioning to establish the market value of logs in individual transactions but it is questionable whether it can now properly be referred to as an open or freely competitive log market (Quoted in Pearse, 1976: 296).

Pearse pointed to independent manufacturing firms being forced to attempt to acquire their own timber rights. By integrating into logging, these firms tried to obtain logs that they could then use as leverage to fulfill specialized needs. He cited examples of manufacturing enterprises that had been forced to purchase or otherwise acquire timber rights and produce their own logs even though their limited opportunities and expertise often resulted in heavy financial losses.

The logs once produced by the independent operator were being funneled into a market being cleared by fewer and fewer individual transactions. During the post-war period, the fraction of the coastal cut that was marketed declined as the rate of cut rose. From more than 20% in the immediate post-war period, the proportion reported to have passed through the market had declined to an average of less than 14% of a nearly doubled cut. Of this 14%, the transactions

that dominated the log market were not those between independent sellers and buyers but rather trades between the large integrated companies (Pearse, 1976). Since the number of arm's length transactions was decreasing, the estimation of log values was a serious problem for both the BC Forest Service and the few remaining independent operators.

Another intervention and one that would have important consequences in the decades to come was the instant town legislation of 1965. In order to help externalize the costs of labour and to ensure the continuity of a stable labour supply, industrialists investing in British Columbia sought to create instant towns. Thus between 1965 and 1972, coincident with the growth of multinational resource extraction companies, the provincial government co-operated in the creation of 8 new "instant" towns to replace company towns. Ucluelet, Gold River, Tahsis and Port Alice were on Vancouver Island. Corporations as a result withdrew from almost all direct involvement in the provision, financing or management of resource settlements in the 1960s (Bradbury, 1978).

Given the enormity of the change ongoing in the forest sector, it is surprising that government waited until 1975 before acting and striking another Royal Commission on Forestry. Industrial access to timber supply had been almost totally closed by sustained-yield policies. As the ownership of timber tenure became more and more concentrated, Forest Service revenues were increasing but so were costs. In 1975, costs of administering the public's estate exceeded revenues by some \$36 million (BCFS, 1975).

Pearse Commission

In September of 1976, a fourth Royal Commission on Forest Resources, chaired by Dr. Peter Pearse, submitted its final report, Timber Rights and Forest Policy in British Columbia (Pearse Report). Some twenty months later the Legislative Assembly of British Columbia approved Bill 14. This legislation

repealed its predecessor, the Forest Act (1912) replacing it with legislation embodying revised terms for conveying cutting rights on Crown land to the private sector.

Pearse had been charged with making recommendations in two areas. The first was to examine timber apportionment in the Province. The second area was to report on;

1. The extent to which the forest resources of the Province are committed to use and to users under all tenure arrangements, including Crown grants;
2. The procedures for allocating rights under these various arrangements;
3. The provisions for conservation, management, utilization, protection and development of the forest resources allocated;
4. The taxes, royalties, rentals and other charges levied upon forest land, timber and primary forest products, excepting the general form of the stumpage appraisal system;
5. The implications of these tenure arrangements for the structure of the forest industry, having regard to its pattern of integration, concentration and control; and for the structure of markets for forest products produced in the Province (Pearse, 1976: xi, underlining added).

Pearse's second set of responsibilities was to establish policy recommendations that would ensure that:

1. The full contribution of the forest resources to the economic and social welfare of British Columbians is realized in terms of the diverse commercial and environmental benefits they potentially may generate;

2. The various public levies on, and the charges associated with the acquisition and retention of, Crown timber reflect the full value of the resources made available for harvesting, after fair and reasonable allowance for the cost, harvesting, forest development and profits; and that the various forms of public revenues derived from Crown granted and Crown forest resources are systematic, equitable and consistent with general taxation policy in the Province;
3. The marketing arrangements for timber products permit their full value to be realized and are consistent with an efficient economic structure;
4. The regulation of exports of forest products serves the best economic interest of the Province;
5. The efficiency and vigor of the forest industry is maintained and that domestic participation in its ownership and control is adequate;
6. Proper provisions are made for the efficient management, protection and enhancement of the forest resources and for the regulation of harvesting and utilization practices (Pearse, 1976: xii).

The first set of responsibilities, while necessitating considerable analysis was rather straightforward and resolved in recommendations involving little controversy. The second set of responsibilities, however, contained phrases like "the full contribution...they may potentially generate", "the best economic interest of the province", "adequate" and "proper." These are highly subjective concepts that can be interpreted to mean whatever one wants them to mean.

Further, Pearse was hampered because of limitations in the terms of reference for his Commission. While he had examined both timber tenure and timber appraisal as separate issues in his 1974 task force review (Pearse, 1974b and 1974c), he was not given the mandate in the Commission to look at

stumpage appraisal and timber tenure simultaneously. This shortcoming was to help give rise to trade controversy with the United States spanning the next two decades.

Major changes in forest policy in British Columbia had been preceded by Royal Commission investigations in 1910, 1945 and 1956. The question in 1975 was; would the legislation following the Pearse Commission result in major reforms or would its recommendations just be an endorsement of the *status quo*?

In 1979, R. S. Schwindt summarized the impact of the Pearse Commission and 1978 Forest Act:

The Report of the Royal Commission of Forest Resources and the subsequent Forest Act do not call for a redirection of provincial forest policy. Rather they act to legitimize and thereby to entrench the concentration of harvesting rights (and, therefore, concentration throughout the sector) in large part induced by previous policy.

Had the Commissioner's recommendations been made law there may have been a cessation, but not a reversal, of the trend towards higher levels of concentration. The Forest Act of 1978 contains diluted versions of these recommendations and will result in a deceleration, but not a cessation, of the trend (1979: 34).

Wagner (1987) concurred with Schwindt's predictions, arguing that there were unrecognized economic values in quota and that these were the drivers of tenure concentration. Schwindt may not have been quite fair in his evaluation of Pearse's recommendations. Pearse clearly saw that log pricing on the Coast had reached a point of crisis. He noted:

If present trends continue, all manufacturing firms will require their own rights to standing timber and the market will be reduced to exchanges

between them. The prices will not provide a reliable base for stumpage appraisals, both independent milling and logging will disappear, and the industry will become increasingly consolidated into fewer large companies (1976: 298).

Pearse recommended a deliberate and explicit policy to reverse current trends and saw "...measures to invigorate the log market as essential elements in an industrial strategy for the Coastal forest industry" as a necessary first step to reverse the trend (Pearse, 1976: 299). In an earlier study, Pearse (1974b) called for the establishment of a Forest Products Board of British Columbia, which was authorized in the Timber Products Stabilization Act of 1974. He appreciated that the main markets at issue were for logs and chips -- the products of a forest management and harvesting sector -- and noted that the circumstances and implications of the production of logs and chips are so different that they must be treated separately.

Where Pearse was adamant in his argument for an openly competitive log market and the need for a Forest Products Board to monitor log and chip markets, his tenure recommendations on how to bring this about were hazy. One obvious course -- modifying the stumpage appraisal system -- was not part of the Commission's mandate. Although Pearse did recommend the removal of appurtenance clauses associated with timber tenures, these clauses were retained and enhanced. He also recommended that several old forms of temporary licences, including the Special Timber Licences issued at the turn of the century, be rationalized under a Timber Licence system that would provide for the harvesting and liquidation of these tenure arrangements.

When the Forest Act and the Ministry of Forests Act were adopted "a determination to maintain an openly competitive log market" was not expressed nor was an institutional arrangement created that would aid in the construction

of a competitive industrial structure. Instead, the Forest Act, as Schwindt (1979) stated, legitimized the Timber Sale Harvesting Licences and renamed them Forest Licences. The Act kept the Timber Sale Licence form of tenure. Also, the old temporary tenures were renamed Timber Licences. Tree Farm Licences were not affected except that their term of tenure was extended from 21 to 25 years.

What did change was the separation and creation of the Ministry of Forests from the Forest Service in the old Lands Ministry. Forest revenue basically was removed from the control of the Chief Forester and transferred to the responsibility of the Minister. The Ministry of Forests Act, Section 4, defines the purposes and functions of the Ministry to:

1. encourage maximum productivity of the forest and range resources in British Columbia;
2. manage, protect and conserve the forest and range resources of the government, having regard to the immediate and long term economic and social benefits they may confer on British Columbia;
3. plan the use of the forest and range resources of the government, so that the production of timber and forage, the harvesting of timber, the grazing of livestock and the realization of fisheries, wildlife, water, outdoor recreation and other natural resource values are coordinated and integrated, in consultation and cooperation with other ministries and agencies of the government and with the private sector;
4. encourage a vigorous, efficient and world competitive timber processing industry in British Columbia; and
5. assert the financial interest of the government in its forest and range resources in a systematic and equitable manner.

It appears that the purposes and functions of the Ministry of Forests embrace similar subjective ideas that caused the Pearse Commission to stumble. For example, is there a precise meaning to “encouraging the maximum

productivity of forest and range resources... while having regard for the immediate and long-term economic and social benefits they may confer upon British Columbia"? What does "having regard" mean? With the reconstitution of the Ministry, apparently, much more power was placed in the hands of politicians than under the Forest Service concept. For example, the regional and district managers would report to the Minister of Forests rather than the Chief Forester. Also, all financial control with respect to revenues and expenses resided with the Minister.

There are often issues and questions raised by Section 4 of the Act. "Planning [so] the use of...natural resource values are coordinated and integrated..." suggested that the government was moving away from sustained-yield management -- if it ever got there -- to a new integrated approach. Further, how is "...a vigorous, efficient and world competitive timber processing industry..." to be encouraged without attracting the attention of international competitors? Finally, what exactly does asserting "...the financial interest ... in a systematic and equitable manner" suggest?

The Ministry started to grapple with these subjective issues. The picture, although quite muddled, began to gain focus when the Forest Act was amended in 1982 making it possible to elevate a Forest Licence (FL) or a combination of FLs held by a company into a Tree Farm Licence. The Ministry was, in essence, trying to devolve some of its responsibility to the private sector and let that sector develop alternatives in the highly subjective issues in its mandate. The rationale behind the 1982 amendment appeared to be that the secure right to harvest future crops would be an incentive for the licensee to enhance timber growth and productivity of the land. While that rationale may have merit, security of tenure is only a portion of the forest's production equation. Pearse had argued for an openly competitive log market and the need for a Forest Products Board to monitor log and chip markets. With regards to the tenure

system, he recommended the removal of the linkage between timber quota and mills.

On September 20, 1983, the Ministry of Forests released its "Forest Management Partnership Proposal - Tree Farm Licences" (FMPP). These partnerships were to be called Subsidiary Agreements. The basic thrust of the Ministry's "Proposal" was to reduce costs by reducing Ministry surveillance on TFLs and relying on professional foresters, employees of the licensees, for control. The FMPP suggested that the Ministry use an audit system to "...enable the Ministry to maintain the ability to ensure that the Crown forest, range, and recreation resources are being managed in an acceptable manner (MoF, 1983: 7)." The Ministry not only proposed creating new TFLs; these new licensees could enter into a subsidiary agreement for monitoring their own forest practices.

The FMPP was even more interesting in that it listed a few new priorities for the Ministry. These new priorities appeared to depart from the purposes and functions listed in Section 4 of the Ministry of Forests Act (Wagner, 1987:176). These new priorities included:

- reducing the size of the Ministry,
- increasing the role of the private sector, and
- aiding, enhancing and supporting the economic recovery in the forest sector to the greatest possible degree.

Apparently, the intention of the FMPP was to manage the whole province as one big tree farm using policy interventions already interwoven into the timber tenure system. On the Coast, as of August 1984, licensees had applied for approximately 930,000 hectares of the lands held in the public working units or Coastal TSAs to be converted to TFLs. Wagner (1987: 170) estimated that this was a transfer of around \$1,244 million (in 1985 C\$) of public land assets to relatively few organizations in the private sector.

Overlooked in the Ministry's plan to build a huge system of TFLs was the fact that fundamental elements in sustaining and enhancing timber growth and productivity of the land are continued access to markets for products derived from the land and public acceptance of the government's management paradigm. If new forest policies permit a large portion of the associated natural resource rents to be shared with private developers, the policy direction may not only attract attention of competitors in other countries but their respective government regulators as well. Also, the public may not accept different forest policy directions, especially if those directions endorse the use of public timber resources to fuel economic growth and ignore changes in public expectations and values concerning those resources. If the policy pathway is still followed in spite of concerns over public acceptance and resource rents, the direction may well ethically and financially bankrupt the provincial "forest steward" in the process.

The goal of this chapter was to outline development of a few key institutions and institutional arrangements that resulted from the retention almost 95% of the forests in public ownership. Key ideas embroidered into the policy fabric of British Columbia's forests were a result of the Progressive Conservation Movement in the United States.

A major theme of the Progressive Conservation Movement was that forest management agencies should be free from political influence (Hayes, 1959). Yet by 1928, timber interests had succeeded in co-opting "the administrative process in order to shape public policy to their private needs (Gray, 1989: 24)." Both the First Sloan Commission and the Pearse Commission made recommendations around the areas of forest finance, to free forest administration from some political influence. These recommendations went unheeded. Indeed, with the creation of the Ministry of Forests, almost exactly the opposite had occurred. The FMPP of 1983 suggested that Crown forest ownership, at least under Ministry of Forests' administration of the tenure system, would not lead to

positive and responsible state interventions. Rather business or political interests would be able to continue to shape public policy to their own private needs.

Finally, the reconstitution of the Ministry of Forests in 1978 also appeared to signal change in the realm of state intervention. The Ministry was much more political than the old Forest Service. A goal of the next chapter is discuss some of the ramifications of the politicization of public forestry in British Columbia.

Chapter 3 -- At the Threshold

"Government can change the law. Government can do anything."

David Zirnhelt, Minister of Forests,

September 13, 1996

Vancouver Sun, Page 1

Two issues played havoc with the fledgling Ministry of Forests through the 1980s. The first issue was (and is) continued access by the province's forest sector to international forest products markets. The second was (and is) domestic and international public acceptance of changes in the provincial government's forest policies. As with the issues addressed in Chapter 2, it is difficult to discuss these issues in the context of just British Columbia or Canada, or for that matter, without examining the larger geography of forestry at the time of the reconstitution of the Ministry of Forests.

In regard to timber supply, British Columbia as owner of 95% of the forest is in the position of a monopolist. In the economics of natural resources the general presumption is that monopolists restrict output and increase prices relative to those that would prevail in a competitive situation (Pearce and Turner, 1989). However, instead of maximizing prices through the 1980s, it appears that British Columbia may have used its monopoly position to further its own policy initiatives. Some of these public forest policies had enormous impacts -- not all of them recognized at the time of implementation. Sustained yield as practiced in British Columbia, for example, had long-term implications especially in timber tenure and pricing that encouraged and resulted in a highly concentrated ownership of major tenures by provincial lumber producers.

Sustained-yield forest policies had the objectives of preventing "cut and run" forest practices and maintaining or promoting communities where the forest sector was the primary employer. The emerging literature on

resource community sustainability suggests very little relationship between sustained-yield forestry and community stability. Indeed, community control of resources and the capture of natural resources wealth are far more important factors (Byron, 1978; Kusel and Fortmann, 1991; Nadeau *et al.*, 1999; Schallau, 1989).

Another development, and one that could be taken as indicative of a move back toward the basic forest exploitation economy of the 1950s and 1960s, was the increasing political nature of decision-making in the Ministry. For example, the Chief Forester determines the Allowable Annual Cuts associated with a particular type of tenure as set out in the Forest Act. Seven criteria set out in the Act are technical in nature, but three others are more discretionary and economic. Further, the Minister and not the Chief Forester, designates land as timber supply area and may order the consolidation, division or abolition of timber supply areas or order their boundaries changed (Forest Act Section 7 and 8).

A major purpose of this chapter is to illustrate unintended impacts of forestry sector interventions by the Canadian and provincial governments. Apparently disregarding the historic division between the coastal and interior lumber industry, Canada and the province became embroiled in a controversy with the United States over industrial access to the American softwood lumber market: the ultimate result led to near catastrophic consequences for the coastal lumber industry.

Global Demand Conditions in a Post-war Forest Economy

During the period from 1950 to 1976, Canadian forest product trade surplus grew almost geometrically, whereas United States' forest product trade experienced a continuous, although linear, deficit. Table 3-1 illustrates the magnitude of these trends. The Canadian surplus far exceeded the

American deficit so that a large and growing North American surplus resulted.

In 1976, only two of the world's seven continental regions had net surpluses of trade in forest products. North America accounted for over three-fourths of the total intercontinental surplus and the USSR had the remainder. While North America was a dominant net exporting region, the United States and Canada developed complementarily. The United States had a high level of export but also had a huge domestic demand. Further, a large portion of Canada's production went to service the American domestic demand.

Sedjo and Radcliffe (1981) developed a free trade paradigm to explain trade in North American forest products to 1976. They noted that "the geographic proximity of the United States and Canada, their long common border, and the locations of the major North American forest resources and markets have all contributed to a trade pattern that generally conforms to the hypothetical (free trade) pattern (1981: 50)." However, they noted one important restriction that distorted the trade pattern away from the unrestricted trade mosaic - the restriction of raw log export from Crown lands in Canada that should promote increased domestic wood processing.

Trade Distortions

There is an accumulating body of evidence suggesting that British Columbia's restriction on the export of unprocessed forest resources from Crown lands promoted increased domestic processing (Copithorne, 1979; Schwindt, 1987). Sedjo and Radcliffe suggested that the British Columbia policy should cause production and exports to shift toward more processed commodities and skew the export pattern toward processed rather than unprocessed products. On the other hand, for the United States, the effect would be to provide some export markets for log products relatively free

from Canadian competition. Sedjo and Radcliffe expected to see specialization with large volumes of American exports of unprocessed wood into foreign markets. They conclude:

Canada has been a dominant net exporter of forest products to the United States and countries throughout the world. The United States, on the other hand, has been a persistent net importer, with the vast majority of her forest product imports originating in Canada. Overall, Canada's net exports substantially exceed the U.S. net resulting in a large and growing net forest product flow outside of North America. Their behavior was generally consistent with the hypothesized "free trade paradigm" although some trade distortions appear to result from the Canadian restriction on unprocessed wood exports (1981: 83).

Table 3-1 summarizes trade between Canada and the United States for the period 1950 to 1976. During this period, the North American forest

Table 3-1: North American Net Forest Products Trade

Selected Years, Millions of Current U.S. Dollars, () Negative Flow

Year	North America Net Trade	U.S. Net Trade	Canadian Net Trade
1950	56	(917)	973
1956	267	(1,013)	1,590
1960	465	(965)	1,430
1966	753	(1,153)	1,906
1970	1,905	(678)	2,743
1976	4,212	(1,437)	5,649

Source: Sedjo and Radcliffe (1981: 60)

products market seems to have had most of the characteristics of a competitive domestic market for British Columbia lumber producers. Further, analysis of trade balance of this market by Sedjo and Radcliffe revealed substantial improvement from 1950 to 1976. Although the United States showed substantial forest product deficits and Canada experienced substantial trade surpluses, both countries improved North America's overall trade balance.

Forest Products Markets

For lumber, newsprint and market pulp the United States historically has constituted the most important component of the province's marketplace (Sedjo and Radcliffe, 1981). This market became increasingly important after 1940 as the giant American cellulose corporations began investing in British Columbia forestlands and production facilities, then vertically integrated them into vast international complexes of industries servicing the American demand for forest products. Unlike their American-based competitors, British Columbia forest product manufacturers had a very small home market in which to hone their competitive tools. Porter (1990) hypothesizes a competitive home market is required for success in the international marketplace. Instead, the province's lumber producers were compelled to work in a world market where they were subject to the vicissitudes associated with international political and economic crises (Lawrence, 1957) and where they had very little control of prices for their products (Langille, 1915; Mead, 1966; Sedjo and Radcliffe, 1981). On the other hand, as discussed in the last chapter, British Columbia producers often benefited from favourable public sector forest policies.

It was not just the American demand that led to the development of the industrial structure in British Columbia's forest sector. Profitability of the forest industries in Canada to 1980 was positively and significantly

related to the proportion of output exported and to the degree of domestic seller concentration (Nautiyal *et. al*, 1985). American demand coupled with favourable public sector interventions in timber tenure and pricing appear to have been the dominant driving forces of the highly concentrated industrial structure of British Columbia forest products industry (Wagner, 1987).

Western North American Softwood Lumber Market

As early as 1915, Northwestern American lumber interests noted that a partnership had been established between the lessees and the actual owners of the forest resource in British Columbia. They complained that this forest partnership could access Eastern American products markets through the Panama Canal at lower costs than those being experienced by Northwest producers. Western North American forest producers also complained that Canada was seeking and gaining preferential tariff relations with other countries in the British Empire that were importing forest products (Langille, 1915).

Whether real or perceived, American forest products interests argued that the province's partnership between public and private forestry interests constituted "unfair" competition. As a consequence, western lumbermen stated that there was an urgent demand for the restoration of an import duty on Canadian softwood lumber. Yet, other American workers studying potential British Columbian public sector subsidies and rates of cut argued that the province's levels of forest conversion would result in benefits for Americans. For example, Mason's (1927) examination of cutting rates in British Columbia suggested that "unfair" competition was not an issue. He explained that present cut in the province had "...reached or passed the sustained-yield capacity of its forests." He noted:

The cut will continue to expand for a time, but while this expansion will furnish additional competition for the producers of the United

States, the over-cutting will require a later contraction of production which will prevent any increased supply coming to the United States in future years when we shall most need it (1927: 635).

Taking 1923 and 1925 as representative years, Mason then examined the American trade deficit of some 2-billion board feet annually. More than 80% of this trade deficit was in softwood imports from Canada, largely from British Columbia -- an area that Mason charged with cutting at non-sustainable rates. He concluded that softwood lumber imports from a region currently over-cutting would not be sustainable in the future. He stated:

Since in future years it is apparently going to be impracticable to secure any substantial additional quantity of softwood timber from sources outside the United States, we must grow within our borders nearly all of the timber which we shall need, or go without it (1927: 635).

Over the next 50 years, America would neither grow its timber requirements within its borders nor do without. With a sustained period of prosperity in the United States after the late 1930s, demand for forest products continued to grow. Except during the Depression years, there was little American government intervention by way of trade barriers between British Columbia and the United States in the softwood lumber sector of the industry.

Prior to the 1970s, the United States lumber industry had often been cited as a real world approximation of the model of pure competition. Mead (1966) investigating the structure of the Northwest American Douglas-fir lumber industry concluded:

The behavior of firms as buyers of timber is in sharp contrast with the behavior of firms as sellers of lumber. The former, reflecting an

oligopsonistic structure, includes implicit and explicit collusion among buyers, whereas the latter reflects a competitive structure and shows virtually no evidence of collusion (1966: 1).

From an economic point of view, a firm in a competitive industry does not affect price by its control over output. Rather, price is taken as a given and the firm consciously selects its output usually to maximize profit. By definition, the province, with respect to wood supply, is in the position of the monopolist. It has the potential to be a price setter. Yet, while the provincial government had and still has the potential of being a price-setter, the government's behavior as orchestrated through its timber tenure and pricing policies had not been one to maximize public sector rents but to share a portion of those rents with industry.

This divergence in public sector behavior initiated significant structural events in post-World War II British Columbia where the early forms of Tree Farm Licences were being created. Firms owning this type of tenure initially gained advantage because their access to timber on the tenure positively changed the basis on which they had been competing. They now had access to a certain quantity of timber supply at a known price. More important, because of the limited amount of private timber in British Columbia, firms without the public timber tenure were having a difficult time securing a supply for their mills.

In terms of operating in the competitive American lumber market, these firms had a competitive advantage. Until the 1980s, the province's share of the American market continued to grow while the industry continued to consolidate and concentrate (Schwindt, 1988). For example, Pearse (1976) estimated that MacMillan Bloedel owned 12.8% of the cut associated with long-term major tenures alone. He estimated that 10 of the largest forest-converting firms owned 59% of the cut and the largest 75 firms

controlled access to 96% of the timber of the province. By 1985, Wagner (1987: 130) estimated that MacMillan Bloedel owned 11.7% of the cut associated with long-term major tenures, the largest 4 firms owned 32.8%, and the largest 8 owned 50.7%, while the largest 20 owned 78.5%. The industry would appear even more concentrated if inter-corporate connections were taken into account.

When the provincial government adopted the public-sector model of forestland ownership before the turn of the century, it became the “central authority” for planned decision making. In designing the land and timber tenure system, the Crown also established the policy, quite early, that a portion of the value of the public forest would be shared with its developers (Ross, 1914). Changes to the Land Act after the first Sloan Royal Commission created the private working circles. Through appurtenance clauses, sawmill ownership and later, pulp mill operation, began to be linked with award of timber tenure.

The linkage of a mill to timber tenure seems to have caused a substantial transformation in the sawmill sector. Between 1950 and 1974, the number of mills fell more than 200% while the shift capacity increased over 300% (Table 3-2).

There was not just consolidation but industrial concentration in the lumber sector. Caves (1982) divided manufacturing industries into four groups according to their degree of concentration. He pointed out that the lines separating these groups are drawn in arbitrary fashion.

Nautiyal *et al.* (1985) used this same classification in a study of economic performance of the forest products industry in Ontario and Canada.

These were:

- Type I Oligopoly. The largest 8 firms make at least 50% of the industry's shipments; the largest 20 make at least 75% and no single firm supplies more than 10-15%,
- Type II Oligopoly. The largest 8 firms make at least 33% of the shipments; the largest 20 make at least 75%,
- Unconcentrated Industry. The largest 8 firms make less than 33% of the shipments.
- Competitive Industry. The largest 4 firms make less than 10% of the shipments.

Table 3-2: Sawmill Numbers and Capacity, 1950 to 1974
British Columbia

Year	Number of Mills	Shift Capacity (M f.b.m.)	Average Capacity per Mill (M f.b.m.)
1950	1,826	19,143	10.5
1955	2,489	28,016	11.3
1960	1,938	29,432	15.2
1965	1,191	27,641	23.2
1970	881	23,670	26.9
1974	787	26,596	33.8

Source: Pearse (1976: B8)

In 1975, the province's lumber industry was quite concentrated. On the Coast, 71 controlling companies operated 98 lumber mills with an average

capacity of 115,000 f.b.m. per shift. In the Interior, 179 companies operated 248 mills with an average mill capacity of 77,000 f.b.m. per shift. The top two lumber producers -- MacMillan Bloedel and BC Forest Products -- controlled 13.6% of provincial lumber manufacturing capacity. When Northwood, Canadian Forest Products, and Weldwood are included, the top five producers controlled 25% of the province's total capacity. If the next three producers -- Crown Zellerbach, BC Cellulose and Weyerhaeuser are added-- then the top eight firms controlled 33.6% of the provincial total capacity. So in 1975, the sawmill sector was a Type II oligopoly using Caves' definition.

Also significant was the amount of public land distributed to leading companies in the form of various timber tenures (Table 3-3). On tree-farm licences, the top 10 firms controlled 99.8% of the harvest rights. These same 10 Coastal firms controlled 57.4 percent of harvesting rights on the public sustained yield units. With respect to public sector harvesting rights, the Coastal sector was a Type I oligopoly.

Public Sector Strategies

The strategic problem, from a public sector viewpoint, is not to explain why a firm is more or less successful in the market but why a region is the desirable base for the firm in competing in the industry. Only one of the firms listed in Table 3-3 survived the next 25 years -- Canadian Forest Products. The area from where the firm operates is pivotal in the application of a global strategy in which advantages drawn from the region can be complemented with those from outside.

In 1975, British Columbia had a tremendous factor advantage associated with its timber resource somewhat diminished by the relatively high factor cost of labour (Copithorne, 1979). Because of the public sector

**Table 3-3: Distribution of Harvesting Rights
(Coastal Companies)
Committed Allowable Cut in 1975
(Thousands of Cunits)**

Controlling Company	Public Sustained Yield Units	Tree-farm Licences	Total	Share of Coast Total %
MacMillan Bloedel	93.3	2686.4	2779.7	32
BC Forest Products	490.7	508.1	998.8	11.5
Rayonier	44.1	859.4	903.5	10.4
Crown Zellerbach	115.4	485.7	601.1	6.9
Canadian Forest Products	138.8	404	542.8	6.2
Tahsis	216	302	518	6
Weldwood	233.4	157	390.4	4.5
Eurocan	-	312	312	3.6
Bay Forest Products	246.4	-	246.4	2.8
BC Cellulose	82.2	72	154.2	1.8
Total	1660.3	5786.6	7446.9	85.7
Coast Total	2893.1	5798	8691.1	

Source: Pearse, 1976: 39

ownership model and a favourable business climate in the administration and management of forest resources, political forces along with economic were beginning to have profound impacts on the province's forest economy.

When British Columbia timber tenure, pricing, and exports characteristics are combined with an increasing oligopolistic timber and lumber industry, grounds emerge for trade disputes. Surprisingly, during the period after World War II until 1979 when the Forest Act and the Ministry of Forests Act legitimized many of the province's past tenure, timber pricing and exportation practices, there were few major complaints. Yet things were about to change.

Stumpage prices on public forests increased rapidly in the United States in the late 1970s, especially in the Pacific Northwest region. The price for timber from national forests managed by the US Forest Service is determined by winning bids and competitive auctions. In the late 1970s, speculative fever became a characteristic of these auctions. Inflation and fears of timber shortages were driving prices up and when a recession struck the North American economy in the early 1980s, many American lumber manufacturers found that the prices they had bid for timber were far too high. Some timber buyers actually paid more for timber supplies than the value of lumber derived from the timber.

Through the early 1980s, Canadian lumber producers launched a seemingly successful attack on the American softwood lumber marketplace. Instead of increasing prices, Canadians increased market share. As a share of total U.S. consumption, Canadian exports of softwood lumber grew from 26.1% in 1979 to 29.3% in 1984. In 1979, unit value of the Canadian imported wood was \$326.63 (US). By 1984, value had fallen to \$314.94 (US) and by the end of 1985, the Canadians had captured 31.6% of the U.S. softwood lumber market (USITC, 1985).

The Changing Competitive Conditions in US Softwood Lumber

The structure of the American softwood industry had changed from Mead's competitive model in the 1950s and 60s. In any competitive market

when concentration ratio is around 33%, a few producers have the potential of influencing prices (Caves, 1982). If the British Columbia lumber industry gained market share as the industry became more and more concentrated, a few producers in that industry had the potential of ruining the competitive nature of the U.S. Softwood lumber market.

Of course, at the same time, the competitive nature of the American market for softwood lumber had declined through the decade of the 1970s. Paul Ellefson, professor of forest economics and policy at the University of Minnesota's College of Forestry studied the wood products industry in 1984. He described the American lumber and wood products group in 1981 by corporate assets and taxable income. Less than 0.1% of the producers – 12 in number – had total assets at or beyond \$250 million. These 12 corporations accounted for nearly 62% of the total assets claimed by the group and over 59% of the taxable income. Assets and income were highly concentrated among relatively few manufacturers of lumber and wood products in the United States in 1981 (Ellefson and Stone, 1984: 80).

As the Canadians gained market share at relatively constant or decreasing prices, income of these 12 firms was impacted significantly. Little wonder the American government intervened.

Countervail

The first modern piece of American countervailing duty legislation of real significance was the US Trade Act of 1974. The Act contained three provisions found in current legislation. First, private sector complaints of unfair trade practices would produce a mandatory investigation of alleged subsidy under the auspices of the US Department of Commerce. Second, it would now be possible to impose countervailing duties on goods like newsprint, lumber and pulp that had previously entered the US without a

tariff. Third, US producers must show proof of injury before the Commerce Department would apply countervailing duties.

In 1979, the Americans began to move toward a sharper definition of countervailable subsidy under the Trade Agreements Act. In this legislation, a subsidy was defined to occur when a foreign government assumes part of a specific export industry's cost of production. When the recession became obvious in the early 1980s, American lumber producers pursued two courses of action. They lobbied to have the stumpage in their contracts with the US federal government adjusted to reduce their exposure from what they had originally bid for the timber. At the same time, they petitioned the US Department of Commerce (DOC) to impose countervailing duties on Canadian lumber suppliers since Canadian stumpage prices were lower than US bid prices for timber (Anderson, 1986).

The U.S.-based Coalition for Fair Lumber Imports first filed a petition in 1982 and it charged Canada with subsidizing its softwood lumber industry. The petition claimed that the Canadian government's timber programs offered lumber to the Canadian softwood industry at a price 27% lower than the U.S. rate. However, in May 1983, the DOC rejected the petition's allegations and the petition was denied. DOC based its rejection on U.S. law that defined a subsidy as government assistance provided to a single industry or group of industries. Stumpage programs are available within Canada on similar terms regardless of the industry or enterprise of the recipient. The only limitations as to the type of industries that use stumpage reflect the inherent characteristics of the natural resource and the current level of technology. As technological advances have increased the potential users of standing timber, stumpage has been made available to the new user. Any current limitations on use are not due to activities of the Canadian government. In other words, the Canadian government program

did not offer assistance to just one industry or a group of industries, but to a number of different industries.

In 1984, the US legal framework changed. To meet a challenge from Mexican natural gas producers, the U.S. Congress passed the Trade and Tariff Act of 1984. That legislation defined the term "upstream subsidies" (Giesen, 1985). Two additional considerations were required for proof that an upstream subsidy existed in the DOC specificity-preference analysis:

1. whether the subsidy bestowed a competitive benefit on the exported merchandise; and
2. whether the subsidy had an effect on the costs of manufacture.

On March 6, 1985, without a formal complaint, the United States Trade Representative requested the International Trade Commission (ITC) to conduct an update investigation of the 1982 complaint by the Coalition. Although the investigation did not result in a determination by the ITC, the International Trade Administration (ITA) of the U.S. Department of Commerce made a preliminary finding of damage on October 16, 1986. It found that the timber pricing and allocation determination programs in Alberta, British Columbia, Ontario and Quebec were countervailable domestic subsidies. The ITA went on to calculate an estimated subsidy of 14.5%.

That was enough for the Canadian delegation. They did not wait for a determination. Canada chose to avoid the implementation of the tax by negotiating a Memorandum of Understanding of 1986 (MOU). Following further negotiations, the DOC and the Canadian government reached agreement. The Canadian government would impose a tax on softwood lumber exports and attempt to transform its provinces' forestry programs. Although this agreement also forced Canada to impose a 15% tax on softwood lumber exports, it was thought to be more beneficial for Canada than a 15% countervailing duty charged by and retained in the US.

Subsequent changes to the MOU allowed provincial governments to increase their stumpage fees in lieu of assessing the full export tax.

The policies in the MOU were designed to increase the price of Canadian lumber in US markets and to reduce any Canadian competitive advantage arising from the alleged subsidy. Importantly, free trade between Canada and the US with respect to softwood lumber had ceased to exist. Instead, the notion of "fair trade" was now being defined and it would work as a substitute for "free trade". This "fair trade" idea spelled out the conditions under which the future British Columbia's Coastal softwood lumber industry would work

New Beginnings

In the countervail action put emphasis on the tenuous relationship between the federal and provincial governments and created a rip current in timber tenure, log and lumber export and pricing policies in British Columbia. These pressures began to draw the forest sector toward uncertain waters. The American softwood lumber market would no longer be able to operate as "clearing house" and work as a "free and competitive" domestic market to prove the value of either industrial products like lumber or government policies that were designed to make public timber assets available to industry. Instead of a competitive market, the American softwood market was now serviced by a set of concentrated domestic producers supported by public sector interventions on both sides of the border. Criteria more associated with a "level playing field" were being used to determine access to the US market for Canadian softwood lumber with the American consumer ultimately the loser (Wear and Lee, 1993).

After World War II and through the 1980s, in British Columbia, there was a transition in the composition of the forest processing industry. Powerful economic combines composed of production, trade and financial

corporate networks were developing. These, in turn, were held and controlled by a few highly diversified, assets holding, multinational corporations. CWC (Canadian Western Capital Ltd.) concluded a study for the Forest Resources Commission in 1991 that estimated the value not collected through stumpage associated with major tenures in the Vancouver Region to be between \$37.50 and \$105.63/m³ in FY 1988-1989. Renewable and transferable timber quota created value for the owner. These uncollected resource rents are a major reason posed for the development of intercorporate ownership in the forest sector during the 1980s (Wagner, 1987; CWC, 1991).

The largely closed tenure system controlling the distribution of access to under-priced public timber through long-term major timber tenures appeared to force companies to undertake capture-or-be-captured tactics rather than cost efficiency strategies. It would take time for the British Columbia lumber sector, especially on the coast, to develop replacement competitive strategies and move away from government subsidies. But in 1986 the time had run out.

As the provincial Government moved to implement the "Forest Management Partnership Proposal of 1983", the Federal Government began to institute the export tax defined in its 1986 MOU with the American Government. It appeared that all three governments were almost oblivious to the major changes that had just occurred in the business climate of softwood lumber on both sides of the border.

The MOU took effect at the beginning of 1987 and influenced lumber trade for the next five years. Superficially, the MOU seemed Canada's "best" solution to the American claims of public sector subsidies. First, it gave the federal and provincial governments the necessary time to transform their forestry programs. According to the MOU the provinces

intended to increase their stumpage fees and transfer some of their management costs to industry. Once the province's forest policies were significantly altered, the export taxes could be reduced or eliminated. Second, the MOU allowed Canada to maintain control over its forest management program and to receive the revenue from the tax.

If the United States, on the other hand, had imposed and collected the 15% countervailing tax, the US intervention into the market would have caused Canadian resource rents to flow the US. Yet, if it had been imposed, this tax may have had the some benefits. First, the provinces would have had an incentive to change their log pricing and export policies in order to assure continued access to the American softwood lumber marketplace without countervailing duties. Second, it would have permitted the lumber industry time to rationalize the structure of its operations to be competitive in the American softwood lumber market.

Most importantly, the optics of the issue would have changed. The American government would have been collecting a tax favoring a small segment of American industry. If the tax resulted in higher local prices for American consumers -- and apparently it would have -- Americans may have become disenchanted with the tax idea rather quickly. As long as the Canadian governments were intervening and increasing costs to Canadian producers the resulting softwood lumber price increase would be due to events external to the American softwood lumber market, so American consumers would feel helpless to respond. But if American consumers were paying higher prices for softwood lumber while the American government was collecting a tax protecting those higher prices, a number of political choices would have been available to the consumer within the American economic system that may have worked in Canada's favour.

If the Americans were collecting the tax then Canada could at any time and especially, after its provinces had addressed the issues defined in the American's countervail determination, bring the softwood lumber issue forward for another investigation. An unfortunate consequence of the MOU was an implied admission that public subsidies in Canada not only exist but also give Canadian and, especially, British Columbia lumber processors a comparative advantage over American lumber interests.

Further, there still may be little or no substance to the complaints of Canadian public sector subsidy. Indeed, coastal British Columbia producers have a very strong argument that the US Department of Commerce's determination was seriously flawed. There are important differences in log quality (Constantino, 1988) and in harvest costs (McCloy, 1986) between the coastal U.S. and coastal Canada. Percy and Yoder (1987: 59) argue that "inputting an intrinsic value of the land and adding this value to provincial expenditures on harvesting represents double counting and nearly doubles the magnitude of the alleged subsidy". Uhler (1991) developed a case that because allowable cuts are set using biophysical criteria, stumpage pricing does not influence lumber outputs. Because Canada is collecting the tax, these points never found their way into ITA's analysis.

From an American lumber industry's point of view, the MOU was a complete success. Wear and Lee (1993) estimate that during the period 1987 to 1990, Canadian imports fell by 2.6 billion board feet a year while US production increased by 1.8 billion board feet a year. US softwood lumber consumption fell .76 billion board feet per year during the period. In a time of decreasing demand, average lumber price increased by \$19.90 per thousand board feet per year (1982 US\$). US producer surplus was \$658.1 million (1982 US\$) while consumers paid \$947.4 million (1982 US\$). The

total cost of the MOU to the American economy was \$289.3 million per year or \$1,157 million (1982 US\$) for the period of the MOU. Wear and Lee estimated the total shift to American lumber producers to be \$2,632.4 million (1982 US\$).

The costs of the MOU to British Columbia lumber producers are still accruing while the costs to province's forest-dependent communities were still ignored in the algebra of federal Canadian forest export policies.

New Directions

Ignoring pleas from the federal government, in 1987, the British Columbia government heralded a "New Direction in Forest Policy." This "New Direction" was almost a complete reversal of the policy direction charted under the "Forest Management Partnership Proposal" of 1983. The new policy shifted the financial liability for reforestation to the licensee, transferred 5% of the annual allowable cut from all replaceable licences back to the government, and imposed a 5% "tax" in quota every time a licence was transferred. The government also changed and increased stumpage through the introduction of a new and very complicated stumpage appraisal system termed Comparative Value Timber Pricing.

The policy direction included an immediate 5% withdrawal of quota that had an average coastal value of \$51.32 per cubic meter in 1989 (CWC Canadian Western Capital, 1991). This represented a withdrawal of more than \$158.5 million in quota value from coastal firms. Further, the foundation for the whole Comparative Value Timber Pricing scheme started out with a target rate which was and is more tuned to political needs than market reality.

On October 1, 1987, the Government of British Columbia established an initial target rate for the Coast (\$10.59 per cubic meter) and for the Interior (\$8.59 per cubic meter). Those target rates were set in

consideration of a number of Provincial objectives, the most notable being the Government's desire to eliminate the federal tax on softwood lumber exported to the United States (MoF, 1991: 2).

In reality, British Columbia's "New Policy" imposed two types of costs: direct increases in costs of operation and reductions in investor confidence. This reduction in investor confidence resulted directly from the policy change in the regulatory climate. The short-run effects of the 1987 policy changes appeared but the long-run effects were less clear (Zhang and Binkley, 1995).

By September 1991, as a result of increases in the target rate, lumber exported to the US from British Columbia was not subject to the federal tax administered under the MOU. Although lumber from Ontario and Quebec still were subject to the MOU and paid a portion of the tax, in October of 1991 Canada abandoned the MOU.

After the cancellation of the MOU by the Canadian Government, much to the displeasure of the Americans, receipts from the tax were returned to the British Columbia companies that had been subjected to the export tax in the first place. More important was the fact that the MOU had established a precedent. Grounds for another investigation by the International Trade Commission of the Department of Commerce had already been established.

Another Countervail

The American government countered by immediately requiring that US importers of Canadian softwood lumber post bonds equal to the amount of tax the Canadian exporters paid under the MOU. While this should not have really impacted British Columbia lumber producers, the American government launched another investigation into Canadian timber pricing to determine whether countervailing duties were still warranted. Several factors worked to preclude any thorough examination of the economic issues during

the countervail process itself. First, the time frame in each stage of the process is set by law and was so short as to severely handicap the respondent in preparing research and documentation. Moreover, the burden of providing evidence to refute allegations of subsidy rested with the Canadian respondent not the US petitioner. Also, only the cost structure of the foreign industry is under review: subsidies received by the American domestic industrial sector are not considered relevant to the process.

If these factors are mixed together and a full measure and one half of Canadian/ American politics added to the brew that had simmered for 20 years, the conditions for the one-sided 1986 MOU are created. When the gridlock surrounding the management of US federal forests in the Northwest, the escalating successes of the environmental movement and a severe economic down-turn in lumber products were added to the pot, the boundaries for a 1991 American review of Canadian timber pricing were established. In July 1992, the ITC ruled in favor of the United States; singling out British Columbia's tenure and export policies. 3% was related to pricing and tenure, while another 3.5% was related to the log export restriction for a total determination of 6.5%.

Canada, in order to gain time, initiated a request for a determination by a General Agreement on Trade and Tariff (GATT) panel on whether Canadian subsidies were countervailable. Canada also appealed to a binational committee under the United States-Canada Free Trade Act. Canada received a favourable ruling from GATT. The Americans were quick to point out that GATT decisions are not binding on members. The GATT panel can only recommend compliance. Further, the United States' Executive Branch argued correctly that softwood lumber imports are outside of the Free Trade Agreement.

Meanwhile in 1994, the NDP government publicly announced several other major revisions in forest policy. It called for the formation of a new Crown Corporation called Forest Renewal BC and a Forest Practices Code, along with a change in the schedule of stumpage fees to become effective on May 1, 1994, to pay for cost of the corporation and the code. To modify stumpage fees, government changed the target rate with a revenue increase of \$450 million per year (\$562.5 million a year increase in timber fees and a resultant reduction in corporate taxes of about 20% of the \$562.5 million). Fees increased by \$12.30 per cubic meter for Interior licensees (81.1%) and \$10.83 per cubic meter for Coastal producers (64.4%). A large fraction of the stumpage increase was to fund Forest Renewal British Columbia (FRBC). FRBC was expected to turn most of the additional revenue back to various forest-sector activities. The Ministry of Forests was to receive an additional \$50 million per year to fund compliance and enforcement activities associated with the new Forest Practices Code.

These new relationships were based on the optimistic assumption that lumber market prices had moved to a permanently higher plateau (Scarfe, 1998). The schedule not only increased the level of payment but also attempted to index any future changes in lumber price with the Statistics Canada Softwood Lumber Index Series D613601 for the Coast and Series D613600 for the Interior. Ignoring the target rate for the moment, the new formula did improve the market sensitivity of the stumpage pricing formula. Unfortunately, the target rate had been set through political forces not market ones. Given the tremendous amount of public land in the province, these political forces may have inadvertently impacted market forces.

Binkley and Zhang (1998) studied the impact of the April 14, 1994 provincial government's announcement of stumpage increase on the stock value of 12 publicly traded firms. They found the impact to be highly

correlated to the amount of timber a firm had available under replaceable forest licences. They determined the announcement had an impact on the firms' stock equivalent to a negative \$33.3 per meter of quota.

“The total decapitalization of the industry amounted to about \$2.4 billion, roughly the capitalised after-tax cost of the higher stumpage fees. Hence, the capital investments made by FRBC do not represent new capital to the sector, but rather a shift of capital from private investors to public ones (1998: 623).”

The magnitude of the shift of capital from the private to public sector can be illustrated using the example of MacMillan Bloedel. In 1994 that company's stock traded at \$17.63 per share with about 124,336, 000 common shares outstanding for a value of \$2.190 billion. The results estimated by Binkley and Zhang suggest by shifting timber rents from companies to FRBC, the government eliminated from the private forest sector an amount of private capital roughly equal to the market value of MacMillan Bloedel Ltd. – the single largest company in British Columbia at the time. As already noted, the provincial government had already removed about \$158 million in capital from the coastal industry when it took back 5% of the quota in major tenures in 1988.

Van Kooten and Wang (1998) reported on the economic costs and benefits of the Forest Practices Code. They estimated the annual costs of the Code to be between \$492.4 and \$696.3 million. They estimated benefits to be between \$88.2 and \$497.6 million. Thus, they concluded that the social benefits of the Code were far less than its costs, which they estimated to be between \$198.7 and about \$404.2 million. David Haley (1996) also researched the costs of the Code. He assumed a reduction in cut of only 6%, while van Kooten and Wang had used assumptions of 10% and 20% respectively. Haley estimated a Code cost of \$1.4 billion per year.

The true social costs of the Code probably will never be known. The stumpage increases in 1994 should have more than made up for the 6.5% subsidy that ITC had determined for British Columbia in 1992. What is certain is that after 1994, there was very little value in holding timber quota and the whole foundation of the structure of the 1987 forest industry had collapsed.

Another Understanding

Although British Columbia had adjusted its target rate in 1994, the US was to still pursue countervail taxes. In March 1996, the Canadian Federal Government entered into another Memorandum of Understanding with the United States relating to the export of Canadian softwood lumber. The result may well have been the serious erosion of the various firms' ability to retain a competitive position in the global forest sector. In the face of an increasing US demand for softwood lumber, the freezing of British Columbia supply through lumber quotas to the US softwood lumber market is demonstrated in Table 3-4. The power of one seller, a small group of US lumber producers, using the American federal legal system, may have induced the Canadian federal and provincial governments to fritter away the British Columbia's coastal forest sector's ability to compete in the US lumber market.

In the new understanding between Canada and the US, Canada agreed to limit its softwood lumber shipments to the US. In exchange, the US would curtail any new trade action under the then current US countervail legislation for five years. An important result of that agreement was that export of lumber to the United States was frozen at the 1995 - 96 level. Lumber export quotas were assigned to individual companies on the basis of the amount of lumber each company exported during the two-year period of

1995 - 1996 and a whole federal bureaucracy was created to administer the process.

Table 3-4: Lumber Exports from BC Ports (MMBF)

Source: Coast Forest and Lumber Association, Sept. 7, 2000, Personal Communication

Year	Total		To US		To Japan	
	Coast	Interior	Coast	Interior	Coast	Interior
1990	4305.8	6268.8	1974.5	5302.3	1212.5	456.6
1991	3836.3	6490.8	1693.3	5442.9	1305.0	599.4
1992	3723.2	7546.8	1663.0	6511.2	1355.1	607.7
1993	3877.7	7931.4	1756.0	7084.1	1567.2	704.1
1994	4011.6	8139.6	1904.1	7336.0	1602.6	643.8
1995	3964.7	9396.6	1860.9	7467.6	1671.7	748.6
1996	3787.6	8344.3	1692.5	7332.0	1710.5	905.7
1997	3541.6	7974.4	1693.2	7170.0	1460.8	669.4
1998	3146.4	7553.9	1781.8	6961.4	1070.8	504.7
1999	3302.5	7593.6	1807.8	6851.3	1152.8	642.5
Average	3749.7	7724.0	1782.7	6745.8	1410.9	648.2

The allocation of quota was completed in a manner very similar to the method the province used to assign major tenure access - if a firm had historically cut at a certain level, the Forest Service attempted to maintain that harvest level. Thus, there were no incentives built into the export system to reward positive economic performance. More important, the lumber quota system did not recognize and take into account the geographic partitioning of the lumber industry between the coast and the interior and the changes that had been occurring during the last few decades. The

coastal lumber processing industry shipped a growing amount of its production to Asian markets with a large amount going primarily to Japan while more and more of the lumber production in the Interior was destined for the US (Table 3-4).

The export lumber quota system was another public sector intervention leading to another non-market transaction in a stream of non-market transactions. Table 3-5 summarizes some of the most significant recent market interventions by the Canadian and British Columbia governments. There is little doubt that American demand for forest products coupled with public sector interventions in timber tenure and pricing are the dominant driving forces behind the industrial structure of British Columbia forest products industry - both its growth and decline. The more important question, and one to be examined in the next two chapters, is if those public sector interventions are now causing adverse impacts on the forest resource and its dependent human community.

Table 3-5: Chronology of Public Sector Interventions

- 1955: BC Government Moves Toward Rothery System.** BC Government introduces Rothery system of stumpage appraisal. BC timber companies organise US lumbermen to come north to aid in the fight against the new system.
- 1974: US Trade Act of 1974.** Three provisions established precedents. First, mandatory investigation of alleged subsidy. Second, countervailing duties could be imposed on goods that had previously entered the US without a tariff. Third, US producers must show proof of injury.
- 1974 - 1975: The Pearse Commissions.** Dr. Peter Pearse completes a number of studies with respect forestry and forest sector of BC's forest economy culminating in the 1976 Report of the Royal Commission on Forest Resources. A new provincial government is formed.
- 1978: Ministry of Forest Act.** Act creates and defines purposes and functions of the new Ministry of Forests.
- 1978 Forest Act.** Some of Pearse's recommendations incorporated into the Forest Act of 1978 by new government that include the creation of Forest Licences and a schedule for review and determination of AAC.
- 1981 - 1982: Recession.** US lumber interests complain of "unfair" government interventions in the market economy. They argue that the Canadian licensing and pricing system acts as an unfair subsidy. Commerce finds no ground for countervailing duties.
- 1984: Trade and Tariff Act.** New US legal definition of "upstream subsidies".
- 1985: New Control of Lumber Lobby.** Control passes to major US paper products companies. Increasing the asset value of US timberlands and the improvement of the comparative production costs against Canadian competitors enter the basic cost equation.
- 1986: MOU.** Canada and the U.S. sign a softwood lumber treaty. Canada agrees to impose a 15% export tax on lumber exported to the U.S. until individual provinces change their timber pricing systems.
- 1987: Comparative Value Timber Pricing and other policies.** Stumpage appraisal now uses a target number as a base to calculate standing timber value. Volume from major tenures reduced by 5% without compensation. Basic silviculture becomes responsibility of major tenure holders.
- 1991: Target rate changes.** BC raises stumpage fees contrary to market price signals. BC companies experienced an average 15% increase in stumpage. Canada abandons MOU. U.S. begins another countervailing investigation.
- 1992-1996: Timber Supply Review.** Conventional harvest reduced by 9.3% in Vancouver Region and 6.8% in the Prince Rupert Region.
- 1994: Northwest Forest Plan.** FEMAT's Option 9 selected for Western US National Forests. Cutting on US National Forests reduced by 75% and costing local economies approximately \$4.6 billion.
- 1994: BC Creates FRBC and Forest Practices Code.** Target rate adjusted upward to pay for new Crown corporation. \$2.4 billion per year in capital transferred from private sector.
- 1996: New MOU.** US Export quotas established for individual companies.

Chapter 4 -- Across the Threshold

Collectively, foresters are just now realizing that in a democracy they will practice forestry at the discretion of the people as a whole. A forester's prerogatives in the end are what the people say they are - no more no less

*Jack Ward Thomas
Chief Emeritus, USDA Forest Service, 1999*

Certainly the ideas embodied in sustainable development have charged the coastal forests of Canada's most western province with the electricity of change. Indeed, the importance of keeping human cultural and economic development within natural environmental limits is now being recognised not only in British Columbia but also on a world scale. Highlighted in Our Common Future (1987) these sustainability ideas require purposeful discussion and analysis if they are to have practical regional application in today's global economy.

It was proposed in the last chapter that the unintended results of a series of public sector interventions have created uncertain economic conditions in the coastal forest sector. Key among these interventions were those designed - like the Timber Supply Review, the Forest Practices Code and Forest Renewal BC - to move provincial forestry practices toward sustainability (Wilson and Wang, 1999). But what is sustainable forestry? It does not lack in number of definitions. For the purposes of this dissertation, Dr. Bill Wilson and Dr. Sen Wang of the Canadian Forest Service developed one of the more useful while writing on sustainable forestry in British Columbia. They define sustainable forestry as "a host of management regimes to maintain and enhance the long-term health and integrity of forest ecosystems and forest-dependent communities, while providing ecological, economic, social and cultural opportunities for the benefit of present and future generations" (Wilson and Wang, 1999: 37).

The definition properly places people as an integral part of the arithmetic of sustainable forestry; it involves creating a balance between the four pillars of sustainability identified by the Wilson and Wang definition in this and future generations. Shannon and Antypas (1997) identify six emerging principles of sustainability from a broad range of current international forestry literature. These are:

- Maintain ecological functions, conditions, and/or biodiversity;
- Evaluate and adapt social processes and governance structures;
- Adapt to change;
- Integrate ecological, cultural, and economic systems;
- Ensure intergenerational equity; and
- Accept ambiguity in the concept of sustainability (Shannon and Antypas, 1997: 440).

Since the Wilson and Wang definition captures the essence of the ideas of the emerging principles identified by Shannon and Antipas, it will be used in the rest of this dissertation.

A Host of Management Regimes

Forest management approaches to the stewardship of forests in North America can be classified around four types (Boyce, 1985; Boyce, 1995; Oliver, 1994; Oliver, 1999). These are:

1. **Old-growth Reserved Forests.** Reserved forests are areas where forest products' extraction is excluded. These are protected areas and parks.
2. **Old-growth Incidentally Administered Forests.** These forests are basically non-renewable; they are replacement forests that will have different and usually poorer characteristics than the original forests. These forests historically have been cut and permitted to regrow until economic conditions make it worthwhile to cut them again. The time of recut is relatively flexible. This system has been employed widely on the coast.

The system has historically been associated with a migratory wood industry in both the US and Canada. Companies that began in the 1800s in one part of the continent followed the timber resource from region to region and now are returning to places where the forest has regrown and again become profitable to cut. The Douglas-fir forests of eastern Vancouver Island are being exploited once again largely under this type of forestry.

3. **Integrated Managed Forests.** These forests are basically renewable and can be managed in such a manner as to avoid the pitfalls of both Incidental and Intensively managed forests. Using a diversity of silvicultural treatments, forest stand growth can be modified so that a targeted diversity of wood products that includes various habitat conditions can be created.

Oliver (1994) refers to this approach as "portfolio management". Instead of managing for a single product or objective, science is used to minimise risk and maximise profit by harvesting different stands containing different species and products as the prices related to each stand reach cyclical peaks. Boyce (1985) and Boyce and MacNab (1994) suggest that integrated management could also provide more diverse habitat for biodiversity reasons or for other values.

4. **Intensively Managed Forest Plantations.** These forests are basically non-renewable. Intensive plantation forests are managed with the objective of obtaining a high volume per hectare of a few uniform wood products, generally using mechanisation and mass production. Intensive plantations can grow very large amounts of wood - between 10 and 40 m³/ha/yr. These forests are quite costly to establish and protect.

Sustainable forestry will involve all these approaches and more. Many other values than timber are being identified and being considered. Ecosystems, economics, socio-cultural requirements and the future generations all become elements in sustainable forestry. Needless to say, each category of forest management generates quantities and qualities of products or values that are quite different. In terms of economic values, it is not unusual for an old-growth coastal forest logging operation to average a net volume of 1000 m³/ha and sort for some 30 different products. On the other hand, second-growth incidentally administered forests often have less than

400 m³/ha and sort for less than half-dozen products. A coastal forest plantation would be expected to have more volume/ha than incidentally administered forests but often would contain only one or two products produced on necessarily short rotations. These short rotations tend to produce innately weak wood that has a low value and requires greater investments in manufacturing and marketing (Oliver, 1999).

Perry (1998) writing in the Annual Review of Ecological Systems identified three very different roles that science is playing and has played in forestry. These are:

- Improving growth through intensive cultural practices;
- Researching the environmental impacts and sustainability of intensive forestry; and,
- Developing a science of ecosystem-based management.

Applying cultural practices to vegetation management under any of the management regimes can induce significant gains in growth and changes in the physical biological characteristics of forest stands. Curtis *et al.* (1998) discuss a silviculture for multiple objectives in the Douglas-fir region. Historically, silviculture developed to supplement declining timber in unmanaged natural forests. Much of the existing silvicultural literature and silviculture terminology is often presented in terms of wood production. Silviculture is much more than this. It "... consists of a body of knowledge and techniques that can be applied to shape development of forests to meet whatever objectives are selected -- whether the emphasis be on watershed protection, scenic values, ecological restoration, development of wildlife habitat, or wood production" (Curtis *et al.*, 1998: 1).

Yet silviculture does not contain the answers to some of the most challenging scientific problems facing forestry in the new century. Obviously integrating ecosystem management with social sciences will

provide many new challenges. Further, achieving sustainability within an economic system that devalues the future also provides some very real concerns for a long-term discipline such as forestry.

Silviculture has also created many new issues. Probably one of the most significant has to do with the simplification of natural systems through the application of plantation forestry. As Perry (1998) pointed out, science has aided in identifying environmental impacts of intensive forestry, but at the same time, science has failed to provide answers to questions that have been asked for decades. For example, nitrogen deficiency is the major reason Northwestern conifer forests produce less growth than would be expected in optimal conditions (Mahendrappa *et al.*, 1986; Prescott *et al.*, 1993; Radwan *et al.*, 1989; Weetman *et al.*, 1989; 1997;). Like carbon, the major source of free nitrogen is the atmosphere. Unlike carbon only a few microorganisms are capable of transforming atmospheric dinitrogen gas (N_2) to organic forms and then only in certain circumstances (Chatarpaul and Carlisle, 1983). The cycle of nitrogen involves major oxidation and reduction reactions that influence mobility of nitrogen in soils, retention of nitrogen by geochemical mechanisms and competition for nitrogen between microbes and plants. Nitrogen inputs to forest systems come primarily from wet and dry depositions from the atmosphere and from symbiotic and non-symbiotic fixation.

While the nitrogen cycle is probably the best understood of all the nutrient cycles, much of the nitrogen cycling within relatively closed systems like watersheds is poorly characterized (Landsberg *et al.*, 1991). Where symbiotic nitrogen fixation occurs, it may dominate the cycle and greatly influence ecosystem productivity (Mahendrappa *et al.*, 1986). The quantities of nitrogen fixed vary considerably between the type of symbiosis and site characteristics. Red alder (*Alnus rubra*) in a symbiotic relationship with

Frankia sp. can fix up to 300 kg/ha/yr. This is comparable to legumes like alfalfa (*Medicago sativa*) that are known for their soil building capacity in agriculture (Burns and Hardy, 1975).

Regardless of the quantities of a potentially available nutrient in soils, the demands of forest trees vary greatly between seedling establishment and mature tree. In secondary development and before crown closure, stands are characterized by small trees with low nutrient requirements. Growth is rapid and the tree retains most of the absorbed nutrients. At this stage, organic materials accumulated from the previous forest stand, along with unincorporated organic materials and dead tree roots, decompose rapidly because of increasing ground temperature. Quite likely nitrogen is not limiting at this stage (Mahendrappa *et al.* 1986). Conversely, after crown closure, leaf biomass and nitrogen demand tends to stabilize and there usually is strong biological competition for slowly cycling nutrients like nitrogen.

In primary development on recently deglaciated soils at Glacier Bay, Alaska, Crocker and Major (1955) noted that under alder (*Alnus sinuata*) the reaction of uppermost horizons of soil was reduced from pH 8.0 to less than pH 5.0. Further, within 35 to 50 years and at 45-cm. depth the mineral soil profile and forest floor combined to have accumulated almost 4.0 kg of organic carbon and 0.3 kg of nitrogen per m². While alder dominated, Bormann and Sidle (1990), studying the same area, found that soil nitrogen increased rapidly. As above ground biomass increased with the establishment and growth of *Picea*, soil nitrogen declined. As the spruce became mature (100 to 160 years old), nitrogen in above ground biomass also declined. Swanston and Myrold (1997) studying the incorporation of nitrogen from decomposing red alder leaves into plants and soil of a recent

clearcut found that approximately 71% of the labeled ^{15}N was recovered in soil, litter, or vegetation components.

Alder then, under certain conditions, has the potential of improving forest nitrogen budgets in the early stages of secondary succession. Yet, there is a hiatus in the literature about the taxonomy, variability and genetics of Canadian and introduced alders. It is clear that alder is sufficiently variable in form, wide enough in range and easy enough to propagate that it should respond well to genetic selection. Yet, in the standard forestry literature in British Columbia, alder is almost invariably treated as a “weed” that should be eliminated from the “working forest”.

Chatarpaul and Carlisle (1983) discussed other opportunities in applying nitrogen-fixing symbioses in forestry. They observed that there are, like alder, wide gaps in the knowledge of the factors affecting the symbioses and the silvicultural techniques suited to different species and different sites. These gaps in knowledge often produce undesired consequences.

For example, Hetherington (1985) in the coastal Western Hemlock Biogeoclimatic Zone (Pojar *et al.*, 1987), studied the fate of fertilizer ^{15}N applied to southern Vancouver Island watersheds. Preston *et al.* (1990) studied the fate of ^{15}N -labelled fertilizer applied on snow at Green Mountain, southern Vancouver Island. Preston and Mead (1995) examined long-term recovery ^{15}N from Douglas-fir needles decomposing in the forest floor. All the studies suggested nitrogen losses of up to 50% from their various sites. Hetherington (1985) calculated nitrogen losses to streams after first year of fertilizer application to be 5.9% of applied nitrogen in one stream and 14.5% in another. Almost all the nitrogen lost to the streams occurred as nitrate flushed out of the soil during rainy periods.

Preston *et al.* (1990) studied in 13-year old Douglas-fir. Preston and Mead (1995) and Hetherington (1985) worked in 23-year old Douglas-fir. Because of the young age of the stands, these studies may have been undertaken before nitrogen might be expected to limit forest productivity in conifer stands in the northwest (Mahendrappa *et al.*, 1986). Indeed, fertilization in these cases may have led to short-term nitrogen saturation in these stands. Saturation has been defined as the availability of ammonium and nitrate in excess of total combined plant and microbial nutritional demand (Aber *et al.*, 1989). In these cases, after fertilization the forest became an ecological source for nitrogen rather than a sink with nitrate leaching from soils and degrading water quality.

The importance of nitrogen to northwest forest systems has been understood for quite some time. Yet, there is currently still no validated general model of forest nitrogen cycling and subsequent nitrogen budgeting and there are major gaps in knowledge concerning the controls on carbon and nitrogen allocation by vegetation and on decomposition rates in older components of soil organic matter (Raison and Stottlemyer, 1991). The gaps in knowledge required for implementing sustainable forestry are formidable especially as society attempts to apply adaptive ecosystem management to coastal forests.

Sustainable Forestry

The natural forests of the West Coast have the inherent capacity to produce a number of goods and services, singly or in combinations, that people desire. Of course, the things society desires from forests are in constant flux but it is apparent that the manner in which these goods and services are to be provided from public forested lands has changed.

Over the past 20 years, forestry in the United States has diverged into two approaches with very different objectives and priorities (Perry, 1998). Management on public lands has tended toward protection of specific attributes like endangered species, old growth, viewsapes, or recently, the maintenance or enhancement of biodiversity and bio-geo-hydro resources and relationships. The management of industrial lands, however, is now focusing on increasing productivity of wood fibre through plantations and the application of various cultural tools that include genetic selection, site preparation, initial seedling spacing, fertilization, thinning and control of non-crop competing vegetation.

Jack Ward Thomas (1999), Chief Emeritus, USDA Forest Service, explains the background for the dichotomy:

In a democracy we practice our [forestry] profession at the sufferance of the people at large. And that will apply, ultimately, to private as well as public lands. This will of the people will come to bear first on the public's lands (1999: 605).

For the first three quarters of the century forest management focussed on building an "agricultural model" for the harvesting and growing of trees. In this "agricultural model" there is an effort made to restock disturbed areas, both natural and anthropomorphic, with species and individual trees that grow fastest and straightest. Another objective is to control or eliminate plant and animal competition and concentrate growth factors on the "crop-tree". Further, the "new" crop must be protected from fire, insects and theft. This involves fire, access, insecticides and police management.

The "agricultural model" a type of hybrid between Oliver's (1999) old-growth incidentally administered forests and integrated managed forests, seems to be best applied to gentle terrain that tends to moderate visual and environmental impacts of harvesting. Public outcry began as the

“agricultural model” was transferred to steeper ground and less productive areas in the Coastal and Cascade Mountains of the Pacific Northwest United States. For a time, industry and the US Forest Service persisted in the application of the “agricultural model” on public forests without adequate explanation to the citizens.

Thomas (1999) states:

The reaction to the citizens’ backlash has, thus far, been more pronounced in the United States than Canada. For example, the annual cut from the National Forests has dropped from 12.5 BBF to 3.5 BBF over the past 15 years. And, even now, one influential environmental organization is pushing for a “zero-cut option”

During the time of the public outcry, the industry lobbied vigorously against reductions in levels of cuttings on public forests. At various times during the controversy, reductions could have been as small as 3%, then 9%, and then 40%. Ultimately, the reduction was around 75%. Time and continued levels of cutting of old growth had eroded the number of options available that could resolve the crisis in the public Northwest forests of the US.

On public forestland in British Columbia, many of the sustainability issues have been bundled into an eco-centric or “natural condition is best” approach. Under this approach, if society wants a natural condition all that is necessary is to leave natural processes alone. No knowledge, no scientific research, no monitoring, no baseline survey or experimentation is required. All that is necessary is to set the area aside and protect it from human intervention either from industrial or accidental processes.

This is the stated objective of British Columbia’s Protected Areas Strategy (BC, 1993). It is quite plausible and often will achieve the wrong

objective. The ecological basis for much of forest development in North America has been major disturbances. Often these disturbances have been initiated by pre-industrial human activities (Attiwill, 1994; Botkin, D.B., 1990; Oliver, C.D, 1981). Since change is natural and some features of areas that society is attempting to protect are products of pre-industrial human activity, it follows that if society wants to use resources, it should understand the cumulative effects of human-induced change to natural change. Knowledge is essential. Baseline surveys, monitoring, and experimentation are all part of adaptive ecosystem management, a fundamental portion of sustainable forestry.

Scientific research is important. It has been demonstrated that cultural techniques management can intervene in the life cycles of some species like Douglas-fir and produce timber crops and a variety of other values in less than 60 years in favourable terrain on Vancouver Island (Curtis *et al.*, 1998). It also has been illustrated that many of the factors easily affected by forest management pertain to the soil and some of these are quite malleable with resulting increases in many types of productivity (Powers, 1989). As research becomes important to the conservation and management of resources, initial management policies must be flexible and, depending on the degree of uncertainty, quite conservative.

Sustainable forestry is not sustained-yield timber management nor is it just ecosystem management, as some workers seem to suggest (Galindo-Leal and Bunnell, 1995). It is determining a balance between ecological, cultural, social, economic and managerial considerations. Ecological considerations alone do not adequately consider the economic and social costs and benefits associated with a pure eco-centric approach to forest management. People become important considerations in the arithmetic of sustainability.

People in Canada communicate their values about forests using three systems: political, economic and social. Forest decision-makers have almost invariably identified the values that individuals attach to forests through political and economic systems and ignored the socio-cultural elements (Robson, *et al.*, 2000). It is argued effectively elsewhere that the economic system has largely been ignored in the British Columbia government's policies on sustainable forestry (van Kooten and Wang, 1998). This lack of economic analysis and ignorance of the socio-cultural factors is bringing about a very unbalanced approach to the implementation of sustainable forestry in the province and producing a kind of political alienation in the rural timber-dependent community.

While the provincial government has introduced a host of policies to support the transition to sustainable forest management, sustainable forestry does not appear to be taken seriously by forestry leaders in government, business and labour. As an example, all the studies presented at Vancouver's 1992 "Forest Summit" were based on the continued availability of "old growth" mature sawtimber and the provincial annual cut from private and public forests rising from the current 72 million m³/yr to a 90 million mark. In a more recent example, the Council of Forest Industries in an October 1999 open letter to British Columbians titled "Blueprint for Competitiveness", called for "establishing a clear, unequivocal public objective to stabilise, then increase, the provincial Allowable Annual Cut over time" (COFI, 1999: 15).

In the Vancouver Region, volume billed from Crown lands suggests the amount of forest harvesting has been declining at fairly constant rate on the coast throughout the period 1980 to 1996 (Table 4-1). The Vancouver Island Land Use Plan had reduced land available for timber harvesting and management while other land areas became "priority-use zones" further reducing the available timber supply. Of course, the Timber Supply Review

was just finishing its first phase and there was now a Forest Practices Code. At the provincial level, the cut has been maintained.

Table 4-1: Volume Billed from Crown Lands for Various Years

	(000 m ³)	
	Vancouver Region	Province
1980-81	20,844	65,416
1985-86	23,643	72,345
1990-91	21,197	66,908
1995-96	19,450	66,282

Source: Ministry of Forests: various Annual Reports

More areas of forest are being reserved for uses other than timber -- parks and protected areas. Further, by 1992 harvesting, fire and pests had generated more than 873,400 ha of not sufficiently restocked (NSR) forest (Thompson *et al.*, 1992). By 1996-97, the figure had grown to 2,844,000 ha. The Ministry of Forests estimates that more than 150 000 ha of this forest class is of productive forest coastal sites. Before cutting, these natural forests appeared to have the potential of growing at an average annual rate of 6.2 m³/ha/yr or about 930,000 m³/yr (Wagner, 1987: 107). The volume not being grown because of NSR in secondary and managed forests represented about 5% of the coastal actual cut in 1995-96.

Province-wide, the estimate of replacement volumes not being grown on Crown forests due to NSR, fire and insects is another 3.4 million m³. This volume is also about 5% of the total annual provincial allowable cut. This fact alone should suggest a problem with management and would suggest a reduction in annual cut rather than an increase as recommended by industrial interests at the 1992 Summit.

Luis Constantino from the University of Alberta and David Haley from the University of British Columbia (1988) studying trends in wood quality for the British Columbia coast confirmed that the wood quality in the remaining timber supply is declining. This is even more alarming because it suggests cutting is centred first in the highest quality stands and then moves progressively to less desirable stands as management progresses. In other parts of North America this practice has been termed "high-grading."

Further, the "managed" forest is generating a radically different product mix than the natural endogenous forest. For example, the natural coastal forest historically yielded between 500 and 1600 m³/ha of "sawtimber" type product. The "new" forest, under current forest policy, is expected to produce between 500 to 900 m³/ha of "chip and saw" type product with very little "sawtimber" (Wagner, 1987: 87-91). Further, there is an increasing body of evidence that suggests that at current rates of exploitation, the first-growth timber will be logged before the second-growth stands are mature (Murray and Bartoszewski, 1998). The Ministry of Forests has been aware of this "fall-down effect" since Chief Forester W. Young used the term in 1981 (Young, 1981).

The lower volumes and different timber types associated with second growth imply that an industry tooled for processing the "old" forest for one type of product will have to reinvest in equipment to process the "new" forest from a significantly reduced and changed resource base. To make that investment, industry should be interested in the amounts and kinds of values that will be in the "new" forest. On the other hand, government decision-makers should be interested in the rate of depletion of the old-growth timber resource so they can avoid shortfalls and identify local and regional problems in the transition to the "new" sustainable forest economy.

Balancing Rate of Use and Depletion

It is quite a common practice for a society to draw down resources to finance economic growth. Unfortunately, it has also been a trend of some developing resource-dependent countries to engage in resource exploitation without employing a process that makes a reasonable accounting of the human and natural resources used in the "progress" (Repetto *et. al*, 1989). In tropical countries, this has proven to be a very unwise strategy. Often severe environmental degradation has occurred as a result of this kind of "progress". To complicate the issue of degradation, the national – particularly the regional – economic benefits of timber harvesting in developing tropical countries seem to have been overstated. Net domestic benefits gained by the economies of many tropical countries depleting their forest resources have been surprisingly small compared to the gross value of timber being exported (Repetto, 1988).

Some modern resource-dependent economies like British Columbia may also be pursuing unwise but similar self-destructive policy directions and overstating net domestic benefits associated with forest harvesting. Historically, the province has achieved a form of "economic growth" by drawing down the naturally generated timber stock that took centuries to establish. Since these forests are not renewable in any reasonable time period, they represent the basic biological wealth of the forest economy.

A revealing method for indicating how effective the government policies have been in capturing the economic values associated with exploitation is to compare a few indicators of the results of public sector forestry of the British Columbia coast with the coastal states of Washington, Oregon and California. In this comparison, only volume and stumpage are plotted.

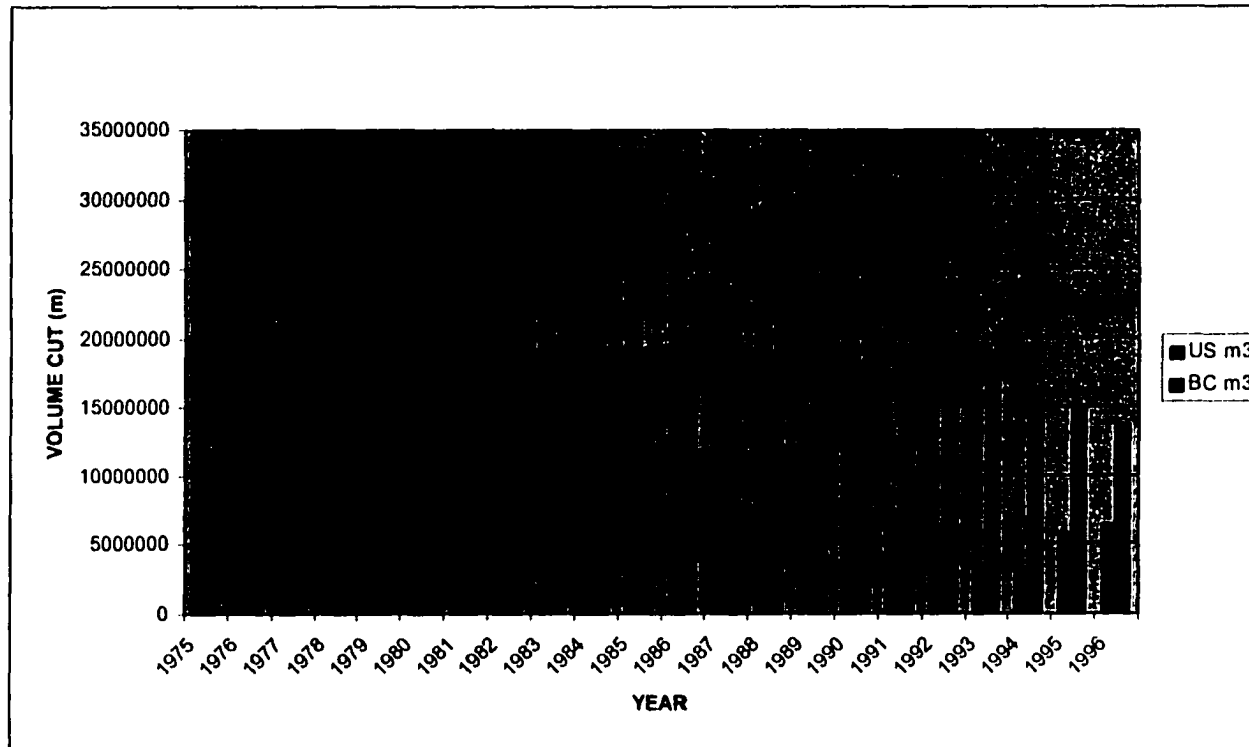
Regional Comparisons

Figure 4-1 is a comparison of the volumes harvested from public forests in the Coastal region of British Columbia and the Coastal Region of the Pacific Northwest. In this exercise, the Pacific Northwest includes both State and Federally administered forests. Figure 4-2 is a comparison of the stumpage paid for timber from the various Coastal public forests in the Pacific Northwest and British Columbia in their respective dollars. Figure 4-3 is a combination of stumpage and volume to show the economic values collected by the public sector for harvesting in the respective jurisdictions and dollars.

The three figures compare roughly 8 million ha from coastal British Columbia and about 7 million ha of forest in the United States. Since both jurisdictions practiced sustained-yield forestry during the time of the study, it is not surprising to see a fairly continuous flow of volume until about 1990. At that time in the western United States, concern for endangered species and other ecological values began to impact logging on federal forests. In 1994, the federal government officially adopted a recommendation of its Forest Ecosystem Management Assessment Team, permanently and severely reducing harvest in the Pacific Northwest (Chase, 1995). But up until 1990, because of relatively higher site productivity and greater volumes per hectare, the Americans consistently harvested more volume from a smaller land area than British Columbia (Figure 4-1).

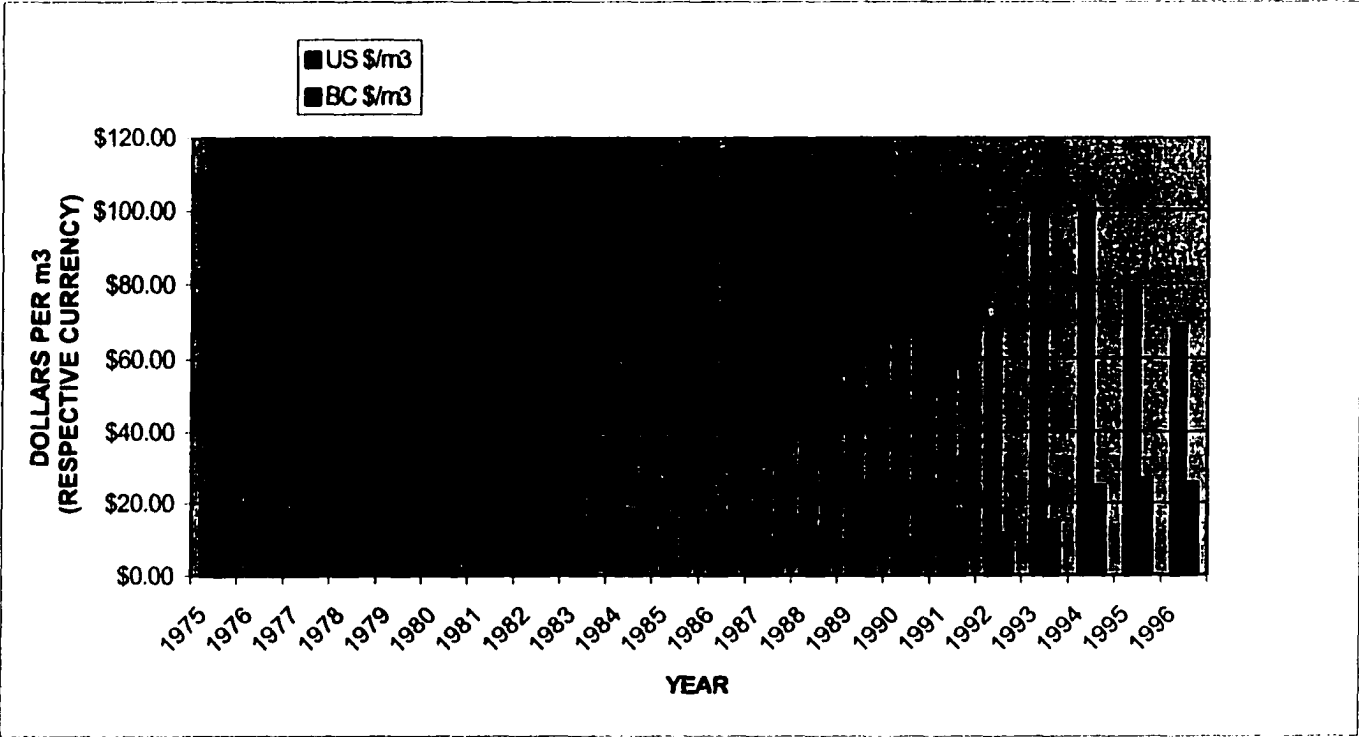
Figure 4-2 illustrates that the American stumpage system seemed to be market sensitive while British Columbia coastal stumpage did not appear particularly sensitive to changes in log prices for the period 1975-1996. While some of the price effect is probably better timber quality, the figures presented are average for all species and grades.

Figure 4-1: Volumes Cut From Coastal Public Lands: British Columbia and US Pacific Northwest



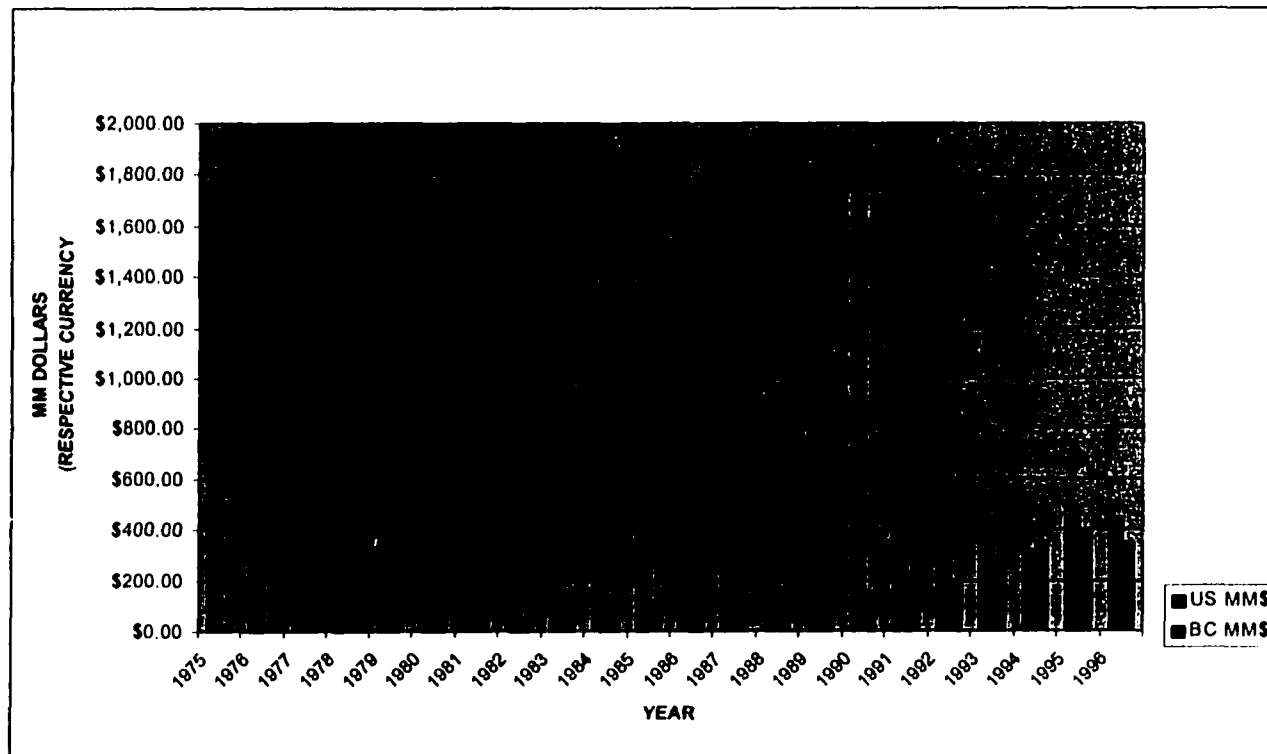
**Sources: BC: Ministry of Forest Annual Reports
US: Resource Bulletin PNW-RB-226**

Figure 4-2: Stumpage from Selected Public Lands in British Columbia and the Pacific Northwest



**Sources: BC: Ministry of Forest Annual Reports
 US: Resource Bulletin PNW-RB-226**

Figure 4-3: Comparative Values from Coastal Public Forests in British Columbia and US Pacific Northwest



**Sources: BC: Ministry of Forest Annual Reports
US: Resource Bulletin PNW-RB-226**

The figures suggest other areas of interest. Was the US cutting at sustainable rates on the National Forests? If so, then since 1990 the US has been foregoing huge amounts of economic values in its approach to public forestry on the National Forests on the coast. This could constitute a subsidy to other forest regions in the US.

Figure 4-3 clearly demonstrates that American forest pricing policies generated higher revenues than British Columbia pricing policies. Given the historical perspective presented in earlier chapters, this should be no surprise because up to 1994, provincial forest pricing policy clearly intended to share stumpage with the licensee.

Income-Sharing in the Western US

The United States took a different approach. The gradual shift over the last 120 years towards a national policy of retaining western forests and lands for public purposes has fueled an increasingly complex program of federal timber revenue sharing in the west. Because federal and state land is exempt from local property tax, local governments that have federal land within their jurisdictions have consistently and successfully argued for compensation for the loss of a tax base. An underlying theme to the western states' claim for compensation has been the relatively large amount of land held in the federal domain compared to other regions of the country.

The most significant compensation to the counties of the western states comes from the National Forest Revenue Act of 1908, amended in 1976. It provides for 25% of the *gross* receipts received by the national forest to be returned to the counties in which national forest is located. In terms of 1977 US \$, payments to the west have averaged about \$150 million per year from this 25% fund with increasing amounts in the early 1990s (Schuster, 1996). The amount going to each county is related to receipts from timber sales and acreage distribution of federal land. In 1991, over 90 % of the revenues generated from

lands administered by federal government in the Pacific Northwest United States came from timber sales. In that year just over \$250 million was distributed in the west, which is considerable more than the average (Schuster, 1996).

Historically, revenue sharing in the United States has centered on equivalency or how well payments approximated the contribution of these lands were they in the private sector. The US Forest Service uses a market-based appraisal system that superficially appears to be a good approximation of the value of domestic logs. The Forest Service also uses a sealed bidding system on all timber sales. The system worked fairly well until recently when federal land managers began to move away from programs emphasizing commodity-based management to ecosystem management. Timber revenues fell dramatically. Decreased emphasis on commodity production raised concerns over revenue-sharing payments and how they relate to the sustainability of rural communities.

This concern is especially apparent in timber-dependent counties in Washington, Oregon and northern California where there are few options to replace the federal timber revenue (Bray and Lee, 1991). Because of the precipitous decreases in annual cut in the Pacific Northwest and California, the American Congress passed legislation to maintain the level of payments from national forests known as "owl guarantees." For Fiscal Year 1991, the fund payments were to be not less than 90% of the Fiscal Year 1988-90 annual average. For Fiscal Years 1992 and 1993, the guarantee was 85% of the Fiscal Year 1986-1990 annual average (Schuster, 1996). Because of the declining revenues resulting from the Northern Spotted Owl controversy, even with "owl guarantees" contributions to California, Oregon and Washington had declined from \$321 million in 1989 to \$145 million by 1998 (USDA, 1998)

In the western United States, revenue sharing with forest-dependent regions is a highly complex political issue covering about 40% of the forested estate. The other 60% of the forested lands are under private ownership and

subject to local taxes. Elsewhere in the United States, the issue is not as important. In 1991, for example, 32% of the timber cut in the United States was from industry lands and 51% from non-industrial private lands. Only 27% of the harvest came from public forests in 1991 (Warren, 1997).

Schuster (1996) observed that revenue sharing funds affected local forest-dependent communities in two important ways. First, the amount and stability of payments varied as commodity markets rose and fell, raising concern about the dependability of federal revenue sharing as a source of funds. Second, local communities have become very interested in issues of land management because they have a vested interest in the natural resource products produced from national forests. Local governments are understandably concerned about decisions that allocate land to preservation rather than revenue-generating timber production.

During the controversy over the preservation of habitat for the Northern Spotted Owl (*Strix occidentalis*), resource-dependent communities were quite vocal in their disagreement with the recommendations of the Forest Ecosystem Management Assessment Team that led to the Northwest Plan. It has been estimated that the total economic costs of these recommendations and the Plan total \$680 million yearly (McKillop, 1994). These costs break out to be:

- about \$290 million in net annual timber sale receipts,
- \$209 million in federal payments in-lieu-of-taxes to counties and school districts,
- \$5 million in sales taxes,
- \$6 million in timber yield taxes,
- \$56 million in state income tax; and
- \$114 million in federal income tax.

Because of a local “forest constituency” with a vested interest in forest harvesting policies, it became politically expedient for the United States government to create “Owl” payments as a substitute for harvest revenue sharing. As mentioned earlier, although these payments were linked to harvesting in a few key years, in the Pacific Northwest, the amount associated with revenue sharing quickly eroded.

Although there is a tremendous amount of non-taxable forestland in almost every regional district in British Columbia, a revenue-sharing program with the forest dependent regions/communities does not exist. This is somewhat surprising, as many coastal communities –Ucluelet, Gold River, Tahsis, Port McNeill, Port Hardy, Port Alice, Ocean Falls and Kitimat - were the result of British Columbia’s instant town programme between 1962 and 1972. These towns were created with all the physical trappings of an urban centre along with the physical aspects of a permanent settlement. Yet, Bradbury (1977) noted a vital flaw in the development of these “instant towns”:

The permanence or stability of a settlement was allied with the fortunes of the resource base of the community and the fortunes of the company, which operated the industrial enterprise (1977: 19).

As a partial consequence of the lack of a vested interest, local residents, unless required by employment, have little idea of the local consequences of the forestry being practiced. Indeed, the idea of sustainable resource-dependent communities has not really been an issue in the province until the government began to move toward sustainable forest management.

For example, Professor F.L.C. Reed of the University of British Columbia, speaking at a conference on Community Stability in Forest-Based Economies in 1987 cited Sloan’s (1956) statement that “sustained yield forest could provide a continuous wood supply and regional stability of employment.” He then quoted

Byron (1978) who concluded: "Even-flow regulation *per se* cannot achieve short-term stability of employment ... when the forest industry of a region produces primarily for volatile export markets." Professor Reed noted that Sloan might have oversold the power of long-term timber tenures to stabilize the forest industry in the short run (Reed, 1989: 110).

Patricia Marchak, a professor of sociology at the University of British Columbia, in an examination of British Columbia's forest industry compared the "instant town" of Mackenzie with an old logging town like Terrace. Her survey was completed during the period 1977-1978 (Marchak, 1983). She noted:

Both the new and old towns are economically stable only to the degree that their populations have steady employment. Both are vulnerable to changes in market demand and investment decisions. The differences in their economic stability over time have more to do with these factors than social conditions (1983: 304).

Marchak observed that few researchers have been concerned with the external environment within which resource communities exist. Rather they have been concerned with social conditions within the towns. If the assumption is that a stable external environment exists, then it follows that social variables become causes of community instability. Of course, it is contended in this dissertation that the external environment of these towns is anything but stable. The softwood MOU, Comparative Value Stumpage, the Forest Practice Code and Forest Renewal BC have all worked to perturb the external environment of resource-dependent communities.

The economic and environmental forces that brought about rapid changes in federal forestry in the United States and caused turmoil in forest dependent communities in the Pacific Northwest seem to be working in British Columbia also. But there are important differences between the communities of the Pacific

Northwest and coastal British Columbia. One important difference is the vested interest most forest-dependent communities in the Pacific Northwest have because of revenue sharing compared to the situation in British Columbia. Another difference has to do with the lack of potential for economic diversity in the sparsely populated coastal areas of British Columbia. Almost without exception, coastal forest-dependent communities are found in the sparsely settled areas. The location and isolation factors almost guarantee that each settlement will remain a single enterprise community.

Today, British Columbia's coastal forest is a workplace and a source of livelihood for an ever-decreasing number of individuals. In 1981, the forest sector employed one in 11 workers in British Columbia; by 1994, the industry accounted for one in 17 workers (BC Stats, 1996). Conversely, rural communities' economic futures are more dependent and linked to the production of forests and forest products than ever before (White *et al.*, 1986). On Vancouver Island and much of the mid and north coast, forest-related activities dominate industrial activity (Horne, 1999). In 1991, 71% of income in the Alberni area was dependent upon the forest industry; 61% in the Port Hardy area; and 70% in the Campbell River area. Fishing was a major activity in the Alert Bay and Butte Inlet area where it accounted for 45 and 48% of income, respectively, until the coastal salmon fishery started to decline. Mining was important in the Port Hardy area providing 25% of the area's income to individuals until the Island Copper mine closed in 1996 (Horne and Penner, 1992).

The classic 'timber town' is alive but ailing in most of coastal British Columbia. The plight of one "instant" town -- Gold River -- has been constantly in the news since the announcement of the closure of the pulp mill. In British Columbia, for the most part, community participation in forestry is and has been defined in terms of jobs (Byron, 1978; Reed, 1999).

Yet there are other methods for determining participation. Gary Horne has worked over a decade on regional and local economic impacts (Horne, 1999). His method is termed the economic base method and it attempts to examine the external economic environment in which communities exist and its impact on regional income.

The Economic Base Method

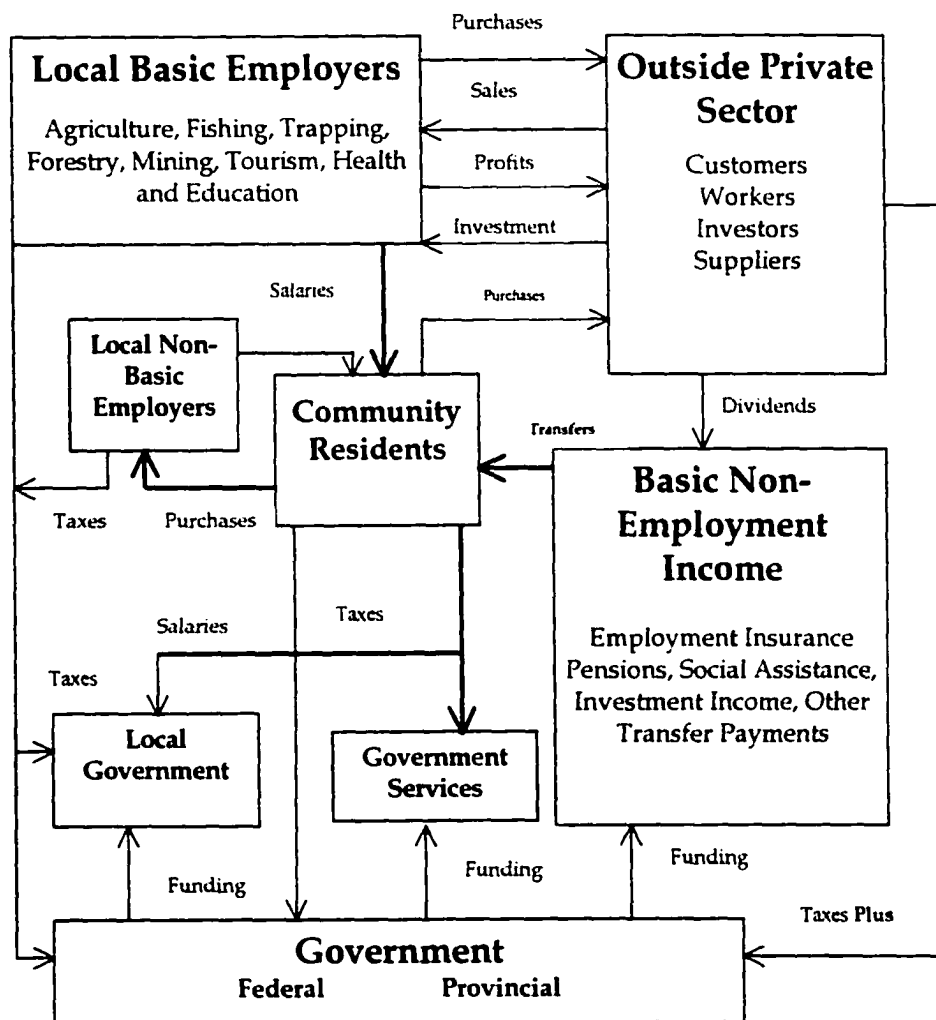
Horne (1999) working on local area economic dependencies in the province used an economic base method to develop a typology of forest-dependent communities in rural areas. He not only found 'timber towns' but significant Coastal areas largely dependent upon forests. Horne's "... fundamental premise is that the economy of community can be represented by income flows, which can be classed as *basic* and *non-basic*" (Horne, 1999: 8).

Basic income flows into the community from the outside through the production of goods and services in the community that are exported from it. Non-basic income is paid to individuals in the community for goods and services provided to other individuals of the community. Figure 4-4 illustrates the relationships used by Horne's typology. Each arrow in the diagram represents a flow of dollars. At the centre of the diagram are community residents that receive income from a variety of sources. In turn, they make purchases and pay taxes.

Horne defines forest-dependent areas as those in which 20% or more of the areas' income is derived from the forest sector. Using this definition there are 31 forest-dependent areas containing 270 communities in the province; 15 of these forest-dependent areas are on the coast. These areas contain 62 communities on Vancouver Island, 22 on the mainland coast and 49 on the north coast (Horne, 1999). While Metro Vancouver is not defined as a forest-dependent community, it is the largest single beneficiary of forestry in the province.

Figure 4-4: Community Income Components

(Adopted from Horne, 1999)



The forest sector employs more than 20,000 people in Vancouver. Thus, 22% of all forestry employment and over \$2.2 billion annually of the gross domestic product (GDP) of about \$98 billion in 1997 has found its way into Metro Vancouver from the hinterland. Total forest sector contribution to GDP was \$17 billion in 1997 (COFI, 1999).

Horne, like Adam Smith more than 220 years ago, recognized the fundamental importance of labour and its skill level in explaining observed differences between the wealth of different areas. In an opening paragraph to An Inquiry into the Nature and Causes of the Wealth of Nations, Smith wrote:

The annual labour of every nation is the fund which originally supplies it with all the necessities and conveniences of life which it annually consumes, and which consists always either in the immediate produce of labour, or in what is purchased with that produce from other nations.

Although Horne breaks his research areas into the various forest districts throughout the province, his work does not include sub-regional disparities in natural capital and only indirectly includes human-made assets. Thus, his work can not be viewed as any measure of total regional wealth but it is a measure of regional income.

There are close links between wealth measures and sustainable development. An emerging and powerful interpretation of sustainable development concentrates on preserving and enhancing the opportunities open to people rather than meeting the needs of future generations. Shifting attention from flow measures of economic activity, such as GDP, to the stocks of environmental resources, produced assets, and human resources is important. Stocks of wealth are the foundation of the opportunities available to people. Thus, the process of sustainable development in this view is the process of creating, maintaining and managing wealth. It follows that sustainable forest management is just an extension of this idea. But to manage wealth, there must be some way of estimating value.

Forest Valuation

In the real world, trees and forests are storehouses of economic values. Forest production associated with fibre is often found in capital theory literature

(Groundry, 1960). Capital theory is concerned with values and costs of volume rather than just volume alone. Capital theory approaches suggest different rotation periods than those that would be expected from just physical criteria. Because the amount of economic value generated is related to the type of management system employed, dramatically different tenure and pricing arrangements may have evolved in the province if a combination of value and volume had been used or was being used in apportioning forest tenure. Using a combination of economic and ecological criteria, managed rotations would have been considerably shorter and because of cost considerations, many forest areas with older mature forests may never have been allocated to commercial forestry.

The concept of trees as capital provides both the forest manager and the decision-maker with fiscal, rather than physical information. In the secondary and managed renewable forest, growth cannot really be separated from value. In a special research study for predominantly second-growth forests, returns on timberland investments in the United States were broken down by the following percentages (The Stratford Investment Advisory Group, 1989):

1. Timber Prices – 30%
2. Biological Growth – 60%
3. Land Price – 10%

Thus, in secondary and managed renewable forests growth makes up a large fraction of the value spectrum. Yet for old-growth forests, where there is very little net growth, timber prices would be expected to be the dominant form of value.

On the coast in British Columbia, the public forests are in transition to extensive management. They have been treated as old-growth mined forests that are basically non-renewable in any “human-referenced” timeframe. These forests are being converted from their unmanaged natural state to an extensively managed condition at highly variable rates. The suggestion here is that there will

be a spatially disproportionate amount of "extensively" managed timber available to the forest sector as it enters its first managed forest cycle.

For second-growth and managed renewable forests, the productive quality and spatial relationships of timber on the land can be used for valuing a forest's present net worth. Because British Columbia's exploitation policies have favoured the harvesting of older stands first, a market for biological forest growth has not developed on public forest land and is only now developing on fee simple or private forested land.

The idea of valuing growth would also be important in valuing present area-based tenure arrangements for their potential to produce economic social benefits. Unfortunately, to use the idea in an old-growth transition context, there should exist an old-growth log market from which to estimate resource rents. To determine a value for these old-growth logs, prices should be set on the commodity under an open system of negotiations between buyers and sellers.

The Council of Forest Industries keeps a record of about 25% of the predominately first-growth logs traded in the Vancouver Island – Howe Sound area. It is termed the Vancouver Log Market (VLM). While much has been written concerning this market, most observers agree with Pearse (1974b) that "... there are strong grounds for suspecting that log prices generally underestimate the value of the timber transacted" (1974b: 185). Wagner (1987) examined the domestic and export log market of the United States in comparison with the VLM. He found the value of the average log traded from 1977 to 1985 (weighted by volume transacted and indexed to 1985\$) on the combined coastal area of Alaska, British Columbia and NW US log market in 1985 to be \$86.15 Canadian. The same log traded on the Vancouver Log Market was valued at \$52.01 Canadian. On the U.S. Export Market, the same log was worth \$100.15 Canadian per m³.

Why is a good estimate of forest value of so important? Repetto *et al* (1989) studying potential rent dissipated from roundlog processing inefficiencies in Indonesia's forest processing industries observed:

The potential rent obtainable from roundwood at the time of harvesting, equivalent to that on log exports, is therefore a more valid economic measure of depletion costs for the timber resource than the rents actually earned (1989: 36).

Thus to approximate the amount of rent obtainable from the forests of coastal British Columbia, a method has to be determined for reconciling the difference between the market value of a coastal British Columbia log as opposed to the VLM value.

Margolick and Uhler (1992) modelled the economic impact of removing log export restrictions in British Columbia. Because of potential increase in supply from the influx of logs from British Columbia, they reduced Pacific Rim log market price by an average of 25%. They concluded that the VLM log price in coastal British Columbia for all grades and species is about 20% lower than the real Pacific Rim market for logs.

Wagner's (1987) figures are higher but are between Margolick and Uhler (1992) and the U.S. Export Log Market. Since the goal in this paper is to determine a regional methodology for valuing depletion, the Margolick and Uhler 20% figure is a reasonable first approximation. Thus, the values listed in Table 4-2 have been modified to reflect the log values on the potential British Columbia Log Market.

While the Vancouver Log Market is not directly used as an estimate of world log value, it is an indirect measure. Importantly, the market tends to display relative changes in prices over time. The US Export Log Market apparently, also reflects these prices. Table 4-2 illustrates these changes. It indicates that the relative price change have increased over time for all species tabulated on the

Table 4-2: Vancouver Log Market -- Average Annual Transaction Price

Values adjusted upward by 20%

Western Hemlock Logs (\$/m³) Douglas Logs (\$/m³)

Year	Grade 1	Grade 2	Grade 3	All Grades	Grade 1	Grade 2	Grade 3	All Grades	Red Cedar	All Sps
1974	34.88	33.62	23.03	24.53	58.27	43.12	22.90	29.50	26.21	32.09
1979	73.68	67.42	45.08	47.42	105.16	81.38	53.76	62.72	70.01	72.40
1980	79.58	73.42	49.86	52.39	117.61	88.25	46.63	58.57	51.05	
1981	64.39	61.21	38.17	41.58	125.42	83.83	39.89	55.27	51.62	
1982	70.97	64.54	39.10	44.42	127.08	73.81	33.11	53.17	55.69	
1983	78.14	65.40	34.87	40.27	126.40	67.79	36.49	57.02	73.91	
1984	70.79	55.85	35.68	39.48	147.41	68.83	34.63	56.48	69.41	57.68
1985	73.78	57.89	42.72	46.67	186.56	77.72	37.97	62.35	61.54	
1986	78.32	61.14	39.80	44.15	221.71	86.50	41.10	72.82	67.44	
1987	100.07	70.13	44.63	49.67	262.75	88.21	44.15	75.54	76.81	
1988	140.86	88.45	51.76	58.91	278.16	97.02	45.40	73.46	81.31	
1989	118.42	82.76	55.62	60.49	360.43	105.66	56.58	85.96	73.27	78.41
1994				108.38				182.27	106.76	130.98

Source: Council of Forest Industries

Vancouver Log Market (Douglas-fir, hemlock, balsam, cypress, pine, spruce, and cedar).

The information in the Table suggests that the annual average growth in hemlock price was 6.2% for the past 15 years; growth in the Douglas-fir log prices has been 7.4%; and for all species transacted on the market it was 6.1%. Interestingly, the table indicates that value is related to both the species and the grade of log. For example, for the five-year period 1985-1989, Grade 1 Douglas-fir logs increased 19.6% while Grade 3 Douglas-fir increased only 10.3%. For hemlock, the range was not as wide but shows the same trend.

Thus, the quality of the wood volume has value that is changing in time. For factor input like logs, quality is associated with species and log grade. Price is a measure of the contribution the log input makes to the producer's output. Other things being equal, higher-quality logs add more to the user's total product and command a greater market price than logs of lesser quality. In British Columbia, these higher-quality logs are almost invariably products of old-growth forests.

Regional Forest Accounts

Obviously, it takes hundreds of years to produce the higher quality old-growth logs. Under current extensive management regimes used on the coast to administer the forest resource, it would seem that a system of regional forest accounts would be in place to ensure that woodland development progresses within natural limits. Further, this system would insure that allowances are made for depletion of the higher value natural old-growth forest asset. At the same time, this system could be expected to provide an information framework for assessing the annual performance of the regions in the province's forest economy.

Of course, there is no such system of regional natural forest accounting in place. Even the Ministry of Forests' inventory techniques used in monitoring forest type change or scaling methods for measuring the forest products extracted from the natural wood resource may not reflect spatial and temporal

orientation of forest transition. Whether information from the Ministry's present inventory, scaling and pricing systems can be used to measure the economic values associated with exploiting the old forest is also an open question. Indeed, in a meta-data audit of a number of map sheets on various timber supply blocks on the coast, there was considerable disagreement between the inventory and ground measurements (Lodin, 2000). For example, on selected polygons of the Kingcome TSA the inventory showed leading species correctly 76% of the time and species percentage correctly 84% of the time. Thus, there is a 34% probability of being wrong in the two attributes that are the basic building blocks in the determination of volume and allowable annual cut.

If forest use is to be sustainable, the total capital stock in land and timber available to society over time should not vary between beginning and end points of the period. Alternatively society may compensate for errors in measurement, changes in discount rate and the changes in market value of the forested estate by accounting for depletion and then investing a portion of capital derived from resource exploitation income in alternatives realising the same or higher alternative rate of return. An initial suggestion for a rate of alternative investment would be the increase in value directly resulting from timber price. Using the case of the Vancouver Log Market as an example, annual investment would be at least 6.1% of the value exploited.

An Alternative Sub-regional Income Correction Methodology

Research completed at the University of Victoria's Centre for Sustainable Regional Development suggests that resource accounting is a potential method for monitoring regional sustainable development. Preliminary work indicates that forest resource accounting methodology should shift away from an emphasis on income correction and move toward interfacing socio-economic and ecological systems.

There is much merit in Prudham and Lonergan's(1992) argument that when the socio-economic system uses ecosystems for economic purposes, an accounting interface is mandated. Present timber exploitation policies were established precedents before ecological principles were even thought of being extracted from the "bird-watching and natural history" literature. With respect to the coastal forest, even the step toward income analysis and correction would seem to be an improvement in the present situation.

Assuming for the moment that the Forest Practices Code is ecologically based, the province's exploitation policies pre-date any such ecological policy. It would, therefore, seem that the first step in "interfacing socio-economic and ecological systems" would be to examine regional income ramifications of using old-growth timber resources as the provincial forest economy's driving force. The determination of the forest depletion and its capital element – a value to be invested in alternative capital markets – would be of high priority in the evolution of a system of regional forest accounts.

Non-renewable Resource Accounting

In a study of petroleum resource depletion over the period of 1963-1987, Foy (1991) compared a depreciation method of deduction from a system of resource accounts introduced by Repetto *et. al* (1989) to that of a user-cost or sustainable income method suggested by El Serafy (1989). Either would appear to be suitable to estimate depletion in a region.

A major difference in the two approaches is that El Serafy applies the user-cost adjustment solely for non-renewable resources. El Serafy defines net receipts as total revenue from exploitation minus exploitation costs (Foy, 1991). He avoids the serious difficulties inherent in natural resource valuation by separating the net receipts from exploitation into income and capital consumption components.

In the case of forest exploitation policies on the coast, the El Serafy adjustment seems more appropriate than the sustainable income method of

Repetto. Further, the depreciation method includes a calculation of resource rent over the lifecycle of the resource. The user-cost is more concerned with the net receipts of the current year. Foy (1991) summarises the El Serafy approach:

A non-renewable asset has some finite lifetime over which it yields real net receipts, R per period. Some portion of these receipts must be put aside and reinvested at a real return, r , if the owner is to have constant income over an infinite period, X . $R - X$ is the 'user cost' or 'depletion factor' that should be set aside as a capital investment. The percentage of annual receipts, (X/R) , that represents income is determined by equating the present value of a constant and finite stream of receipts R to the present value of a constant and perpetual stream of income X (1991: 30).

El Serafy (1991: 17) presents the mathematics and the following results:

$$X = R [1 - 1/(1 + r)^n]$$

Where:

R = expected net receipts

r = alternate rate of return (Average Yields, Treasury Bill Auction)

n = period of years to deplete resource

Here:

$$(X/R) = 1 - 1/(1 + r)^n = \text{El Serafy's income}$$

$$1 - (X/R) = 1/(1 + r)^n = \text{El Serafy's capital element}$$

Using the El Serafy approach, a value can be developed that suggests an amount that could be accessed by the local forest-dependent region or regional district as a substitute for the depleted old-growth forest resource.

The intent of the next chapter is to organise and use the Ministry of Forests' inventory database for a timber supply area and apply the El Serafy approach for accounting for old-growth forest depletion. This information will then be used to estimate the rate and value of forest depletion in one timber supply area and estimate the magnitude of depletion on the sub-regional forest economy.

Chapter 5 – Into the Abyss

A healthy company invests at a pace at least equal to its annual depreciation - the amount by which its plants and equipment lose value.

Doug Whitehead, Past President,
Fletcher Challenge Canada

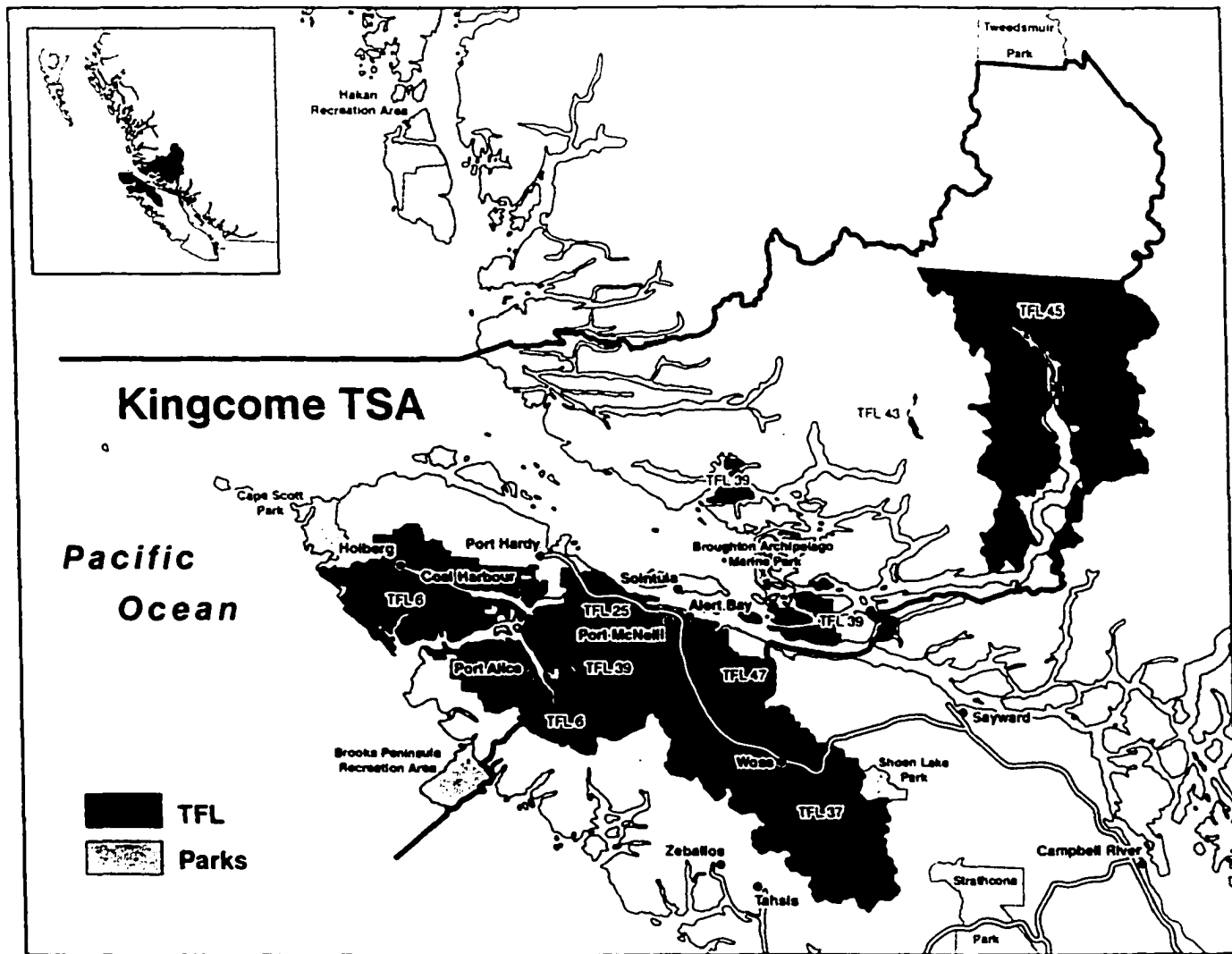
The purpose of this chapter is to develop a methodology for estimating depletion in the Kingcome TSA. Timber information from three Timber Supply Analyses was used, as were two data sets of the Kingcome TSA inventory - 1984 and 1994. Adjustments were made for difference in site index functions using the Ministry of Forests' site class conversion table. The rate of depletion was then estimated.

The Kingcome TSA is an administrative unit of the Vancouver Forest Region, Ministry of Forests. It lies within the Port McNeill Forest District, and is located on northern Vancouver Island, the adjacent mainland, and on small islands between the mainland and Vancouver Island (Figure 5-1). Most of the TSA is on the mainland opposite Port McNeill. Small areas of the TSA lie on the very northern end of Vancouver Island, along the north-east coast of Vancouver Island and on the north-west coast adjacent Brooks Bay. On the mainland, the TSA abuts the Mid coast TSA to the north, the Williams Lake TSA and Tree Farm Licence (TFL) 45 to the east, and Sunshine Coast and Strathcona TSAs to the south. On Vancouver Island, the TSA is adjacent to TFLs 6, 25, 39, and 47 and the Strathcona TSA. Within the TSA's boundaries lie small blocks of TFLs 39 and 43 (MoF, 1995a).

The total area of the TSA is about 1 130 000 ha, of which around 520 000 ha are productive Crown forest. For the following reasons, a significant portion of this productive Crown forest is presently unavailable for timber extraction and management under the timber supply review process. Figure 5-1 shows the location of the TSA with respect to the other major forest tenures.

Figure 5-1: Map of the Kingcome TSA and Adjacent TFLs and Parks

Scale 1:1 175 000



- Inoperability, 17.9%: a classification of the availability of an area for timber exploitation using terrain characteristics as well as the quality and quantity of the area's timber and/or economic reasons;
- environmental sensitivity, 6.3%: a designation of an area with significant non-timber values or fragile or unstable soils or geological features, or where there are serious problems of forest regeneration;
- low site productivity, 2.3%: a measure of the ability of an area to produce biomass. In the data set for the 1995 Timber Supply Review, site indices are based on tree height as a function of stand age. In the 1984 Inventory data set, site indices were based on the volume of wood produced per hectare per year. A low site productivity produced less than 1.5 m³/ha./yr;
- Unmerchantability, 1.0%: stands of trees that are accessible and otherwise available for exploitation but are assumed to be non-merchantable due to characteristics such as small size, amount of decay, species make-up or low number of trees per unit of area.

Therefore about 27.5% or about 143,000 ha of the productive forestland base is not available for timber production because of the reasons listed above.

Topography ranges from rolling terrain with flat valley bottoms found on northern Vancouver Island to the rugged mountains and numerous inlets of the mainland coast portion of the TSA. The timber of the TSA is dominated by hemlock and balsam stands (covering approximately 54% of the timber-harvesting land base) and cedar forests (43%), with small amounts of Douglas-fir and Sitka spruce (3%).

About 15,000 people reside in the Port McNeill Forest District, mainly on or near Vancouver Island. The principal communities and their approximate populations are Port Hardy (5400); Port McNeill (2800); Port Alice (1500); Alert Bay on Cormorant Island (700); and Sointula on Malcolm Island (700). There are 11 First Nations with traditional territories in the Port McNeill Forest District.

Although there are approximately 4000 members associated with these Nations, only half of the membership lives within the forest district.

Economies of the communities within the Port McNeill Forest District are highly dependent on natural resource industries that include forestry, mining, fishing and tourism. The forestry sector provides approximately 36% of the District's employment. Cuttings from the Kingcome TSA represent only approximately 28% of the District's total timber cut. The various Tree Farm Licences (TFLs) are the largest source of cut, logging about 45% of the wood from the District. Timber Licences cut about 24% with the remaining 3% of the wood coming from private forestland.

Approximately 90% of the timber cut in the Kingcome TSA is processed in facilities located outside the Port McNeill Forest District on southern Vancouver Island and the Lower Mainland. Shushartie Log Sales Limited's mill, located in Port Hardy, processes approximately 60 000 m³ annually. Most of this timber is harvested from the TSA. A pulp mill located in Port Alice relies on approximately 45 000 m³ of timber annually from the TSA to provide about 5% of its fibre requirement.

Exploitation History

Logging has occurred in this part of the North Island since the turn of the century. That logging was, for the most part, quite in scale with regeneration and growth and by the middle and late 1970s the area that was to become the Kingcome TSA was still largely undeveloped and uncut. Most of the development that occurred before 1970 occurred on Tree Farm Licences and along the waterways under the general control of a company rather than the forest service.

In the late 1970s this situation began to change. As a result of the Forest Act of 1979, the interim Kingcome TSA was carved out of a number of old Public Sustained Yield Units that had been part of an even older Broughton Provincial Forest. Since the interim Timber Supply Areas were established in the Vancouver

Forest Region there has been an ongoing rationalisation of the land-base. The Kingcome TSA suffered fewer changes than the old Quadra and Nootka TSAs, losing about 7% of its land in the Loughborough Timber Supply Block to the new Strathcona TSA. These changes make it very difficult to get a clear picture of past practices and changes through time on the TSA.

Sustainability and Timber Supply Analysis

The current Timber Supply Review (TSR) predates the present government's move toward sustainability, as it is a result of an internal study completed by Pedersen and Errico (1991). In 1991, their report was presented to Forest Service Executive and they recommended a three-year timber supply review because it was "absolutely critical to get a current view of how forest management practices in British Columbia translate into impacts available timber and allowable cuts" (Pedersen, 1993: 72). Because of its potential impact on allocated cut, the TSR has significant economic implications.

Information required for timber supply analysis is contained in three main categories: land classification, management activity schedules, and yield projection. The land classification system has three basic components: a definition of the land areas to be included in the analysis, an inventory of the timber resources, and assessments of the productivity of each land category unit in which the timber resources are found. Management activity over the last 20 years, for the most part, has been the conversion of the old-growth forest to new managed stands. Yield projection methodology has varied over the years with the Production Forecast Method through the early 1980s when it was replaced by the Ek-Payandeh Volume Ratio System. In the early 1990s the Variable Density Yield Prediction System was developed to replace all earlier versions of the Ministry of Forests natural stand yield prediction systems (Drummond and Bartram, 1993).

There have been three Timber Supply Analyses in Kingcome over the last 20 years and a fourth is in process. The first Analysis was completed in 1980. The

yield prediction process used for the 1980-timber supply analysis was termed the Production Forecast Method. It determined feasible cutting rates for a twenty-year period and predicted the long-term consequences of that rate. The 1980 Analysis removed both low forest sites and broadleaf forest types from the forest inventory as unmerchantable. Based on the analysis, which estimated a timber harvesting land base of 343,406 ha from a productive forest of 552 719 ha, the annual cut was set at 1 700 000 m³. The annual cut was reduced to 1 632 500 m³ in 1987, to reflect the decrease in the land area resulting from the transfer of the Loughborough Supply Block (approximately 85,850 ha) to the Strathcona TSA (MoF, 1990a).

In 1990, after the 1989 Timber Supply Analysis, the annual cut was increased to 1 769 500 m³. Three non-replaceable forest licences were awarded as a result of this increase. One of 112,000 m³ for the harvesting of low-site conifer stands was awarded to Shushartie Log Sales Ltd. Two others for harvesting in broadleaf stands were awarded to Discovery Hardwoods Ltd. (20 000 m³) and Scott Paper Ltd. (5 000 m³/yr). This Timber Supply Analysis used the Ek-Payandeh Volume Ratio system to estimate yield.

The most recent Timber Supply Analysis was completed in 1995, and used the Variable Density Yield Prediction System. A new determination of allowable annual cut by the Chief Forester was released in 1996. The apportionment is presented in Table 5-1.

The comparison of the 1995 condition of the forest resource using the 1980 and 1990 databases is extremely difficult. For example, the initial forest survey was highly fragmented with some effort starting in 1961, others starting in 1966 and others being started in 1969 and 1971. The various timber supply blocks were re-inventoried by aerial photo in 1974 (Peel, 1991). Also, techniques for estimating or measuring volume during the last 15 years have changed along with the methodology for measuring site class.

**Table 5 -1: Kingcome Timber Supply Area Apportionment -
1996**

TFL apportionment for Port McNeill Forest District not included.

Tenure	Cubic Meters	% of AAC
Forest Licences, replaceable (5)	986 689	71.8
Timber sale licences replaceable (2)	10 009	0.7
Small Business Forest Enterprise Program	270 430	19.7
Forest Service Reserve	13 990	1.0
Forest Licences, non-replaceable (low site productivity coniferous)	86 382	6.3
Woodlot licence volume*	6 500	0.5
Total Coniferous	1 374 000	100.0
Forest Licences, non-replaceable (deciduous)	25 000	100
Total Apportionment	1 399 000	

The existing forest inventory has developed over the last 30 years from information collected by photo interpretation and some field sampling. All three Analyses used the same database, which had been up-graded over time to reflect harvesting and other changes to the resource. The objective of the initial inventory was primarily to produce statistics upon which to base the allowable annual cut. Thus, sampling was concentrated in mature coniferous stands. Because many of the forest attributes were sampled remotely from photography, there is a serious

question about the reliability of the data. For example, in a recent audit of some 50 polygons from map sheets of the Kingcome TSA, species percentage was correct 84% of the time and leading species was correct 76% of the time (Lodin, 2000). So 16% of the time the inventory poorly represents the actual distribution of species and 24% of the time the wrong growth model is used to project long-term sustained yield.

Additionally, sampling in second-growth stands really has occurred more as an afterthought of the initial inventory with real progress being made subsequent to the 1995 Timber Supply Review. The present allowable annual cut decision became effective November 1, 1996. Prior to this determination, Kingcome TSA had an AAC of 1,769,500 m³/yr with 1,415,895 m³/yr apportioned to major forest licences. Of the some 1,076,953 ha that made up the non-TFL portion of the study area, only about 552,500 ha were classed as productive forestlands. After the 1996 Timber Supply Review, the allowable cut was partitioned into three components: Conventional, Deciduous, and Low Productivity and set at 1,399,000 m³.

Table 5-2 is a list of the apportioned cut in the Port McNeill Forest District by licensee in 1996. The Tree Farm Licence blocks that are included in the Port McNeill Forest District and this table are Ministry of Forests' estimates of area and volumes.

Table 5.3 lists some of the technical changes in the interpretation of data sets between the 1980 and 1990 Timber Supply Analyses. These changes help explain the difficulties and sources of error in comparing physical values between years on the same area. Much of the interpretation of inventory data is subjective. Further, methods used for computing volume figures have changed several times. These changes tend to obscure forestry-induced changes. While both forecasts are based on the same management assumptions, the same timber

Table 5-2: Land and Allowable Cut by Major Licence - 1996**Port McNeill District**

Licensee (m ³)	Licence	Land Area (Ha)	Volume (m ³)	AAC (m ³)
Interfor	FL A19238	31,787	16,529,307	727,924
	TFL 45	40,590	23,901,520	209,920
Western	FL A19240	3,071	2,150,733	83,981
	TFL 6	143,818	82,345,700	1,464,264
Canfor	TFL 37	134,561	74,188,960	1,024,816
Weyerhaeuser	TFL 39:2-4	152,252	not known	1,251,000
	FL A19244	4,010	2,492,577	66,698
TimberWest	TFL47: 1,17	40,296	not known	260,000
Richmond Plywood	FL A19243	1,482	1,047,366	54,293
Mill & Timber	FL A19242	2,789	1,313,236	53,773
TOTAL		554,656		5,196,669

supply objectives and similar forest-planning models, the critical differences in how volume was calculated and presented reduces confidence in the results of any comparison.

The original forecast (1980) was used to set the 1980 AAC and was the database for the 1984 Forest and Range Analysis prepared by the Ministry of Forests under provisions of the Forest Act of 1980. The other forecast was based on the data set for the 1990 AAC recommendation. The same inventory database, except for updates, projection and changes to yield projection is used in both data sets (MoF, 1990a: 29).

Table 5-3: Comparison of the 1980 and 1990 Data Sets

(Adapted from Table 5, MoF, 1990a: 30)

DATA ASSUMPTIONS	1980	1990
Allowable Annual Cut	1,700,000 m ³ /Year	1,744,500 m ³ /Year
Inventory		
Updates for depletion to	1979	1986
Projection for growth to	N/A	1989
Inventory Methodology:		
Site index curves and site classification	Forest Service	Bruce for Douglas-fir; Wiley for hemlock, cedar, and balsam fir; Forest Service for other species
Volume estimations and yield projections	Average Volume Lines/Volume Over Age Curves	Ek-Payandeh/Volume Ratio method
Planning Methodology	Yield Production Forecast Method	Timber Supply Analysis System (TSAS)
Analysis Results		
TSA Total Land Base	1,233,400 ha	1,147,747 ha
Operable Land Base	354,260 ha	288,080 ha
Inventory Volume	167,590,000 m ³	136,480,000 m ³
Average Yield over 200 year planning horizon	1,584,800 m ³ /year	1,237,900 m ³ /year
Long Run Sustained Yield with 9,000 m ³ /Year unsalvaged losses	1,456,900 m ³ /year	1,075,800 m ³ /year

In the 1990 Analysis, the Ek-Payandeh Volume Ratio System was used instead of the Production Forecast Method. By 1993, the Ministry of Forests had identified serious difficulties and errors in the use of Ek-Payandeh method on the coast (Drummond and Bartram, 1993). Comparison of standing inventory

volumes in the Midcoast and Queen Charlotte TSAs indicated that Ek-Payandeh overstated TSA volumes by 15% in mature and 7% in immature on the Midcoast and 11% in mature and -3% in immature on the Queen Charlotte. In comparing projected inventory volumes, Drummond and Bartram found that Ek-Payandeh overstated volume projections on the Midcoast TSA by 14% in mature and 6% in immature timber.

As already noted, the boundaries of the TSA were changed in the period between analyses and resulted in a 7% decrease in land area. The reduction in area along with updates for depletion and new inventory methodology resulted in a 19% decrease in operable land area and a 19% decrease in total volume. Average volume per hectare fell from 136 m³/ha in 1980 to 119 m³/ha in 1990.

Rate of Use: 1980-1990

During the period 1982 to 1989, approximately 12,072,237 m³ of old-growth forest was cut from the TSA (MoF, 1990b). Since this is only slightly (3%) less than the allowable cut for this period, licensees appeared to be meeting cut control guidelines. Table 5-4 is a presentation of species, age class and site class in hectares from the two Timber Supply Analyses conducted by the Ministry of Forests described above.

During the 1980 to 1990 period the TSA area shrank by 49 242 productive ha or about 9%. This is a little more than the 7% loss associated with the transfer of the Loughborough Supply Block from the Kingcome TSA. Surprisingly, hectareage in the Good and Medium site classes increased by 5 835 (12%) and 2,391 (1%) hectares, respectively. This increase is probably the result of the application of Wiley's (1978) "new" site index curves for cedar and hemlock. In the 1980 Analysis, Forest Service site index curves rather than Wiley's site index had been applied to both these species.

More surprising, after cutting the TSA for 10 years, percent area in good, medium and poor 1-60 year age class went from 15.8% in 1980 to 14.6% in 1990.

Table 5-4: Comparison of Two Data Sets in Study Area¹

Hectares by Leading Species, Age and Site

SITE CLASS: GOOD

AGE (Years):	(1-60)		(61-120)		(121-251+)		Total	
Species	1980	1990	1980	1990	1980	1990	1980	1990
Fir	374	754	312	0	20	114	706	868
Cedar	255	506	283	12	421	1566	959	2084
Hemlock	2835	5308	3885	2443	7139	9905	13859	17656
Balsam	43	123	0	4	637	636	680	763
Spruce	257	497	183	123	787	897	1227	1517
Other	139	906	2654	1813	215	669	3008	3388
Total	3903	8094	7317	4395	9219	13787	20439	26276

SITE CLASS: MEDIUM

AGE (Years):	(1-60)		(61-120)		(121-251+)		Total	
Species	1980	1990	1980	1990	1980	1990	1980	1990
Fir	2909	921	2836	740	3205	2723	8950	4384
Cedar	3833	4296	628	365	33663	57923	38124	62584
Hemlock	24474	19201	14116	9695	62608	58451	101198	87347
Balsam	413	192	590	407	5191	5619	6194	6218
Spruce	1560	1366	323	232	1413	1293	3296	2891
Other	4215	2801	4890	3517	2315	1831	11420	8149
Total	37404	28777	23383	14956	108395	127840	169182	171573

¹ Ministry of Forests, 1980 and 1990. "Kingcome TSA No. 33 Report", Inventory Branch, MoF, Victoria, BC

Table 5-4: Continued**SITE CLASS: POOR**

Species	AGE (Years): (1-60)		(61-120)		(121-251+)		Total	
	1980	1990	1980	1990	1980	1990	1980	1990
Fir	799	2168	2945	2357	5212	4360	8956	8885
Cedar	5188	6067	841	1012	149863	121504	155892	128583
Hemlock	17589	9651	4760	4446	48062	38700	70411	52797
Balsam	533	359	1178	1182	8349	7737	10060	9278
Spruce	606	333	6	19	605	581	1217	933
Other	4822	4674	7354	6855	725	741	12901	12270
Total	29537	23252	17084	15871	212816	173624	259437	212746

SITE CLASS: ALL

Species	AGE (Years): (1-60)		(61-120)		(121-251+)		Total	
	1980	1990	1980	1990	1980	1990	1980	1990
Fir	4082	3843	6093	3097	8437	7197	18612	14137
Cedar	9276	10869	1752	1389	183947	180993	194975	193251
Hemlock	44898	34160	22761	16584	117809	107056	185468	157800
Balsam	989	674	1768	1593	14177	13992	16934	16259
Spruce	2423	2196	512	374	2805	2771	5740	5341
Other	9176	8381	14898	12185	3255	3241	27329	23807
Total	70844	60123	47784	35222	330029	315241	449058	410595

SITE CLASS: LOW**TOTAL STUDY AREA:**

109784 **99004**
558842 **509599**

In the 61-120-age class, the percent of area went from 10.6% in 1980 to 8.6% in 1990. This apparent increase was especially evident in the 121-251+-age class. In 1980 73.5% of the area was in this age-class. By 1990 good, medium and poor land area in this age-class had increased to 76.8% of the productive land base. After harvesting the TSA for 10 years, the area apparently in second growth declined while the area in mature timber increased. This just does not make sense.

Species, Site Class and Area

Thus, the summary information in Table 5-4 seems counter-intuitive. Table 5-5a and 5-5b were developed to compare data used for all three different Timber Supply Analyses in the Kingcome TSA. Site Class is not separated as a distinct category in this table because site class was determined differently for the 1995 data set. In order to compare the magnitude of change, the data sets are also presented in unit value in Table 5-5b.

The data in Table 5-5a and 5-5b suggest there may be some serious errors built into the 1990 data set. In Table 5-5b the 1980 and 1995 data sets for percent area appear to be reasonable in that the relative amount of immature forested area is increasing while the relative amount of area in mature is decreasing.

After 1990, the Ministry changed the method for presenting site class. Instead of volume of a species grown on a per hectare basis, site class was then defined as the height of a tree at fifty years of age.

The actual TSA cut in 1990 was 788 048 m³ from 1 158 hectares for an average cut of 680.5 m³/ha. Indeed, the volume per unit area of cut has consistently been much higher than the average volume per hectare in the TSA's productive forest. The fact that the volume cut per unit of area continually exceeds the average volume per unit of residual forest may suggest why many licensees are beginning to have difficulty in meeting their AAC targets. For example, during the period 1992 to 1994, there was a continual under-cut in the

Table 5-5a: Comparison of Species and Age Class Area Distribution (Ha)

Age	1-60 Years			61-120 Years			121-250+ Years			Total		
	1980	1990	1995	1980	1990	1995	1980	1990	1995	1980	1990	1995
Fir	4134	4336	1997	6595	3301	3248	8543	7303	7392	19272	14940	12637
Cedar	9418	12361	24070	2215	2063	2557	273365	259702	272972	284998	274126	299599
Hemlock	45306	36277	53281	25077	19125	27775	128515	114870	105746	198898	170272	186801
Balsam	989	730	1590	2089	1874	2044	16847	15760	15670	19925	18364	19303
Spruce	2423	2232	2896	515	377	692	2853	2818	3430	5791	5427	7018
Other	9389	8636	7310	15530	12550	14757	5312	5284	4997	29958	26470	27064
Total	71659	64572	91144	52021	39290	51073	435435	405737	410207	558842	509599	552422

Table 5-5b: Unit Value Area Comparison of Species Composition and Age

Age	1-60 Years			61-120 Years			121-250+ Years			Total		
	1980	1990	1995	1980	1990	1995	1980	1990	1995	1980	1990	1995
Fir	0.74%	0.85%	0.36%	1.18%	0.65%	0.59%	1.53%	1.43%	1.34%	3.45%	2.93%	2.29%
Cedar	1.69%	2.43%	4.36%	0.40%	0.40%	0.46%	48.92%	50.96%	49.41%	51.00%	53.79%	54.23%
Hemlock	8.11%	7.12%	9.64%	4.49%	3.75%	5.03%	23.00%	22.54%	19.14%	35.59%	33.41%	33.81%
Balsam	0.18%	0.14%	0.29%	0.37%	0.37%	0.37%	3.01%	3.09%	2.84%	3.57%	3.60%	3.49%
Spruce	0.43%	0.44%	0.52%	0.09%	0.07%	0.13%	0.51%	0.55%	0.62%	1.04%	1.06%	1.27%
Other	1.68%	1.69%	1.32%	2.78%	2.46%	2.67%	0.95%	1.04%	0.90%	5.36%	5.19%	4.90%
Total	12.82%	12.67%	16.50%	9.31%	7.71%	9.25%	77.92%	79.62%	74.26%	100%	100%	100%

AAC of the Kingcome TSA. In 1992, licensees cut 73% of their AAC; in 1993, 86%; and in 1994, 83%. The degree of undercutting has been substantially greater in the Small Business Forest Enterprise Program (SBFEP) than for the major licensees. On the average, the SBFEP annual harvest has been about 221 000 m³ or about 65% of its AAC (MoF, 1995a).

Table 5-6 was constructed with the aid of Ministry of Forests Research Branch's Site Class Conversion Table to assist in the comparison of different inventory databases using different definitions of site class (Nigh, 1999).

Leading Species	Low	Poor	Medium	Good
Fir	7	18	27	32
Cedar	6	15	23	29
Hemlock	5	14	22	28
Balsam	5	14	23	29
Spruce	4	11	21	28
Other Conifer	4	11	16	20
Deciduous	4	12	20	27

*Site Class in 1995 is the expected height (meters) of a dominant tree in 50 years. Site Class in 1980 was a productivity gradient of the site in m³/ha/yr. Good = 8.46 m³/ha/yr; Medium = 6.02 m³/ha/yr; Poor = 2.94 m³/ha/yr; and, Low = 1.26 m³/ha/yr. (Addison, 1985).

Volume

Volume for a particular TSA depends on a combination of species, ages, site classes, stocking levels, and crown closure. Volume and diameter are predicted using age, height and crown closure or basal area. Crown closure is estimated from the air while basal area is measured on the ground. To project height over age, site indices for the various species are used. All site indices now used are referenced on breast height at age 50. As explained earlier, the 1990 Timber Supply Review used Ek-Payandeh, which is not responsive to crown closure. Nor was the Ek-Payandeh model responsive to species mixtures. Ek-Payandeh

Table 5-7a: Volume Comparison by Species and Age Class Distribution ('000 m³)												
Age	1-60 Years			61-120 Years			121-251+ Years			Totals		
Species	1980	1990	1995	1980	1990	1995	1980	1990	1995	1980	1990	1995
Fir	101	324	26	2045	973	1246	2742	3768	3714	4888	5065	4986
Cedar	103	860	944	733	486	574	117406	128974	126795	118242	130320	128313
Hemlock	3870	3623	5523	10295	6969	13573	50197	76955	69560	64362	87547	88656
Balsam	10	17	57	606	458	652	9345	8763	8502	9960	9238	9211
Spruce	6	30	68	223	219	447	1350	2318	2853	1578	2567	3368
Other	1204	1173	1331	1801	1717	1358	824	930	1163	3828	3820	3852
Totals (m3)	5293	6027	7949	15703	10822	17850	181862	221708	212587	202859	238557	238386
Area (Ha)	71659	64572	91144	52021	39290	51073	435435	405737	410207	558842	509599	552422
m³/ha	73.86	93.34	87.21	301.86	275.44	349.5	417.6	546.43	518.24	363	468.13	431.53

Table 5-7b: Unit Value Volume Comparison by Species Composition and Age ('000m³)												
Age	1-60 Years			61-120 Years			121-251+ Years			Totals		
Species	1980	1990	1995	1980	1990	1995	1980	1990	1995	1980	1990	1995
Fir	0.0%	0.1%	0.0%	1.0%	.4%	0.5%	1.4%	1.6%	1.6%	2.4%	2.1%	2.1%
Cedar	0.1%	0.4%	0.4%	.4%	.2%	0.2%	57.9%	54.1%	53.2%	58.3%	54.6%	53.8%
Hemlock	1.9%	1.5%	2.3%	5.1%	2.9%	5.7%	27.6%	32.3%	29.2%	31.7%	36.7%	37.2%
Balsam	0.0%	0.0%	0.0%	0.3%	0.2%	0.3%	4.6%	3.7%	3.6%	4.9%	3.9%	3.9%
Spruce	0.0%	0.0%	0.0%	0.1%	0.1%	0.2%	0.7%	1.0%	1.2%	0.8%	1.1%	1.4%
Other	0.6%	0.5%	0.6%	0.9%	0.7%	0.6%	0.4%	0.4%	0.5%	1.9%	1.6%	1.6%
Total	2.6%	2.5%	3.3%	7.7%	4.5%	7.5%	89.6%	92.9%	89.2%	100%	100.0%	100.0%

predicts the same gross volumes for mature stands of Douglas-fir (55%) and Red cedar (45%) as those composed Douglas-fir (80%) and Red cedar (20%). In other words, Ek-Payandeh over-estimates gross volumes. In the Mid-coast TSA, adjoining the Kingcome in the north, Ek-Payandeh over-estimated immature volume by 6% and mature volume by 14% when compared to Variable Density Yield Prediction now used by the Ministry to estimate volume (Drummond and Bartram, 1993).

Table 5-7a compares the three data sets on a volume basis without any compensation for the over-estimation of volume associated with Ek-Payandeh. Table 5-7b is the unit value of the same information presented in Table 5-7a. The data in Table 5-7a suggest that average volume in the 121 -251+ age-class increased to 546 m³/ha in 1990 from 418 in 1980. By 1995, it had fallen to 518 m³/ha. This volume increase is an indication of the level of amplification caused by the methodology in calculating volume and the application of Ek-Payandeh but does not account for the increases in volume after 1980.

The Ministry of Forests converted from Ek-Payandeh to Variable Density Yield Prediction to determine the volume of mature forest stands in 1993. It also converted to the Table Interpolation Program for Stand Yields to determine volumes on immature or managed stands (Mitchell and Grout, 1995). The programs are constantly updated and produce a far more reliable product than was possible using the Forest Service Yield Tables in the early 1980s.

Table 5-8 is a presentation of the 121-250+-age class and totals of all age classes. It illustrates some the impacts of the change in the way volume is determined. For example in hemlock, in 1980, 35.6% of the productive forest area held 31.7 % of the volume. By 1995, 33.8% of the area held 37.2% of the volume. The data suggest a 1.8% reduction in area is associated with 5.5% increase in volume. This result is counter to sensitivity analyses completed for the coast during the Timber Supply Review 1993 - 1996. These analyses

established a direct relationship between area and volume. A 1.8% reduction in area should result in about a 1.8% reduction in volume (MoF, 1990a: 31).

Table 5-8: Comparison by Age Class of Area and Volume						
Kingcome TSA						
121-250+ Age Class						
	Area (% Total)			Volume (% Total)		
Species	1980	1990	1995	1980	1990	1995
Fir	1.53%	1.43%	1.34%	1.20%	1.60%	1.60%
Cedar	48.92%	50.96%	49.41%	53.00%	54.10%	53.20%
Hemlock	23.00%	22.54%	19.14%	22.60%	32.30%	29.20%
Balsam	3.01%	3.09%	2.84%	4.20%	3.70%	3.60%
Spruce	0.51%	0.55%	0.62%	0.60%	1.00%	1.20%
Other	0.95%	1.04%	0.90%	0.40%	0.40%	0.50%
Total	77.92%	79.62%	74.26%	82.00%	92.90%	89.20%
Totals for all Age Classes						
	Area (% Total)			Volume (% Total)		
Species	1980	1990	1995	1980	1990	1995
Fir	3.45%	2.93%	2.29%	2.40%	2.10%	2.10%
Cedar	51.00%	53.79%	54.23%	58.30%	54.60%	53.80%
Hemlock	35.59%	33.41%	33.81%	31.70%	36.70%	37.20%
Balsam	3.57%	3.60%	3.49%	4.90%	3.90%	3.90%
Spruce	1.04%	1.06%	1.27%	0.80%	1.10%	1.40%
Other	5.36%	5.19%	4.90%	1.90%	1.60%	1.60%
Total	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Further, it has already been established that the areas harvested in the TSA had a higher average volume per hectare than that found in the uncut areas of the TSA. Intuitively then, it would be expected that the average volume per hectare in the residual stands over the 15-year period would have declined. Yet the data presented in Table 5-9 suggest that volume per hectare in mature stands actually

increased. Again, this is a reflection of the improvement in technology over the years, not that the mature volume suddenly appeared.

Prime timber is in age class 121 - 250. Over-mature and decadent timber falls into the 251+ class. This is illustrated in Table 5-9 where average volume in the 121-250 age class was 578.31 m³/ha while in the 251+ age class the average was 444.84 m³/ha in 1980. A similar difference is observed in 1990. The prime timberland composed almost 15% of a larger area in 1980.

Table 5-9: 121-251+ Year Timber Volume ('000 Cubic Meters)						
BY SITE AND AGE						
AGE (YEARS)	(121 - 251)		(251+)		TOTAL	
Site Class	1980	1990	1980	1990	1980	1990
GOOD ('000 m³)	1666.8	2568	6762.5	11559	8429.3	14127
Ha:	1914	3125	7305	10662	9219	13787
m ³ /ha	870.8	821.7	925.7	1084.1	914.3	1024.7
MEDM ('000 m³)	29977.6	26878	47713.1	77453	111459	104331
Ha:	38772	36072	69623	91769	108395	127841
m ³ /ha	773.2	745.1	685.3	844.0	1028.3	816.1
POOR ('000 m³)	15536.9	13053	87314.6	74942	105720	87995
Ha:	34508	29524	178308	144098	212816	173622
m ³ /ha	450.2	442.1	489.7	520.1	496.8	506.8
LOW ('000 m³)	497.2	919	15234.1	14338	15296	15257
Ha:	7250	5790	97755	84695	105005	90485
m ³ /ha	68.6	158.7	155.8	169.3	145.7	168.6
TOT'LS ('000 m³)	47678.5	43418	157024	178292	240904	221710
Ha:	82444	74511	352991	331224	435435	405735
m ³ /ha	578.31	582.71	444.84	538.28	553.25	546.44

The area in prime timber dropped 2% to 13% by 1990. On the other hand, over-mature and decadent timber had increased from 82% of the volume in 1980 to almost 93% of the volume in 1990. The information in the tables suggests that

between 1980 and 1990 the quality of natural forest in an economic sense had declined. Yet, to quantitatively compare between years, compensation for the differences in the manner of volume calculation is required. Further, an adjustment ought to be made to compensate for the over-estimation in volume by Ek-Payandeh System.

Another Approach

An obvious way around this problem is not to use the Timber Supply Analyses data, which seem misleading any way. Inventory reports were appended to the 1984 and 1994 Ministry of Forests' Forest and Range Resource Analyses, reports required by the Forest Act. The information in Table 5-6 can be used to convert the 1994 inventory site classes to the 1984 site class system for comparative purposes.

There is error in the approach. For example, in constructing the tables, it is assumed that both volume and area are distributed evenly across the site class gradients. Also, instead of Forest Service yield tables, the 1994 Inventory used the Variable Density Yield Projection for mature stands and Table Interpolation Program for Stand Yields for immature forests. The 1994 method produces a better estimate of volume than the 1984 methodology.

Table 5-10 presents a comparison of the 1984 and 1994 of the Forest and Range Resource Analyses. The table begins to lend order to the confusion caused by using the timber supply analyses data bases. The table indicates that mature volume reported had increased 7.9 million m³ in 1994 over 1984 values. It also indicates that there was 7.2 million m³ less in 1994 on good site classes and 37.9 million m³ less in medium site classes than in 1984. Further, in 1994 there was 34.8 million m³ more mature timber in poor site classes than 1984. Of course, unless it held red cedar, low sites were not considered in 1984. Thus, low sites contributed another 18.2 million m³ to the 1994 report not identified in 1984.

Table 5-10: Comparison of Kingcome TSA Forest Volumes between 1984 and 1994

Source: Background Report Volume 1, 1984 Forest and Range Resource Analysis and
<http://www.for.gov.bc.ca/resinv/reports/esr.lac\tsa\coa\COAAF.B.HTM>

Site Class	1984 Volume ('000 m ³)				1994 Volume ('000 m ³)				Difference		
	Good	Medium	Poor	Low	Good	Medium	Poor	Low			
Species											
Fir Imm	213.7	1278.3	613	41.2	2146.2	74	1038	131	28	1271	-875.2
Mat	16.1	1622.1	1559.7	13.6	3211.5	67	2844	785	17	3713	501.5
Cedar Imm	193	381	258	13	845	405	712	380.5	20.5	1518	673
Mat	423	27014	74251	15718	117406	0	12662.5	88898.5	25232	126793	9387
Hemlock Imm	4021	8658	1487	0	14166	6722	10605	1623.5	144.5	19095	4929
Mat	7214	42985	22651	0	72850	215	21863	40317.5	7164.5	69560	-3290
Balsam Imm	0	274	341	0	615	7	343	358	1	709	94
Mat	690	4394	4261	0	9345	3	1558	6768	173	8502	-843
Spruce Imm	0	226	2	0	228	230	267	17	2	516	288
Mat	0	1069	281	0	1350	793	393	477	1190	2853	1503
O.Con Imm	14	123	43	0	180	0	192	55	0	1271	1091
Mat	332	347	578	0	1257	0	324	1204	176	1704	447
Decid Imm	325	1376	749	0	2450	8293	15105	2597	4	25999	23549
Mat	35	446	30	0	511	404	335	10	0	749	238
TOTAL Imm	4766.7	12316.3	3493	54.2	20630.2	15731	28262	5162	200	50379	29748.8
TOTAL Mat	8710.1	77877.1	103611.7	15731.6	205930.5	1482	39979.5	138460	33952.5	213874	7943.5
TOTAL					226560.7					264253	37692.3
Difference in Mature between 1984 and 1994						-7228.1	-37897.6	34848.3	18220.9		

There is probably some refinement between medium and poor sites between the two inventory reports. In other words, there is 37.9 million m³ less in medium site class in 1994 than 1984 while there is 34.8 million m³ more in volume in the 1994 poor site class than 1984. There is 18.2 million m³ more mature timber in the low site class in 1994 than 1984.

Table 5-11: Kingcome TSA by Site Class, 1984 and 1994 (Ha)					
Source: Background Report Volume 1, 1984 <u>Forest and Range Resource Analysis</u> and http://www.for.gov.bc.ca/resinv/reports/esr.lac\tsa\coa\COAAFB.HTM					
		1984 Ha		1994 Ha	
		Ratio (I/M)		Ratio (I/M)	
Good	Imm	11220	1.22	19975	8.99
	Mature	9219		2222	
	Subtotal	20439		22197	
Medium	Imm	60787	0.56	74153.5	1.53
	Mature	108395		48576.5	
	Subtotal	169182		122730	
Poor	Imm	46621	0.22	33325	0.13
	Mature	212816		260711.5	
	Subtotal	259437		294036.5	
Low	Imm	4779	0.046	5564.5	0.05
	Mature	105005		107894	
	Subtotal	109784		113458.5	
Tot'l Mature		452004		459817	
Total		558842		552422	

Table 5-11 compares the area of the two inventory reports in the various site classes between 1984 and 1994. Examining the ratio of immature area to mature forested area, the good site classes were heavily cut. The medium was also cut quite rapidly with some its area probably being reclassified as poor site class.

Almost 88% of the remaining mature timber is on the poor and low sites classes. In 1984, 73% of the mature timber was on these site classes.

Table 5-10 indicates that over half of the immature on good and medium sites is now stocked with deciduous species. In 1994, average Vancouver Log Market price for alder was \$41.40 / m³; for maple, price was \$41.80 / m³; and for cottonwood it was \$39.00 / m³. On the other hand, for hemlock it was \$90.30 / m³; for cedar average price was \$89.00 / m³ and for fir it was \$151.90 / m³. These values suggest that the forest resource, especially on good and medium sites, is being used a greater rate and the forest on these higher site classes is being replaced by species that are different and will have less value than the first forest.

Valuation

To compare the economic impacts of the various changes in the physical state of the Kingcome forest, the effects of inflation should be separated from improvement in price. Statistics Canada Catalogue Number 62-011 estimates the effects of inflation on the woods products industry and produces a woods products index.

Statistics Canada Wood Industries Selling Price Indexes indicate that the year ending January 1, 1980, (1979) product was worth 17.5% more in the woods products industry than the year ending January 1, 1990 (1989). The adjusted Vancouver Log Market Price of all species of logs sold was \$72.40 / m³ in 1979. Logs would have been expected to sell for \$85.07 in 1989 to keep pace with the same value contributed by the log to 1979 buyers; but in 1989, they sold for \$78.41 / m³. By 1995, if the indexed price shadowed market price, it should have been \$113.53 / m³. Instead, the average price for logs was \$90.45 / m³ in 1989 Wood Industries Indexed dollars. The 1989 adjusted price of fir of all grades was \$85.96 / m³ while the price of hemlock increased to \$60.50 / m³ over the period.

Table 5-12: Comparative Timber Value

(1986 = 100)

Source: Statistics Canada Cat. No. 62-011 and previous tables

Species	1984					1994				
	Volume '000m ³	Value 1984 \$/m ³	Index Factor	Value 1986 \$/m ³	Total Value '000 1986 \$	Volume '000 m ³	Value 1994 \$/m ³	Index Factor	Value 1986 \$/m ³	Total Value '000 1986 \$
Fir	3197.9	47.01	1.16	54.53	\$ 174,386.60	3696	151.90	0.552	\$ 83.85	\$ 309,905.16
Cedar	101688	57.84	1.16	67.09	\$ 6,822,695.35	101561	89.00	0.552	\$ 49.13	\$ 4,989,488.81
Hemlock	72850	32.9	1.16	38.16	\$ 2,780,247.40	62396	90.30	0.552	\$ 49.85	\$ 3,110,141.13
Balsam	9345	39.45	1.16	45.76	\$ 427,645.89	8329	90.30	0.552	\$ 49.85	\$ 415,164.00
Spruce	1350	70.02	1.16	81.22	\$ 109,651.32	1663	188.40	0.552	\$104.00	\$ 172,946.68
O.Con	1257	20.85	1.16	24.19	\$ 30,401.80	1528	58.40	0.552	\$ 32.24	\$ 49,257.83
Decid	511	1.25	1.1	1.45	\$ 740.95	749	41.04	0.552	\$ 22.65	\$ 16,967.91
Value					\$ 10,345,769.31					\$ 9,063,871.52
Difference										\$1,281,897.79

Table 5-12 is a comparison of the species values of mature timber in good, medium and poor site classes in the Kingcome TSA between the years 1984 and 1994. It is presented in 1986 \$. The low site class is not included in the table.

In terms of 1986 dollars, Kingcome TSA is estimated to be worth **\$1.3 billion** less in 1994 than in 1984. This conservative estimate of annual depletion over the 10-year period is about \$130 million. It is conservative in that the 1994 inventory report used Variable Density Yield Projection to model volume and these are superior to the Forest Service Yield Tables used to develop the 1984 inventory report. Further, the \$130 million annual depletion factor is in unadjusted Vancouver Log Market prices argued earlier to be underestimating market value by about 20%. Thus, a conservative adjusted annual depletion rate for the Kingcome TSA is estimated to be about \$156 million.

Income

In 1995, the Economics and Trade Branch of the Ministry of Forests released the socio-economic analysis of the Kingcome Timber Supply Area (Fitzgibbon *et al.*, 1995). This study used the information that is presented in Table 5-13 for calculating local, provincial, and federal income and revenue for the year 1994.

In 1994 only \$13 667 400 of a total potential provincial income of \$179 694 000 in forest wealth was captured from timber management in the Kingcome TSA. Of course, both the federal and provincial government taxed that \$13.4 million in regional personal income. Fitzgibbon *et al.* (1995) report that the federal government, through personal and corporate taxes, took another \$26 920 per 1,000 m³ cut for a total \$36 072 800 on a cut of about 1 340 000 m³.

Actual direct pre-tax income to the local area was \$9.4 million in 1989 dollars. Annual depletion was estimated to be around \$156 million in 1989 dollars leaving a pre-tax reduction in regional wealth of about \$146.6 million 1989 indexed dollars for the year 1994.

Table 5-13: Provincial Revenue and Income from Kingcome TSASource: Fitzgibbon *et al.*, 1995

Category	Kingcome TSA (PY)s	TSA Wage Level	TSA Income (1994 \$)
Harvesting	206	\$52 300	\$10 773 800.00
Silviculture	12	\$32 000	\$384 000.00
Marine Transport	4	\$50 000	\$200 000.00
Sawmilling	24	\$49 900	\$1 197 600.00
Pulp and Paper	20	\$55 600	\$1 112 000.00
Personal Income to Region from TSA			\$13 667 400.00
Total Provincial Direct/Indirect Income (\$/'000 m³)		Direct: \$52 640	\$70 537 600.00
		Indirect: \$52 780	\$70 725 200.00
BC Provincial Income		@1 340 000 m ³	
BC Personal Income Tax (\$/'000 m ³)		\$12 770	\$17 111 800.00
BC Stumpage, Rent and Fees (\$/'000 m ³)		\$21 140	\$28 327 600.00
Other BC Taxes (\$/'000 m ³)		\$7,540	\$10 103 600.00
Total Provincial Potential Income			\$179,694,000.00
Personal Income to TSA's Regional Economy			\$13 667 400.00
Potential Income Transferred from TSA			\$166,026,600.00

The numbers from the tables imply that current forest extraction policies are not only resulting in the forests of the timber supply area being depleted in a physical sense; they are also resulting in a redistribution of the wealth associated with forest exploitation away from the local forest region. Indeed, the forest condition seems to mirror the process in New Brunswick noted by Reiger and Baskerville (1996). Only in the New Brunswick case, almost 50% of the forests were owned privately. In both the private and public development models then, the results may be the same. The forest resource may not have been developed at all. It may have been run down and possibly ruined by forest exploitation.

The Coastal Situation

The case study of Kingcome TSA suggests that tenure, directly, and pricing policies, indirectly, have caused the TSA to become economically depleted in a cumulative manner at increasing rates during the period 1980 - 1994. Reductions in high-value species, strategic age classes, and under-production on higher site classes have all combined to reduce the over-all value of the forest resource in the TSA. While there is no system of regional accounting currently in place, it also appears that there is little or no accounting for the resulting reduction expected to occur in TSA-dependent communities' potential income over time.

There are other TSAs on the coast and two more on Vancouver Island -- Strathcona and Arrowsmith. Since these TSAs are administered under the same policies as the Kingcome, similar exploitation patterns might be present. Table 5-14 a comparison of two coastal inventories. The database for this inventory is the same as the one used in the Kingcome TSA and was developed in 1994 Analysis (Woods, 1999).

The information presented in Table 5-14 suggests that the productive land base of the coast increased by 145 625 hectares during the period. The majority of this increase seems to be in the 1-120 year Age Class, indicating the reclamation of non-stocked areas.

**Table 5-14: Comparison of Coast Forest Attributes
Stocked Productive Forest Area (Ha)**

Source: Background Report Volume 1, 1984 Forest and Range Resource Analysis and
<http://www.for.gov.bc.ca/resinv/reports/esr.lac\tsa\coa\COAafb.HTM>

Region	PRC	1984		1994		Difference		
		Van	Total Coast	Total Coast				
Area (Ha)	1 672 042	2 837 708	4 509 750		4 655 375	145 625		
Age Class								
1-120	152 679	925 812	1 078 491	23.91%	1 438 236	30.89%	359 745	6.98%
121-250	300 666	548 093	848 759	18.82%	730 432	15.69%	-118 327	-3.13%
250+	1 218 697	1 363 803	2 582 500	57.26%	2 486 707	53.42%	-95 793	-3.85%
							145 625	
Species								
Fir	0	572 772	572 772	12.70%	665 067	14.29%	92 295	1.59%
Cedar	505 359	787 996	1 293 355	28.68%	1 317 507	28.30%	24 152	-0.38%
Hemlock	771 830	991 643	1 763 473	39.10%	1 825 407	39.21%	61 934	0.11%
Balsam	249 791	294 320	544 111	12.07%	429 741	9.23%	-114 370	-2.83%
Spruce	74 777	43 371	118 148	2.62%	120 267	9.13%	2 119	-0.04%
Pine	42 201	57 029	99 230	2.20%	77 020	1.65%	-22 210	-0.55%
Decid	28 084	90 577	118 661	2.63%	220 366	4.73%	101 705	2.10%
Total	1 672 042	2 837 708	4 509 750		4 655 375		145 625	

The 121-250 year Age Class that was 848 759 hectares or about 19% in 1984 was reduced 118 327 hectares or 3.13% while the 250+ Age Class of 2 582 500 hectares or about 57% was reduced 95 795 hectares or 3.85%. As in the Kingcome TSA, this fact indicates that the prime timber in the 121-250-year Age Class had been exploited at a rate disproportionate to the amount of area in 250+ Age Class.

These numbers are gross and only suggest some of the changes occurring as a result of the administration of Ministry tenure and pricing policies. They do not take into account administrative withdrawals such as protected areas. Nor do they

take into account changes to the parameters of harvest limits set in the Forest Practices Code Act.

Table 5-15: Comparison of Coast Forest Attributes

Species	Volume in '000 m ³				1994		DIFFERENCE	
	PRC	VANC	Total		COAST			
Fir	0	132406.3	132406.3	7.8%	226678	12.7%	94271.6	4.9%
Cedar	155821.7	330175.3	485997.0	28.7%	475848	26.7%	-10149.0	-2.0%
Hemlock	364060.5	330175.3	694235.9	40.9%	786672	44.1%	92436.1	3.1%
Balsam	168487.7	138587.0	307074.8	18.1%	175028	9.8%	-132046.8	-8.3%
Spruce	34949.4	122770	47226.4	2.8%	61128	3.4%	13901.5	0.6%
O.Conif	5201.0	5313.70	10514.7	0.6%	12870	0.7%	2355.3	0.1%
Decid	2974.7	14953.8	17928.5	1.1%	47277	2.6%	29348.5	1.6%
Total	731495.1	963888.6	1695383.7		1785501		90117.2	
Average Volume (m³/ha)			376		384			

Table 5-15 indicates that the increase in the productive land base has been paralleled by an increase in volume. Because of changes in the way Site Class was presented in 1994, there is some error in directly comparing between inventories even with using the Ministry of Forests site class conversion table. Also, volume is derived from a set of forest attributes for a given area. It has already been argued and shown that in the Kingcome TSA there is a considerable likelihood of error in the determination of these attributes.

Table 5-15 is a presentation of the raw information between the two inventory periods. Table 5-16 was constructed with the aid of Ministry of Forests Research Branch's Site Class Conversion Table in order to visualise changes in forest attributes (Nigh, 1999).

An examination of the change in ratio of immature to mature volume suggests that the value of the coastal forests has been measurably depleted in the last 10 years. For example, the good and medium sites produce the highest quality

sawtimber. In the ten-year period between inventories, the ratio between immature and mature volume on good and medium site classes has increased more than five-fold. This suggests exploitation at the coastal scale has started from the highest site classes and worked its way down to the lower sites. The ratios in the poor and low site classes reflect very little change from the 1984 inventory. The mature volume as a percent of total volume by site class supports the "highgrading" view.

1984 Site Class	Low	Poor	Medium	Good
1994 Site Class* Height (m)	0-7.4	7.5-12.4 12.5-17.4	17.5-22.4 22.5-27.4	27.5-32.4 32.5+
1984 Area Ratio (Immature/Mature)	0.37	.248	0.610	1.041
1994 Area Ratio (Immature/Mature)	0.111	.243	6.183	13.317
1984 Mature Volume as a % of Total	4.98	48.12	35.63	3.01
1994 Mature Volume as a % of Total	3.02	64.89	25.29	6.8

*Site Class is the expected height (meters) of a dominant tree in 50 years.

In 1984, about 53% of the mature volumes were in site classes poor and low. By 1994, 68% of the total mature volumes on the coast were in low and poor site classes. The 1994 inventory also indicates that there was another 132,289 hectares of potentially productive forestland not stocked.

Thus, a number of similarities between the coastal timber supply areas and the Kingcome TSA begin to emerge from the data:

- Good and medium sites are logged at a rate much higher than would be expected from the distribution of site classes.
- Species of higher economic value are being replaced by species of lower value.

To 1994, these similarities suggest the universal nature of the forest depletion problem on the coast.

Conclusions

Historically, arrangements guiding tenure, pricing and forest resource processing in British Columbia were framed on other than economic foundations (Roach, 1984). Indeed, early designers of provincial forest policy felt that scientific and technical principles applied to resource development by public-spirited professionals would lead to policies and practices that would be in the general public interest far more frequently than competitive markets and undirected economic development. While a case can be made that this may well have been the case prior to the establishment of the Ministry of Forests in 1979, since its creation the economic value of coastal forest has been measurably depleted.

A very disconcerting issue is that the physical information required for the analysis of even basic timber harvesting and growing decisions is not adequate. The types of information necessary for integrated sustainable resource management in the province are simply not there. Neither the provincial nor the regional portions of British Columbia's economy have the basic resource information in forest growth and yield to employ any rudimentary type of forest resource accounting system. It is becoming increasingly apparent that the physical information on the state of the province's forest is not even adequate to formulate the most mundane of forest management decisions (Peel, 1991).

In comparing inventory information on the Kingcome TSA presented 10 years apart, meaningful insight was gained by holding many variables constant through averaging and indexing. Instead of an apparent growth in volume, the

natural forest had declined in value by some \$1.56 billion (1989 \$) during the period 1984 to 1994. While this figure does not account for the value of the "new" forest, it does begin to account for the shift to lower value species. Also, the figure does not account for the shift to lower grades associated with lower sites. Further, estimated Pacific Rim Log values adjusted for extraction costs were used rather than the Vancouver Log Market prices.

In 1948, J. R. Hicks observed, "If receipts are derived from the exploitation of a wasting asset, liable to give out at some future date, we should say that the receipts are in excess of income, the difference between them being reckoned as an allowance for depreciation" (1948: 187). In Hicksian terms, British Columbia's government's exploitation of the Kingcome TSA's natural forest should be using a "wasting asset" income accounting procedure if it really intended to practice sustainable forest management and to understand the balance between consumption and investment. In the following and concluding chapter, income will be used to approximate depreciation and to begin to account for the regional depletion of the old-growth forest resource.

Chapter 6: An Impending Forest Crisis

"...Soil erosion and human erosion are so closely associated that neither can be studied adequately without the other."

J.L. Hypes, 1944

Like many communities, Canadian governments -- especially the British Columbia provincial government -- are forest dependent. They depend on revenue from the forests in the form of royalty and stumpage but also on taxes from forest companies and from individuals with forest jobs. The resulting income is significant. Table 6-1 presents the estimated revenue from 1994 taxes collected by the federal and provincial governments from three Vancouver Island Timber Supply Areas (TSAs). The estimates are for taxes on direct, indirect and induced personal and corporate income. They include royalty, stumpage and other user fees for the province.

Table 6-1: Estimated Provincial and Federal Income from Taxes, Stumpage and Rent in 1994

Timber Supply Area	Province (1994 \$/m ³)			Federal (1994 \$/m ³)		Total (1994 \$/m ³)
	Personal	Corp	Stumpage	Personal	Corp	
Arrowsmith	10.81	7.57	36.57	21.62	1.38	\$ 77.95
Kingcome	12.77	7.57	21.14	25.54	1.38	\$ 68.40
Strathcona	11.16	5.78	13.81	22.32	1.05	\$ 54.12

Source: Various TSA Socio-economic Analyses, 1994, Timber Supply Branch, Ministry of Forests.

Table 6-2 includes royalty, stumpage and rents for 1994 and presents the total governmental revenue from Vancouver Island TSAs. Thus, in 1994 the estimated total payment to Victoria and Ottawa for the cutting of the forests of three Vancouver Island TSAs was about \$237.7 million with \$143.8 million going to Victoria and \$93.8 million going to Ottawa. The actual cut for King come TSA

in 1994 was about 1.34 million m³ and the total transfer of wealth was somewhat less – a total of \$215.8 million with \$130.6 million going to Victoria and \$85.2 million to Ottawa.

Table 6-2: Total Estimated Federal and Provincial Government Revenue from Three Vancouver Island TSAs in 1994

Timber Supply Area	Province (1994 \$/m ³)			Federal (1994 \$/m ³)		Total ('000 \$)
	AAC ('000 m ³)	Income (\$/m ³)	Value ('000 \$)	Income (\$/m ³)	Value ('000 \$)	
Arrowsmith	417	54.95	22,914.15	23.00	9,591.00	32,505.15
Kingcome	1659	41.48	68,815.32	26.92	44,660.28	113,475.60
Strathcona	1694	30.75	52,090.50	23.37	39,588.78	91,679.28
Total ('000\$)			143,819.97		93,840.06	237,660.03

Source: Various TSA Socio-economic Analyses, 1994, Timber Supply Branch, Ministry of Forests.

For comparison, total expenditures for all Ministry of Forests' wages, services and forestry activities in the Vancouver Region was \$112 million with \$26 million being expended directly on forests (MoF, 1995c). Taxes, stumpage and royalty from these three Vancouver Island TSAs more than compensated the provincial government for all forest expenditures in the Vancouver Region.

Income from the other Vancouver Region's TSAs – Fraser, Queen Charlotte, Midcoast, Soa and Sunshine Coast, had a combined cut of 4.7 million m³ while the Tree Farm Licences in the Vancouver Region had a combined cut of 11.9 million m³ – is not taken into account. Assuming the average revenue from the three Vancouver Island TSAs listed in Table 6-2 is an indication of actual federal and provincial income from the coastal forest then the federal and provincial government received about \$63.04 per m³ of cut. Using this figure, the other Vancouver Region TSAs would have contributed \$296.3 million above the \$215.8 million from the Vancouver Island TSAs to Victoria and Ottawa in 1994. If TFLs

are included in the calculation, another \$750 million per year can be added. Thus, an estimated total of \$1.284 billion transferred from the coastal sub-regional economy to the provincial and national economies in 1994 with \$112 million coming back in as a result of Ministry of Forests' expenditures in the region. A large portion of this "capital flight" is natural wealth associated with the unsustainable exploitation of the older forest.

While stumpage and rents are important sources of revenue, taxes on individual and corporate income are the largest sources of revenue for the two levels of government. The figures presented in Table 6-1 suggest that the two levels of government have different priorities with respect to sustaining this revenue. The province ought to develop policies that favour both jobs and corporate health while the federal government should also be inclined to favour resource jobs. Importantly, both governments ought to be inclined toward sustained-yield forestry if not sustainable forestry. The province as discussed earlier and largely at the expense of the industry, has introduced a host of policies leading toward sustainable forestry. Except for small investment in the model forest program and the South Moresby Replacement Account, which is more about compensation for establishing a protected area, the federal government has been surprisingly quiet in its approach to coastal forest resource management.

Indeed, there has been a provincial emphasis on retraining displaced forest workers as Forest Renewal dollars became available after 1994. Unfortunately, as Reed (1999) argues, while government has added new and supplemented existing programs to support displaced forestry workers, the broader concerns for the sustainability and well-being of rural resource and resource-dependent communities have not yet seriously been considered. Further, the well-being of resource-dependent communities has been linked to company economic health through the timber tenure system (Bradbury, 1977). In spite of industry and

provincial government taking steps to improve efficiencies during the last few years, corporate health in the coastal forest sector has been in steady decline since 1994 (Wouters, 2000). This is causing a serious dislocation of people from resource-based communities.

An indicator of the magnitude of the erosion of social capital occurring in coastal communities is the decline in enrolment in the various coastal school districts. Declines are occurring in districts all located in resource-based areas (Vancouver Sun, 10 July 2000, B4). On the coast, the following school districts have reported declines:

- Vancouver Island West - 20.6%
- Prince Rupert - 11.8%
- Alberni - 7.5%
- Campbell River - 7.4%
- Vancouver Island North - 7.4%

These numbers suggest that there is a migration of families from forest-dependent coastal areas. The Vancouver Island West district includes Gold River and this is probably occurring because of the decline of Pacific Forest Products and the subsequent closure of the pulpmill. Not only is the present working generation leaving the area but they are also taking the next generation with them.

When this observation is coupled with the rate of depletion in forest income potential suggested in the Kingcome TSA case study, it is obvious that resource dependent areas are confronting a serious crisis effecting both the economic and social erosion of their resources and livelihoods. The dislocation and movement of human resources plus the transfer of large amounts of natural forest wealth from the coastal forested regions to Victoria and Ottawa without regard to the impacts on regional wealth can not be viewed as a sustainable economic activity.

Nor can this dislocation of natural and human resources be termed either economically or socially acceptable governance of these resources.

Creating A New Sustainable Reality

The huge proportion of coastal forestland held by the provincial public obligates the forest decision-maker/ manager to consider simultaneously the social and economic consequences of pricing and timber tenure policies along with the competitiveness of the forest sector. It is important that policy makers not only improve the vigor of competition between the companies that hold major licences but improve the well-being of forest-dependent communities in the process. In essence, a forest sector for sustainable development must be created from a forest sector based in the sustained yield of wood products. This means that objectives of forest management must change. The production of fibre, of biodiversity, of old-growth reserves and other ecological and social functions become the means of improving human welfare, which is the real objective of sustainable forestry.

Hampering the movement toward sustainability and balancing local social and economic criteria along with competitiveness of the larger forest sector, decision-makers seem to have developed a false sense of reality with respect to the province's forests. They seem have little idea of the economic costs and the distribution of benefits associated with present pricing and timber tenure arrangements. While there are historical reasons for this, it should be extremely difficult in this age of information for the decision makers to continue to cling to false concepts. Yet, as Carrow (1997: 116) observed, "Those who have a stake in the past usually have great difficulty developing a new vision for the future."

Historically, British Columbia's forest sector was organized around the extraction, manufacturing and marketing of commercial forest products. Timber extraction was very near its apex when the Ministry of Forests was formed in 1980. It has been argued earlier that the Ministry was not designed to manage

the forest to deliver broader economic, social and environmental goals and objectives of sustainable forestry. The Ministry never really attempted to resolve emerging sustainable forest management issues. Rather, it seemed to attempt to devolve responsibility to the private sector through processes like the FMPP in the 1980s and the Forest Practices Code Act in the 1990s. Indeed, only earlier, during World War II did provincial forest-policy makers seriously consider alternatives to top down command and control institutions for delivering public forestry.

Worse, our policy makers today may have adopted their own set of “realities”. These seem to embrace unreal assumptions or supernatural mythologies. They have institutionalized these “realities” in timber tenure and pricing arrangements, through the adoption of the Softwood Lumber Agreement and the Forest Practices Code Act. In negotiating the Softwood Lumber Agreement assumptions like the following have been embroidered in to its basic fabric:

- The economics of sustainable forest management are understood,
- government allocates and manages natural resources more efficiently and effectively than the market, or
- British Columbia’s forest sector’s international competitiveness is dependent on “subsidies” from the public sector.

On the forest practices side, there have been tremendous strides in the understanding of natural systems over the past few decades. However, most of the laws and policies governing forestry are based on old outmoded concepts like sustained-yield or in plausible myths like the balance of nature.

Botkin (1997) explains that the balance of nature myth holds that if undisturbed by human action, natural systems will remain constant. Also, he suggests that society perceives the constant state as most desirable. To manage natural resources under this mythology, very little information is required, nature only needs to be protected from human disturbance and it will eventually

find the correct constant state. Botkin explains that this myth has dominated natural resources management over the past century.

The Forest Practices Code Act is a command-control regulation of the provincial society's relationship with the forest environment (Cassidy, 1994). Not only does the act and its resultant guidebooks tend to embrace the myth of a balance of nature, it also has embedded what Botkin (1997) refers to as "plausibility arguments" into many of its guides. Many of these myths and assumptions are not true and their application can be hazardous to both natural systems and their dependent human community. Botkin presented the example of the popular belief of the dependence of salmon on the ancient forests in Oregon.

Another common belief, according to Botkin, is that, prior to European settlement of the Pacific Northwest, the forests of western Oregon and northern California were essentially all old growth - mature and older forests with very large trees. Also, it is commonly believed that prior to European settlement there was a superabundance of both salmon and ancient forests, therefore, many managers concluded that the continuous, ancient forests provided the proper and necessary habitat for salmon. The removal of these forests then, is the reason for salmon decline.

The US Geological Survey shows forest conditions in 1850, 1890, 1920, and 1940. According to these maps, old growth forests (older than 200 years) covered 40% of the Oregon coast mountain range in 1850, 46% in 1890, 50% in 1920 and only 19% in 1940. Forests older than 100 years covered 62% in 1850 (this included the 200 year class); 52% in 1890; about 70% in 1920; and 50% in 1940. Botkin concluded:

Available evidence suggests that presettlement forests were not a continuous cover of ancient forests. Instead, presettlement land conditions in western Oregon, where it is generally believed salmon were abundant,

appear to have been characterized by 40% of forests older than 200 years and 62% older than 100 years. This also implies that, if there were great abundance of salmon in presettlement times within the area, this superabundance could not have required old-growth forests everywhere (1997: 7).

The study Botkin concluded in Oregon suggested that both forests and salmon undergo change. When human needs are superimposed on natural systems like they are being on the forests of coastal British Columbia, the potential for conflict is enormous. Building the scientific basis for the management of forest resources in an environment undergoing constant change is probably the one most effective way of reducing conflict. Embracing mythology is probably the least effective.

An important component of building the scientific basis of forestry then is the adoption of a paradigm that perceives that not only natural biological systems but dependent human socio-economic systems are undergoing constant change and responding to this change. The idea of sustainable yield of one value -- timber -- is not appropriate to natural systems that are open, in flux, and frequently without stability. Botkin observed that the natural system is affected by a series of often stochastic or random factors, some originating outside of the system itself.

Nor have industrial forestry practices become sustainable. It is very difficult to disguise forestry as practiced in the Kingcome TSA under the rubric of sustainable forest management, so why try? This "hunting and gathering" version of industrial forestry is little more than "forest mining" and currently not perceived by many critics as a valid approach to the use of the public's forested estate (Murray and Bartoszewski, 1998). On the other hand, intensively managed plantations can be forest farming at its best. In New Zealand more than 90% of the forest harvest comes from plantation forestry. As a contrast, in

British Columbia more than 90% of the harvest is derived from naturally occurring timber stands.

By definition, industrial forestry can not be sustainable forest management without building agreement among a constituency of coastal communities in the various dependent areas on the desired future physical and economic condition of the regions' public forests. Without proper information and its presentation that ought to include some form of sub-regional resource accounting procedure, it will be nearly impossible to identify the constituency, obtain its trust and agreement regarding the sustainability of any industrial approach to forestry including integrated forest management.

Clearly, sustainability cannot be achieved by the top-down command and control approach of the Ministry of Forests but only by individuals working on the ground at the local level. Given that a proper reward system for local players is established, this is the level where real sustainability can be defined and made to happen. Yet most, if not all, institutional arrangements governing forest management on the coast and especially those discussed earlier in the dissertation are top-down command and control interventions. This is resulting in a clear lack of public and industrial support for the current forest-management paradigm in British Columbia.

The erosion of public confidence in the Ministry's administration of forest issues seemed to alarm the provincial government into initiating yet another public review of provincial forest policies during the period 1999 - 2000.

British Columbia Public Review of Forest Policy

To facilitate the review the Ministry proposed a set of common principles to start discussions. These were:

- British Columbia will manage its forests in a variety of ways based on a system of Crown lands and tenures.

- Our forests will be biologically, socially and economically sustainable in order to enhance the quality of life for all British Columbians.
- We will preserve our forest heritage, ensuring parks and protected areas maintain British Columbia's Biodiversity.
- We will encourage a globally competitive, dynamic and diverse forest industry that recognizes the needs of other commercial users of the land such as the growing tourism sector.
- By recognizing the full range of forest values, our forests will provide stable jobs and communities.
- We will maximize the value of every tree we cut and plant.
- We will continue to develop an effective and efficient system of forest regulation.
- Forest policies will respect aboriginal rights and encourage an increased role for aboriginal peoples in the working forest (MoF, 1999: 4).

The provincial government had also commissioned a series of papers to encourage public discussion. Collectively titled, Focus on our Forests, the papers formed an adjunct to an extensive program of stakeholder and public consultation that occurred throughout the province. The papers were intended to investigate some of the long-range implications of critical forest policy issues including the following:

- Economic Trends
- Getting More Benefits from British Columbia Forest Lands: The Intensive Zoning Option
- Tenure and Pricing – Issues and Directions
- Non-Timber Forest Resource Values
- Small Scale Forestry -- Enhancing Value-added Manufacturing
- Communities, Jobs and the Forest Sector

The tone of the “principles” and the titles of the background papers suggested a predetermined decision for a continued emphasis on centrally dominated planning for timber extraction in current pricing and timber tenure arrangements under the administration of the Ministry of Forests. It appeared that the application of a politically correct variant of the “agricultural model”

discussed in Chapter 4 would continue to be the direction of public forest management after the public review.

Jobs and Timber Accord Advocate Garry Wouters was commissioned to complete the study. He engaged in an extensive consultation process in which more than 1,400 residents participated. He released his report, Shaping Our Future, in March of 2000. To Wouters' credit, he made many specific recommendations, some quite urgent in nature and others that could be implemented immediately. Wouter's report's recommendations were centered on four themes. These were:

1. Certainty on the land;
2. A globally competitive, dynamic and diverse industry;
3. Workers and communities; and
4. Government.

Wouters observed that "Too many agencies are involved in managing our forest resource. We need to streamline government, cut unnecessary costs and reduce regulator confusion" (Wouters, 2000: 11). He proposed an action plan to implement his report's recommendations. For the land, Wouters recommended that land-use plans be completed within three years and the government designate areas for parks and working forests. For industry, he advocated the creation of a "New Market Model" based in the creation of log markets both in the Interior and on the Coast and a refinement of the timber tenure system. For communities, he recommended the creation of a \$30 million Community Diversification Fund and allocation of more decision-making power to local communities. For the government, he recommended "a comprehensive redefinition of the statutes, regulations, ministries, and agencies responsible for forest activities" (Wouters, 2000: 79).

The Ministry of Forests announced the winding up of the Office of the Jobs and Timber Accord October 6th 2000 with most of the report's important

recommendations untouched (Ministry of Forests News Release 2000: 105). Wouters' recommendations recognized the requirement for a major institutional adjustment if there is to be a sustainable forest sector in British Columbia. Had even a few of the recommendations been implemented the forest sector quite likely would have moved closer to the path of sustainability.

Social Criteria for Delivering Sustainable Forest Management on the Coast

Sustainable forestry in British Columbia may be emerging within a context of polarized conflict (Blake, 1996a). Often this conflict has been the result of tensions between the opposing values, measures of importance and worth to society, of various groups. Although the literature on values does not provide for a common definition, Clark, Stankey, and Kruger (1999: 76) offer the view that "values are the standards that guide or determine attitudes and behavior." They suggest that a combination of people (including their distribution, values, organization and behavior), place (both geographic and symbolic dimensions at a variety of scales) and process (ecological, human and institutional that link people and places) approaches is a framework within which to consider sustainable forestry issues. While there is merit in describing people, places or process independently, the three come together at the community. It is at the community level where sustainability issues are first defined.

Timothy Duane (1997) of the University of California at Berkeley suggests that three types of communities be involved in sustainable forest management. These communities are of (1) place, which are tied together by location; (2) of identity, which are linked to each other through social characteristics that may transcend place; and (3) of interest, whose commonalties lie in the benefits they receive from a resource or the costs they impose on it. Duane's viewpoint is that participation of all these communities is necessary for sustainable forestry. He states that participation provides the foundation for better and more resilient decisions.

In 1991, the state of California commissioned Jonathan Kusel and Louise Fortmann of the University of California to examine well-being in forest-dependent communities – communities of place – in that state. Well-being is a complex and difficult concept to measure for it suggests the consideration of many aspects of a community that include quality of life and social and economic structures. The Kusel and Fortmann (1991) study is important as it attempted to identify the main factors affecting general well-being in forest communities. The study developed techniques for examining the impact of change on well being in 10 forest dependent communities. While Kusel and Fortmann did not study the impact of various American federal and state forest policies, they did determine a positive relationship between depleted timber wealth and an increase in human misery.

Kusel and Fortmann argue that the concept of “well-being” is found in the context of the community and the community’s culture. Communities are composed of and sustained by individuals. At the same time, the community shapes its individuals. Therefore, “well-being” can best be characterized according to such criteria as a healthy forest, forest access through employment and control, community capacity and social infrastructure and services found in a community.

Kusel and Fortmann also recognize that a healthy forest is a prerequisite for maintaining the mix of products and values upon which a forest community depends. As the health of the forest declines, the types and values of the products and service that are provided by the forest usually are diminished. Yet, a healthy forest alone does not equate to community well being.

Both the United States and Canada have embarked on a journey pointed at sustainable forest management. A primary objective of the sojourn is “ that current and future Canadians (and Americans) will continue to benefit from a healthy forest ecosystem (Nadeau *et al.*, 1999). One of the most important

findings of the Kusel and Fortmann study is that the concentration of forest resources control, especially in the hands of outsiders, either public and private, is associated with lower community well-being. They seem to have been pleading the case of every rural coastal community in British Columbia when they observed:

Outside and concentrated control of forest resources often results in: exploitative conditions of employment, exclusion of local people from decisions concerning the use of natural resources, exclusion of local people from the use of natural resources, export of profits from the region, resource degradation and, ultimately, capital flight (1991: 216).

Kusel and Fortmann underlined a fact for “...rural communities living at the economic and political margins of an urban society, community capacity (defined as the ability to respond positively to change) is essential for maintaining local well-being” (1991: 217).

Kusel and Fortmann (1991) along with Nadeau *et al.* (1999) and others working in the area of community well being (Bliss *et al.*, 1998) observed that four components of well-being are often connected. These are:

- Healthy forest
- Employment and resource control
- Community capacity
- Social Infrastructure and Service.

While the components of community well-being are interrelated, the actions that a community can take to conserve and enhance its own well-being are found in the balanced application of these components related to the local problem scenario. Four pathways that a community can embark on to improve community well-being while simultaneously enhancing the probability of the community’s sustainability are also defined in the literature cited above. These pathways are:

- Local decision-making authority over local resources
- Capturing benefits for local communities
- Diversification in forest uses, and
- Maintaining a healthy forest.

The arguments presented thus far in this dissertation assert that forest policy as implemented in British Columbia is a huge barrier to the development of these pathways for planning and developing community sustainability and none are open to coastal forest communities in British Columbia

Managing Forests for People

If the forest-based community is to emerge from the impending crisis in some sustainable state then there has to be a reform in the basic underlying assumptions or essential economic and ecological foundation and organizational structure. The essential components for managing sustainable development, as Wouters (2000) observed, are centrally lodged in separate government ministries -- all competing for pieces of diminishing financial resources. While some of the enabling sustainable forest management policies and legislation have been constructed in a piecemeal fashion, the organizational entities for bringing sustainable forest management into practice have not.

The Ministry of Forests is clearly leading in managing or administering forest issues. Yet, it is clear that single resource and corporate interests dominate much of the policy making in the Ministry. The Ministry is structured to provide for a "sustainable" timber supply while "the realization of fisheries, wildlife, outdoor recreation and other natural resource values are coordinated and integrated." The Ministry is to "...have regard to the immediate and long-term economic and social benefits..." that forest and range resources may confer on the province (Ministry of Forests Act, Section 4). There is nothing about sustainable forest management unless "coordinated and integrated" implies sustainability. Nor is there anything in the Act about providing for the well-

being of forest-dependent communities, but it does “encourage a vigorous, efficient and world competitive timber processing industry.”

Sustainable Forest Management in British Columbia is covered under the Forest Code Act and in the mandate of the Ministry of Lands, Environment, and Parks. Many other social and economic responsibilities that are key to the sustainable use of forests are placed in other ministries throughout government. While there is an obvious need to establish new organizational structures with a mandate of practicing sustainable forest management, this new structure has to also optimally provide economic, social and environmental benefits to the forest-dependent community and the province as a whole.

The kinds of effective and efficient organizational structure that could be adopted that would be effective and efficient remain quite elusive. Institutional arrangements could range from a complete restructuring of Cabinet and the creation of a multi-disciplinary super-ministry for the administration of provincial human and natural resources to the design and development of new delivery systems. A whole new form of tenure and pricing arrangements could be created for developing a sustainable forest sector in British Columbia but they would still be top-down command and control type of arrangements. This, apparently, was Wouters’ view and is simply substituting one unworkable situation for another unworkable situation.

Paradoxically, both the provincial government through its community forest pilot project programs, the federal government through the Canadian Model Forest and International Model Forest programs are experimenting with ways for a community or region to deliver resource management. Both provincial community forest pilots and federal model forests are constructed using communities as basic building blocks. The essential ingredient of sustainability, local application, is imbedded in both approaches. While there is a

difference is scale and activity, both models suffer from the lack of control of the resource. Control stays clenched in the unsteady hands of the politician.

Community forests pilots are small while model forests work at the landscape level. Other than the Harrop-Procter near Kootenay Lake in the Interior, community forests like Burns Lake, also in the Interior, tend to use a business approach, a corporate model and were selected on their ability to manage and use natural resources in an economically profitable manner. Model forests, on the other hand, tend to use a partnership approach and make decisions concerning appropriate forest uses in the landscape of consideration using collaborative processes. All of the model forests are nonprofit organizations designed to facilitate sustainable forest management in their area.

The model forest program is being evaluated during the spring and summer of 2001. Each model forest submitted a proposal for a five-year agreement with the Canadian Forest service in 1997. The evaluation will focus on determining the success of each model forest in meeting its specific and overall objectives; and whether the program is meeting national objectives. The five model forest objectives are:

- To encourage the development of forest management systems that demonstrate practical application of the concepts of Sustainable Forest Management (SFM) developed by the model forest program;
- To establish acceptable local indicators of SFM, including measurement and monitoring systems and reporting mechanisms that can measure performance relative to the goals and objectives of the model forest;
- To promote the dissemination of the results and knowledge gained through the model forest program at local, national and international levels;
- To encourage model forest participants and organizations to work together as a network; and
- To encourage the incorporation of a broad range of forest values into each model forest.

Both model and community forests offer the potential to resolve some of the major issues at the very heart of sustainable forestry and the well-being of resource-dependent communities. By a marriage of the two concepts, and a decentralisation of power and decision-making authority, a radically different approach to public forestry is possible.

A Collaborative Approach to Forestry

For the success of such a marriage, careful consideration has to be given to the building of the partnership and the creation of its constituency. Wondolleck and Yaffee (2000), studying more than 200 collaborative initiatives in natural resources management in the United States, identified eight key factors leading to the success of these initiatives. These were:

- Build on common ground established by a sense of place or mutual goals or fears, or a shared vision;
- Create new opportunities for interaction among diverse groups;
- Employ meaningful, effective, and enduring collaborative processes;
- Focus on the problem in a new and different way by fostering a more open, flexible, and holistic mind-set;
- Foster a sense of responsibility, ownership, and commitment;
- Recognise that partnerships are made up of people not institutions;
- Move forward through proactive and entrepreneurial behaviour; and
- Mobilise support and resources from number sources. (2000: 20-21).

In this new vision of a sub-regional approach to sustainable forestry, centralized decision-making in Victoria is abandoned and a partnership is built in a resource-based community or area that is empowered to visualize and determine its own sustainability path. A first step would be to develop a basis for compensating or reinvesting in a region for the loss of income associated with the forest depletion identified in chapter 5. This compensation could be used as a basis for determining the capital and financial arrangements in the establishment of the 'community model forest'. Another important phase would be the negotiation and development of partnerships from the business, scientific,

government and academic communities with the sub-regional group intending to improve human welfare by managing forest resources in an area. Another important step would be for these partnerships to create proposals in terms of the means, i.e., fibre production, water quantity and quality criteria and create an income or revenue-sharing scheme in which to finance and establish the context of future economic options available to the forest dependent area.

A Kingcome Community Model Forest

In Chapter 4, El Sarafy's user-cost approach was discussed as a vehicle for correcting sub-regional income loss through forest depletion. It is applied here to approximate the amount necessary to compensate the Kingcome forest-dependent area for income loss due to the exploitation of the first forest and provide the enabling natural resources and funds with which to bring the Kingcome Community Model Forest into being.

User-Cost Approach for the Kingcome TSA

In order to use the approach, some other data should be generated:

- The number of years it will take to deplete the amount of mature timber remaining,
- Harvest costs and net value of the timber, and
- An alternative rate of return.

In his AAC Rationale for Kingcome TSA, Chief Forester Larry Pedersen estimated that there were 60 million m³ of mature timber in the timber harvesting land base in 1994. As a side note, he stated that licensees' records suggest that the amount of timber probably is significantly less than this figure (Pedersen, 1996). Thus, at 1994 harvest rates of 1,798,270¹ m³/yr, the timber would be depleted in a little more than 33 years. By just adding years, it would have taken 38 years in 1989 to deplete the old growth resource and 48 in 1979.

¹ The AAC for the Kingcome TSA totals 1798270 m³/yr. This includes an allocation of 139,500 m³/yr for harvesting deciduous timber, low quality sites and woodlots. In the case study only conventional conifer cutting was assessed and an AAC of 1 658 770 m³/yr was used.

Average extraction costs have been estimated by Price Waterhouse to have been \$45.83/m³ on the coast in 1989. Holding harvest costs constant and indexing log value, the regional net value of the average forest cut in Kingcome TSA was \$35.62/m³ in 1979 (1989 \$), \$32.58/m³ in 1989 and \$44.62/m³ in 1994 (1989\$).

The Bank of Canada, Department of Monetary and Financial Analysis publishes the average yields of 6-month Treasury Bonds. These tables will be used to estimate an alternative rate of return. In 1979, Treasury Bonds averaged a return of 11.77%; in 1989 12.03%; in 1994, 6.09%. The higher the alternative rate of return, the lower the capital element required to stabilise regional income. Using the information above, income (X) can be estimated by applying El Serafy's user cost. It would be equal to:

$$X = R [1 - 1/(1 + r)^n]$$

Where:

X = Income

R = expected net receipts

r = alternate rate of return (Average Yields, Treasury Bill Auction)

n = period of years to deplete resource

And:

$$(X/R) = 1 - 1/(1 + r)^n = \text{El Serafy's income.}$$

$$1 - (X/R) = 1/(1 + r)^n = \text{El Serafy's capital element -- the amount to be invested in alternative capital.}$$

Net receipts can now be calculated:

$$R_{94} = \$44.62/\text{m}^3 \times 1\,340\,000 \text{ m}^3 = \$59\,790\,800 \text{ (1989 \$)}$$

$$R_{89} = \$32.58/\text{m}^3 \times 1\,769\,000 \text{ m}^3 = \$57\,634\,020 \text{ (1989 \$)}$$

$$R_{79} = \$35.62/\text{m}^3 \times 1\,700\,000 \text{ m}^3 = \$60\,554\,000 \text{ (1989 \$)}$$

When:

R = Actual receipts for timber, and

R₉₄ is the estimated net regional market value of the timber harvested from the Kingcome TSA in 1994.

R₈₉ is the estimated net regional market value of the timber harvested from the Kingcome TSA in 1989.

R₇₉ is the estimated net regional market value of the timber harvested from the Kingcome TSA in 1979.

Now, X can be solved in terms of 1989 \$:

$$X_{94} = \$59\,790\,800 [1 - 1/(1 + .069)^{33}] = \$53\,177\,000$$

$$X_{89} = \$57\,634\,020 [1 - 1/(1 + .1203)^{38}] = \$56\,865\,000$$

$$X_{79} = \$60\,554\,000 [1 - 1/(1 + .1177)^{48}] = \$60\,264\,000$$

When:

X = Annual income and

X₉₄ is the estimated net regional income for timber harvested from the Kingcome TSA in 1994.

X₈₉ is the estimated net regional income of the timber harvested from the Kingcome TSA in 1989.

X₇₉ is the estimated net regional income of the timber harvested from the Kingcome TSA in 1979.

Percentage of receipts that represent true income:

$$X_{94}/R_{94} = \$53\,177\,000 / \$59\,790\,800 = .889$$

$$X_{89}/R_{89} = \$56\,865\,000 / \$57\,634\,020 = .989$$

$$X_{79}/R_{79} = \$60\,264\,000 / \$60\,554\,000 = .995$$

Thus, using the El Serafy method to estimate amount of regional income compensation for depletion due to the removal of old growth, the capital element of net receipts would have been invested in alternative capital. While this amount would have been only 0.5% or \$302 800 (1989 \$) in 1979, it would have increased as the alternative rate of return fell and the resource began to show depletion. By 1994, the annual investment level would have grown to 11.1% or \$6 636 800 (1989 \$).

Unfortunately, this approach does not compensate for the “running down” of the forest asset only the one-time use of it. Still, the idea of a regional income stabilisation fund has much more merit than the US revenue sharing program in national forests, largely because the fund would be based in the actual value of the timber extracted from the affected area. Reinvestment in the sub-regional economy would be related to the productivity of the area rather than its political power. This suggests a very good foundation for building of a sustainable forest sector.

Sub-Regional Timber Income Stabilisation Fund

If the provincial government had begun a timber income stabilisation fund at the beginning of 1980 when it created the Ministry of Forests, the fund would have grown considerably. Table 6-2 is an indication of the amounts of capital required to generate a sustainable income for communities dependent on the Kingcome TSA applying the El Serafy approach. As alternative interest rates fall and as the resource becomes depleted, the amount contributed to the fund increases. By 1994, the Timber Income Stabilisation Fund would have been valued at about \$63.3 million -- enough to illustrate the paltriness of the \$7.8 million 5-year plan extended to Gold River. It hardly comes close to the regional capital excised by the government and corporate tenure owners from the area during the operation of the mill (Vancouver Sun, 16 October 1999, B10).

Table 6-3: Kingcome TSA Timber Income Stabilization Fund (1989 \$)

Year	Timber Value (\$/m ³)			Capital Element (CE)		CE Value (\$/m ³)	AAC (m ³)	Yearly Amount for Timber Income Fund	1994 Value of Timber Income Fund
	Adjusted VLM Value	Harvest Cost	Net Value						
1979	\$ 72.40	\$37.81	\$ 34.59	0.995	0.005	0.172931	1700000	\$ 293,983.13	\$ 745,129.63
1980	\$ 66.08	\$34.10	\$ 31.99	0.996	0.004	0.127946	1700000	\$ 217,508.06	\$ 523,498.41
1981	\$ 54.83	\$35.56	\$ 19.26	0.9994	0.0006	0.011558	1700000	\$ 19,649.20	\$ 43,872.73
1982	\$ 55.60	\$35.38	\$ 20.22	0.997	0.003	0.060646	1700000	\$ 103,097.72	\$ 215,989.73
1983	\$ 60.65	\$39.00	\$ 21.65	0.981	0.019	0.411287	1700000	\$ 699,187.44	\$ 1,398,444.80
1984	\$ 57.68	\$38.27	\$ 19.42	0.99	0.01	0.19416	1700000	\$ 330,071.15	\$ 622,547.20
1985	\$ 59.09	\$39.00	\$ 20.09	0.98	0.02	0.401733	1700000	\$ 682,946.78	\$ 1,221,450.32
1986	\$ 61.82	\$42.26	\$ 19.57	0.972	0.028	0.547925	1700000	\$ 931,472.02	\$ 1,580,801.17
1987	\$ 72.84	\$43.36	\$ 29.48	0.963	0.037	1.090938	1632500	\$ 1,780,956.84	\$ 2,868,765.28
1988	\$ 77.10	\$44.13	\$ 32.97	0.974	0.026	0.857108	1632500	\$ 1,399,229.56	\$ 2,116,894.40
1989	\$ 78.41	\$45.83	\$ 32.58	0.987	0.013	0.423514	1769500	\$ 749,408.02	\$ 1,043,625.61
1990	\$ 78.71	\$45.56	\$ 33.15	0.988	0.012	0.397836	1769500	\$ 703,970.38	\$ 890,522.53
1991	\$ 74.44	\$44.78	\$ 29.66	0.951	0.049	1.453344	1769500	\$ 2,571,692.93	\$ 3,029,454.27
1992	\$ 88.96	\$48.49	\$ 40.47	0.893	0.107	4.330061	1769500	\$ 7,662,042.97	\$ 8,519,425.58
1993	\$123.52	\$59.30	\$ 64.21	0.816	0.184	11.815	1769500	\$ 20,906,650.14	\$ 22,179,865.13
1994	\$130.98	\$66.36	\$ 64.62	0.858	0.142	9.175779	1769500	\$ 16,236,540.45	\$ 16,236,540.45
									\$ 63,236,827.24

Assuming interest rates stay at around 6 percent per year, by the time the resource is depleted from Kingcome in 33 years, this portion of the fund would increase almost seven times with an end value of \$408 million. The fund would continue to build as the old growth is drawn down and becomes depleted and the sustainable harvesting of second growth is begun.

The idea of Sub-Regional Timber Income Stabilization Fund can be used as a basis for compensating and rebuilding the Kingcome sub-regional economy by capitalizing the Kingcome Community Model Forest. The fund could be first used to determine a base level of compensation or reinvestment for the impact of timber depletion on the Kingcome area's income. Provincial forest assets valued close to the amount associated with the depleted income would be entrusted to a local non-profit association or society of partners for management and renewal. The Kingcome Community Model Forest agreement would be non-transferable but renewable forest resource tenure. It would very similar to the community forest licence written into the Forest Act. There would also be some significant differences.

The goal of the Kingcome agreement would be to improve well-being in the Kingcome dependent area through:

- Local decision-making authority over local resources
- Capturing benefits for local communities
- Diversification in forest uses, and
- Maintaining a healthy forest.

These are the pathways leading to a sustainable forest sector. Instead of Provincially orchestrated top down development, public ownership of the forest resource is retained but in local communities. As members in the new community model forest association or society, local people would begin to have much more control over the use of natural resources in their area. At the same time, government would have started to build a forest constituency and created a

form of revenue sharing with the communities in the sub-region. Further, the fund could then actually be established and managed as the older forest stands are drawn down.

Concluding Remarks

Ever since the Land Act of 1896 defined timberland and reserved such lands from sale, a link between public-sector forest management policies and practices and the standard of living of the people of British Columbia has been forged. Early chapters of this dissertation discuss how the link was never closed or had deteriorated over time in certain key issue areas largely due to inappropriate public sector interventions. With the passage of the Forest Act of 1912, a new era in forestry was supposedly spawned: to paraphrase W. R. Ross, "this was to be an era in which the vast heritage of forest wealth, unexhausted and unimpaired would be passed on for all posterity" (Ross, 1914: 24).

Yet within 14 years of the expression of Ross's vision, Crown forest ownership had not led to positive and responsible resource management. Instead business interests had been able to shape public policy to their own private needs. Simon Fraser historian Steven Gray noted:

The people were to benefit from the forest resource, not through meddlesome restriction, regulations and taxes, but by allowing private enterprise free rein (1989: 46).

Through the years the forest industry developed and matured. Armed with a new form of timber tenure - Forest Management Licence Agreements - a market pulp sector emerged. The government worked with industry through this development period. From 1965 to 1972 government helped create "instant" resource towns to aid in the extraction of natural wealth. Because of the tie to the natural resource, the economic health of these "instant" towns was linked closely to that of the company owning the resource extraction rights.

The coastal forest industry continued to coalesce. Pearse (1976) noted that corporate concentration was an emerging problem in the forest sector in the 1970s. Wagner measured the corporate concentration in 1987 and determined the coastal sector to be a concentrated type 1 oligopoly (Wagner, 1987: 127). He postulated that this structure may have been based on uncollected public resource rents and that the coastal forest sector was not competitive.

Meanwhile, the government began to reorganize itself. The Ministry of Forests was reconstituted in the late 1970s – signaling a change in how the government was to administer the forest and sustained-yield. One of its early policies was the Forest Management Partnership Proposal on Tree Farm Licences. It also moved to expand the Tree Farm licence program. Both of these policy directions converged on political paralysis in other key issue areas, particularly forest inventory, valuation, timber tenure and sub-regional forest depletion.

The Ministry of Forests came into being just as the era of public forest management as a technical project in which the primary goal is production of wood was all but over. In the United States, the demise of the competitive nature of the American softwood lumber market and a small owl were to bring profound change in how the federal public forests on the Northwest coast were to be managed. Some of these ideas began making inroads in British Columbia.

One of these ideas was that the public should receive full value for the industrial access to and use of the forest resource. Material presented in Chapter 4 (Figure 4-3) illustrated the positive change in public receipts over the period 1975–1996 on the British Columbia coast. Yet compared to the US Forest Service, the Bureau of Land Management and selected western state public forests, British Columbia was clearly not collecting the same amount of economic value for forest used.

Much of forests on Vancouver Island and a large portion of the south coast of the Vancouver Forest Region are comparable to the American situation. Logging infrastructure like roads and bridges are constructed, a source for manufacture is available and much of the labour force commutes daily to the job site. Thus, at least, in the southern portion of the Vancouver Region, harvest and management costs ought to be similar to the United States Pacific Northwest.

The province, in its move to develop the forest since the 1940s, locked into a timber tenure and pricing system that was not designed to work in a market-based forest economy. Nor was it designed to collect full public value for accessing and using the forest resource. The fact is that it was designed with every intention of sharing the resource's value as an incentive for resource development. Yet, now some of the more accessible tenures and areas are in a management rather than development state and are being confronted with different cost profiles. For example, rather building new roads, older transportation systems now require management and maintenance. Second growth forests also require a different level of protection than older mature coastal forests. These recurring fixed management costs are poorly compensated for in the pricing system used by the province.

The American lumber producers were not sensitive to the differences in costs of forest management between British Columbian and Northwest. Plus, they could see benefits in restricting Canadian softwood supply at a time when the Northwest Plan would reduce fibre flow from federal forests in the west. With the Memorandum of Understanding in 1996 and the Softwood Lumber Agreement in 1994, the American softwood interests gained a considerable advantage over their Canadian competitors. Wear and Lee (1993) estimate that during the period 1987 to 1990, the total shift to American softwood lumber producers from American softwood consumers, now also a highly concentrated industry, was \$2.63 billion in 1982 US.

Another idea that has received considerable attention by the public sector during the 1990s was sustainable forestry. There is little doubt that this was the idea behind the adoption of the Forest Practices Code and Forest Renewal BC. The transfer of over \$2 billion in assets from the private sector to the public had severe implications for the coastal forest sector, with the net result an increase in the cost of production of logs and fibre. At the same time, miscommunication between the federal and provincial governments resulted in a Softwood Lumber Agreement that almost spelled ruin for the remaining coastal softwood lumber producers.

British Columbia does not have any program comparable to American revenue-sharing schemes with respect to resources extracted from federal land. The province's coastal forest-dependent communities thus suffered because their economies were linked directly to the (often-declining) economic welfare of the company owning the resource within economic proximity to the town.

Within the two-decade tenure of the Ministry of Forests, BC Forest Products, Crown Forest, Weldwood, Pacific Forest Products, MacMillan Bloedel and Fletcher Challenge have all left the coastal forest sector. Many other smaller companies have reduced their operations or left the coast. Along with economic decline, these corporate departures and changes have also had an adverse impact on the mental state of local communities. The lack of access or the control of the use of the resource enhanced the anxiety brought on by change.

The case study of the Kingcome Timber Supply Area over a 10-year period in which it was administered by the Ministry of Forests, suggested that the timber value of the area had declined \$1.28 billion (1986\$). The direct pre-tax income to the local area was estimated to be \$9.4 million (1989\$) in 1994 and the annual depletion rate at \$156 million (1989\$). Therefore, the sub-regional loss of regional income was \$146.6 million (1989\$) in 1994. This does not imply that the funds associated with depletion were lost to the provincial economy or wasted is

consumption. The critical issue is that both the physical values of removing the forest and the economic values of using the forest were lost to the local sub-regional economy.

Further, it appears that some of the practices that lead to the decline in value in the Kingcome TSA are being applied to the coast as a whole. These are:

- Good and medium sites logged at a rate much higher than would be expected from the distribution of site classes.
- Species of higher economic value being replaced by species of lower value.

Forestry is critical to the provincial and national economy. In 1994, the three Vancouver Island TSAs contributed an estimated \$237.6 million to the provincial and federal governments through fees and taxes. It is in both governments' interest to maintain that cash flow and aid in the reconstruction of a sustainable forest sector for the coast. This can not be accomplished with old ideas tied to sustained-yield forest development of the 1940s and 1950s.

In the final pages of this dissertation a method was presented to estimate the amount depletion in provincial forest resources that has occurred in one TSA on the coast. An element of this estimate of depletion is used as a basis for determining the level of reinvestment that would be required to stabilize regional income as the resource is used at current interest rates. Indeed, because this kind fund has not been established, the future of "instant" towns like Port McNeill and Port Alice are questionable.

Much like provincial resources of land and timber were used to capitalize a coastal forest sector during the 1940s and 1950s, the province could use these same resources in the creation of a Kingcome not-for-profit association. The goal of the association would be to practice sustainable forestry. This would mean building regional capacity to use and manage the forest resources. This would

be a government investment to enable the sub-regional actors associated with the Kingcome TSA create a piece of a sustainable forest sector for British Columbia.

Building a sustainable forest sector for the coast requires the partnership of both the federal and provincial governments along with industry. Importantly, it requires the reconstitution of the local community. Sustainable forestry cannot be delivered at either the national or provincial scales. It can only be delivered at the sub-regional level.

In order to practice sustainable forestry and contribute to its own well-being, the community has to have both the capacity to manage and use as well as access natural resources. Investing a fraction of the provincial forest for the use and benefit of the resource-dependent community is a mandatory first step in re-forging the links between the coastal community and its forested environment. Governments' next step is to work in collaboration with the community organization to build the competence and confidence necessary to practice sustainable forestry within this forest.

If the British Columbia government is to avert the impending crisis in the coastal forests, it must rethink the products it intends to deliver to the public. Quite clearly, delivering healthy forests through sustainable forestry should show high on the government's list. Government may also conclude that public acceptance of its forest practices and policies are also of critical priority. The answer then is to close and strengthen the link between forest resources and the standard of living of people in resource-dependent areas. Encourage the participation of all residents in the understanding, management and use of the public forests. The public should accept - possibly acclaim -- forest practices and policies if a sustainable coastal forest sector emerges from the impending forest crisis.

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