THE RELATIONSHIP OF THE HIGHER EDUCATION SYSTEM
TO FORMULATION OF INTEGRATED FOREST LAND-USE POLICY

A Comparative Analysis of
Newfoundland, Tasmania, and Alaska

By

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A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF
THE REQUIREMENTS FOR THE DEGREE OF
DOCTOR OF PHILOSOPHY

in

THE FACULTY OF GRADUATE STUDIES
FACULTY OF FORESTRY
(Department of Forest Resources Management)

We accept this thesis as conforming
to the required standard

THE UNIVERSITY OF BRITISH COLUMBIA

July 31, 1990

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Department of **Forest Resources Management**

The University of British Columbia  
Vancouver, Canada  

Date **August 27, 1990**
ABSTRACT

During the past three decades, in Newfoundland, there have been repeated high level recommendations made concerning the formulation of an integrated land-use policy. In particular, the forest sector has expressed the need for such a policy through recommendations made by several Royal Commissions on Forestry, a Federal-Provincial Task Force on Forestry, and through a number of other documents and forums. This research study began as a problem solving mission, i.e., to answer the questions: Why has an integrated forest land-use policy not been formulated? What are the limiting factors constraining the policy formulation process?

After a preliminary review of the literature and an initial listing of some possible constraints, it became obvious that the complexity of the policy formulation process all but precluded any neatly bounded solutions. Therefore, the problem solving mission evolved into an exploratory process. Based on some empirical observations, I decided that the higher education system might be one of the weak links in the land-based policy formulation process in Newfoundland. At the same time, the higher education system appeared to hold great promise in finding long-term pervasive solutions to land-use problems.

My thesis is that the higher education system is one of the weak links, if not weakest link, in the forest land-use policy formulation process in Newfoundland. To examine and clarify this position, I have conducted a comparative analysis of the higher education systems in three peripheral jurisdictions that have much in common: Newfoundland, Tasmania, and Alaska. Each is peripheral in their respective federation, has a population of approximately one-half million, and has a comparable forest land-base and industry. The comparative analysis consisted of an:
assembly, review, and analysis of relevant documents; on-site reconnaissance in Newfoundland, Tasmania, and Alaska; and interviews with non-replaceable respondents. Specifically, I analyzed the teaching, research, and service functions of the higher education system and how they relate to the integrated forest land-use policy formulation process.

It is concluded that overall Newfoundland's higher education system has contributed less to the integrated forest land-use policy formulation process than the systems in Tasmania or Alaska. For teaching, Memorial University of Newfoundland has the least number of related faculties and departments, offers no professional or graduate level degrees in land-based renewable resource management, and has the least number of related individual courses. Memorial University has also conducted less research on related policy topics. As well, related service functions fall behind contributions made by the University of Tasmania and are roughly on a par with the University of Alaska.

From this comparative analysis, I have begun construction of a conceptual framework that places higher education and natural resource public policy formulation in a wider context. It is suggested that there may be an imbalance between liberal, scientific, and professional approaches in the higher education system and that this may have significant implications for natural resource/environmental policy formulation and implementation.

This study is original in two respects. It is the first research project to compare Newfoundland, Tasmania, and Alaska; and it is one of the first, if not the first, empirical study to examine linkages between the higher education system and formulation of forest land-use policy.
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ACKNOWLEDGEMENTS

This thesis was made possible through the combined assistance and generosity of many individuals and organizations in Canada, Australia, and the United States. I would like to express my sincere appreciation and indebtedness to everyone who helped make this project a reality.

In the first instance, I am grateful to the Board of Governors and Mr. W.T. Barker, President of Fisher Institute of Applied Arts and Technology for approving two years educational leave. As well, Dr. G.K. Winter, Mr. C.J. McCormick, and Mr. M. Renouf were instrumental in arranging the first year of leave. Also, I would like to thank Mr. K. White for computer assistance.

Funding and other research support came from a variety of sources. Greatest amongst these is the substantial assistance provided through Professor F.L.C. Reed’s NSERC/Industrial Chair in Forest Policy Research. Of no less significance are the contributions made by Forestry Canada’s Newfoundland Forestry Centre, the Newfoundland Department of Forestry and Agriculture, the Vancouver and Melbourne Branches of the International Order of Hoo-Hoo, and the British Columbia Festival of Forestry Society.

Technical assistance and advice was provided by a large number of individuals. In particular, I would like to thank all of the interviewees listed in Appendix B. The Australian’s were every bit as friendly and generous as their reputations would have them. In particular, Mr. D. Howick of the Commonwealth Scientific and Industrial Research Organisation went beyond the call of duty in numerous ways. Mr. R. Keenan and Dr. M. Higgs of the Tasmanian Forestry Commission were extremely helpful to the study. In Alaska Dr. T. Gallagher and Dr. L. Gorsuch of the University of Alaska and Mr. R. Behnert of the U.S. Forest Service provided invaluable assistance in Fairbanks, Anchorage, and Juneau, respectively. Numerous fellow Newfoundlanders deserve personal thanks, including: Dr. M. Nazir and Mr. K.J.S. Beanlands, Dept. of Forestry; Mr. R. Warren, Land Management Division; and Dr. J.A. Munro, Forestry Canada.

A special thank you is extended to Dr. M. Coulter, Prof. Emeritus, University of Maine; Mr. T. Horn, Vice President, The Atlantic Center for the Environment; Mr. G. Bull and Mr. P. Wood, fellow graduate students; and Mr. R. Brake, practical philosopher.

The external examiner was Dr. P.J. Murphy, Dean of Forestry, University of Alberta. His meticulous review and thoughtful suggestions were of tremendous value. University of British Columbia examiners were: C.J. Anastasiou, D. Haley, and L.M. Lavkulich.

It is with great pleasure that I acknowledge the support, encouragement and guidance from my U.B.C. supervisory committee: Dr. D.L. Golding, Director of Forestry Graduate Studies, Dr. J.V. Thirgood, Prof. Emeritus Forest History and Policy, Dr. H.C. Hightower, Prof. Planning Theory and Dr. V.R. D’Oyley, Prof. of Comparative Education. My greatest thanks must be reserved for my research supervisor, Professor F.L.C. Reed, Prof. of Forest Policy, whose optimism, and unyielding support have been a sustaining inspiration and without which this whole experience would not have been possible.

Finally, and foremost, I thank my family. My father, Medley, whose foundation of self-discipline and persistence I inherited. My wife, Dianne, who at once is all things; she alone knows the true weight of her pervasive contributions, including the monumental task of typing many versions of this thesis, for which no words can be thanks enough. To Jessica and Heather, my daughters, for whom I dedicate this small effort with hope.
PART I.
INTRODUCTION AND RESEARCH DESIGN

CHAPTER ONE.  INTRODUCTION
CHAPTER TWO.  LITERATURE REVIEW
CHAPTER THREE.  RESEARCH DESIGN
CHAPTER ONE. INTRODUCTION

"What is the moment of triumph for the author? It is the moment of conception. This is when an important idea is born, when there is a sudden glorious clicking of the vitals of the writer, when the creative wells are full and demanding release. It is also a moment of commitment, for the writer knows that the idea will possess him and hover over him until he puts down the words that will set him free again. If it is self-tyranny, it is at least the tyranny of purpose." (Cousins, 1981)

1.1 PURPOSE

My thesis is that the higher education system is one of the weak links, if not weakest link, in the forest land-use policy formulation process in Newfoundland. To examine and clarify this position, I have conducted a comparative analysis of the higher education system in three peripheral jurisdictions that have much in common: Newfoundland, Tasmania, and Alaska. This comparative process has enabled an exploration of the possible higher education system relationships to formulating integrated forest land-use policy. Based on the results of the comparative analysis, I have begun to assemble a conceptual framework that places higher education and public policy formulation in a wider theoretical construct.

This study is original in two respects. It is the first research project to compare Newfoundland, Tasmania, and Alaska; and it is one of the first, if not the first, empirical study to examine linkages between the higher education system and formulation of forest policy.

1.2. SELECTION OF CASE STUDY AREAS

The basis for this thesis was conceived during my experience in forestry as a practitioner and educator in the Canadian Province of Newfoundland and Labrador. Through this experience I witnessed questionable land-use practices apparently due, in part, to the lack of an integrated land-use policy. Although the need for such a policy in
Newfoundland has been recognized by several Royal Commissions over the past three decades, no such policy has yet been formulated. To help understand why this is so, I decided to do a comparative analysis. My initial approach was to seek out for comparison countries in the world that, by general consensus, had advanced systems of forest land-use such as Switzerland, Germany, and Sweden. The more I pursued this route the more I realized that a fair comparison could not be made with Newfoundland since too many important factors were different. For example, the history of settlement, population size, culture, socio-economic and political systems were so dissimilar that many land-use policy solutions arrived at in these advanced countries would seem impractical in Newfoundland. Therefore, I took a different approach and sought out areas that had greater similarity with Newfoundland. I established four criteria: a peripheral position in a national federation, a strong maritime influence, a population size of roughly half a million people, and an important but not dominant forest sector.

My first selection was the island State of Tasmania. It lies off the southeast coast of Australia much like the peripheral island of Newfoundland lies off the east coast of Canada. A second peripheral study area, Alaska, fell quite naturally into place and allowed a comparison with a federation as powerful and diverse as the United States. Both Tasmania and Alaska met the established criteria and had enough other parallel characteristics with Newfoundland to warrant a potentially valid comparison (Table 1.1). I considered other peripheral areas such as Sri Lanka, Madagascar, Falkland Islands, Cyprus, Iceland, Scotland, Appalachia, Puerto Rico, and Trinidad, but none fit the general criteria well enough to be included.
Figure 1.1 illustrates the general framework on which this thesis rests. The large triangle represents the triad of Newfoundland, Tasmania and Alaska, each depicted by its own smaller triangle, each in turn connected to its respective country. The area in the centre represents the important characteristics shared by all three province/states. The double arrows represent similarities shared by two of the three jurisdictions: Newfoundland-Tasmania, Newfoundland-Alaska, and Tasmania-Alaska. Each small triangle represents the unique characteristics of Newfoundland/Tasmania/Alaska which are influenced greatly by their respective federations of Canada, Australia, and the United States. The large border encompassing the whole represents the global interrelations and influences among the three countries.

Table 1.1 provides some examples of factors shared by all three study areas, and by two of the three, as well as factors unique to each area. In addition to the explicit criteria already mentioned, the three study areas share other common features. For example, they each have primary jurisdiction over forests and education. Also, the cost of living is higher than it is in many other parts of their respective federations. Newfoundland and Tasmania share a similar government structure, net emigration, and aboriginal extinction. Newfoundland and Alaska both import much of their domestic lumber requirements, received a big economic boost from U.S. military bases during World War II, and became a Province/State in 1949 and 1959. Tasmania and Alaska are both on the Pacific Rim and export raw logs and woodchips to Japan. Distinctive features not shared include Newfoundland’s earlier settlement, Tasmania’s 100 metre trees, and Alaska’s massive petroleum industry.
Figure 1.1. Schematic diagram of Newfoundland-Tasmania-Alaska comparison.
Table 1.1. Factors in common to Newfoundland, Tasmania, and Alaska; and factors in common to two of three, or factors unique to each.

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<td>Peripheral in a Federalist system: Geographic, Demographic, Political, Economic, Transportation</td>
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<td>Present population approximately one-half million people</td>
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<td>Maritime influence</td>
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<td>Forests are very important but not the dominant economic sector</td>
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<td>Province/States have jurisdiction over forests and education, etc.</td>
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<td>Cost of living higher than other areas in federation</td>
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<td>Import 50% lumber</td>
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1.3. FURTHER BACKGROUND AND RATIONALE

General conflicts over land, land-use, and land-abuse are as old as civilization. Yet, despite the long history of these problems, to this day the solutions remain elusive and woven into the complex fabric of society itself. Furthermore, even when possible solutions are identified, they often seem to defy successful implementation.

How can land be allocated to its best use for both short and long-terms while at the same time filling local needs and ensuring global survival? Many jurisdictions around the world have struggled with this and similar questions, and some have formulated and adopted explicit policies to guide the land-use allocation process. However, relatively few of these places appear to be on a course towards successful implementation. Even those models which are successful are not readily transportable to other countries with different circumstances.

As previously mentioned, this thesis was conceived of during my experience in forestry, as a practitioner and educator, in the province of Newfoundland and Labrador. The province is one of the oldest settled areas in North America, yet paradoxically, by comparison with some younger jurisdictions, it is at an early stage in solving the land-use dilemma. Despite this relatively slow progress towards solutions, the need for better land-use policy has been recognized in Newfoundland for at least three decades. For example, in a speech to a 1959 Symposium on Land-Use, the Honourable W.J. Keough, Minister of Mines and Resources said:

"For over four hundred years we were too busy fishing in this Island to bother about proper land-use. For years and years the procedure for acquiring land was, to a considerable extent, a matter of helping yourself. . . . Indeed, there never has been, as our Royal Commission on Agriculture aptly noted 'a well rounded long range policy designed to obtain the greatest possible
benefit from the use of land resources. Land Use Policy,' (in Newfoundland), the Commission noted further, 'has developed haphazardly, in the form of stop-gap expedients, adopted in response to temporary pressures'." (Keough, 1959)

There is extensive documentation on the need for resolution of forest land-use conflicts in Newfoundland. Recommendations concerning land-use policy have been made by three Royal Commissions on Forestry (Kennedy et al. 1955, Rousseau et al. 1970, and Poole et al. 1981) and a Federal-Provincial Task Force on Forestry in Newfoundland (Sheppard and Carrol, 1973).

In addition, Draper and Storey (1984) prepared a report for the Newfoundland Forest Research Centre, entitled Towards Comprehensive Land Use and Resource Management in Newfoundland, and the 1985 annual meeting of the Newfoundland section of the Canadian Institute of Forestry continued the discussion of competing and conflicting land-uses under the theme of Integrated Land-Use in Newfoundland and Labrador (Nfld. Section C.I.F., 1985).

Although incremental progress has been made, an integrated land-use policy has not yet been formulated in Newfoundland, and allocation of land is still largely governed by legislation covering single sectors. In 1983 an Interdepartmental Land Use Committee (ILUC) was approved by Cabinet to deal with arising departmental conflicts, but ILUC has been described by Fugate (1986) as "a quasi-decision-making body." An anonymous member euphemistically dubbed it "the toothless tiger" to emphasize ILUC's lack of authority. In addition to ILUC, some conflicts are mitigated through the environmental impact assessment process which, although necessary, is piece-meal and not in itself a long-term solution to wise land-use. The problem of forest land alienation due to poor comprehensive land-use planning was emphasized by a group of senior forestry officials from
government and industry (Milne, 1988). As recently as July 1989, a workshop on Integrated Resource Planning was held in St. John's. The participants were senior public land managers and advisors. There was consensus on the need for a comprehensive or integrated land-use policy (LeDrew, 1989).

My initial approach to researching this problem was to identify all the possible constraints to formulating and implementing an integrated land-use policy in Newfoundland. Theoretically, once this was done I could prioritize these obstacles or limiting factors under broad headings such as: philosophical, psychological, social/cultural/historical, technical and institutional (Table 1.2). Priorities in hand, it would be easy to deal with each constraint one at a time. Or so it seemed.

Table 1.2. Some possible constraints to formulating integrated forest land-use policy.

**Philosophical Constraints**
- polarized principles - exploitation, conservation, preservation
- multiple use, dominant use, single use
- functional codes of ethics

**Institutional Constraints**
- political systems and realities, bureaucracies, industrial systems, non-governmental systems
- educational systems

**Social and Cultural Constraints**
- local values, traditions
- history, human nature

**Economic Constraints**
- market systems
- intergenerational transfers, discounting
- benefit-cost ratios

**Technical Constraints**
- definitional difficulties
- available and feasible technical alternatives

**Bio-Physical Constraints**
- site capability for producing desired mix of commodities and amenities
From a preliminary review of the literature on land-use policy initiatives in various parts of the World, it became obvious that there were too many possible constraints for one researcher to handle in a lifetime. However, there were few explicit references to the role of education systems in resolving land-use policy issues. In particular, in Newfoundland, references to education in relation to land-based renewable resources were very limited. A case in point is the Royal Commission on Employment and Unemployment (1986) supplementary report entitled Education for Self-Reliance. It included a relatively large section on training for the oil and gas industry but did not refer to land-based renewable resources education. This omission is noteworthy in view of the importance of the forest sector to the economy and the fact that there are no degree programs in land-based renewable resources management in the province's university system. Because of this lack of provision, the higher education system appeared to have little or no role in resolving long-term land-use problems in Newfoundland. Therefore, I decided to explore these observations in more detail.

1.4. DEFINITIONS AND SCOPE

Before going any further, it is necessary to briefly clarify some of the terminology used within the scope of this thesis. Perhaps the best place to start is with the terms used in the title: The Relationship of the Higher Education System to Formulating Integrated Forest Land-Use Policy. On the surface, the individual terms appear rather straightforward. However, in practice the meaning of each term is actually quite difficult and ambiguous. Furthermore, a precise definition is complicated by the inter- and intra-national differences in both meaning and usage. Therefore, some clarification is in order.
Higher Education System. In this thesis the phrase higher education system is taken to mean any system of education beyond the secondary school level. Quite often, in the United States and Canada, post-secondary education is used as a synonym for higher education. In Australia, higher education is often referred to as the degree granting portion of tertiary education.

For the purpose of the detailed comparative analysis of Newfoundland, Tasmania, and Alaska, I focus on the university and degree granting portions of the higher education system. However, within the context of each country and province/state, I have examined and described the higher education structure as a whole when necessary.

This usage also implies the broad scope of this study to include more than forestry education. Instead it considers any higher education that may have a reasonable link to the use of forest lands, such as political science and policy related courses, environmental studies courses and others.

Integrated Forest Land-Use Policy. In theory the term forest policy would have been comprehensive enough for this thesis. Unfortunately, in practice forest policy is often interpreted as industrial timber policy or, at least, as timber values having automatic primacy over other forest values. Similarly, the term multiple-use policy could have been used, but again, this term has been tainted as reflected by such caricatures as "multiple abuse."

Complicating matters still further, there has been a bevy of terminology developed by different disciplines and professions that have greatly overlapping, if not synonymous, usage. Some of these terms are: land-use policy, environmental policy, integrated resource planning,
integrated resource management, environmental impact assessment, regional planning, comprehensive policy, and conservation strategy. Although a consensus on the use of terminology does not yet appear to be emerging, the term "sustainable development" is the buzz word now in vogue.

Not wanting to contribute to this general taxonomic confusion, but at the same time needing a more precise term to describe my particular emphasis, I have settled on integrated forest land-use policy. The phrase implies the integration of compatible uses and the reconciliation of competing uses of forest land. It does not assume any one consumptive or non-consumptive value has primacy over any other value. In addition, for purposes of analysis in this thesis, the scope is limited to forest lands or lands capable of producing forests.

Policy. Few terms are as ambiguous as is policy. There are perhaps as many definitions of policy as there are authors on the subject. In other words, no two authors use the term in precisely the same way. In this thesis, I am primarily concerned with public policy and will follow the definition put forward by Pal (1987):

"A course of action or inaction chosen by public authorities to address a given problem or interrelated set of problems."

In a democracy, policies are formulated through a process that can involve any citizen, from a single individual to large organized special interest groups. As well, policies formulated within a sovereign state are often influenced by external political and economic climates.

In addition, policies are not necessarily explicit manifestos, but instead are implied through legislation, regulation, ministerial statements and the like. Policies are inherently subjective and value laden. As
well, the distinctions between politics, policy and planning are almost inseparable terms whose meanings blur one into the other.

Relationship. The term relationship in everyday common usage means: connection, association, or involvement. Within the context of this study, no single causal or statistically significant relationships are presumed between the higher education system and the formulation of integrated forest land-use policy. Instead, it is assumed that there are a variety of direct and indirect connections between the two which vary in their degree of influence in the policy formulation process.

These indirect and direct influences of the higher education system are investigated, described, and analyzed under the broad headings of teaching, research, and service functions.

Other Terms. Further explanation of the terms above and definitions of other terms are provided as the need arises within the remaining text of the thesis.

1.5. THESIS OUTLINE

This thesis is divided into four parts:

PART I INTRODUCTION AND RESEARCH DESIGN
PART II THE GENERAL CONTEXT
PART III RESULTS AND DISCUSSION
PART IV CONCLUSIONS AND RECOMMENDATIONS

Part I provides three introductory chapters to the thesis. In this chapter, I have outlined the overall purpose, background, and scope of the thesis. Chapter two provides a review of the relevant body of literature on public policy, the links between higher education and public policy, centre-periphery theory, and comparative analysis literature. Chapter
three describes the research design and analytical framework utilized in this study.

In Part II, the general context surrounding the study problem is presented in two chapters. Chapter four provides a global, international, and national overview of history and settlement, forest land-use, and higher education systems. Chapter five outlines the physiography, history, economy, and forest land-use policy in Newfoundland, Tasmania, and Alaska.

The results of the comparative analysis are presented in Part III. Chapter six presents a detailed analysis of the teaching, research, and service functions of the higher education system and their possible relationship to formulating integrated forest land-use policy in Newfoundland, Tasmania, and Alaska. Chapter seven includes a discussion of the results through assembly of a model that places higher education and public policy in a wider theoretical construct.

Finally, Part IV presents the conclusions in chapter eight, and chapter nine offers recommendations for Newfoundland, further study of Newfoundland, Tasmania, and Alaska, and a few recommendations of global significance.

The ten appendices provide additional supporting documentation concerning the study process and relevant data considered in writing the thesis.
CHAPTER TWO. LITERATURE REVIEW

2.1. INTRODUCTION

In chapter one I outlined the nature of the study problem, why it was important, and generally how I selected Newfoundland, Tasmania, and Alaska for comparison. In this chapter I will review the pertinent body of theory under four broad categories.

The first category covered in section 2.2 provides a review of literature on some general aspects of public policy theory. Next, section 2.3 reviews the literature that connects the higher education system to public policy formulation with specific attention to natural resource/environmental education and policy. The third category, covered in section 2.4, reviews the core-periphery literature as it may relate to the three study areas. Finally, section 2.5 presents a review of the literature on comparative theory.

Chapter two concludes by identifying some possible gaps or weakness in the body of theory, to which this study may contribute through filling or strengthening.

2.2. PUBLIC POLICY THEORY

"... Lord, give me the capaciousness and wit to tolerate and enjoy ambiguity when it is appropriate, the clarity of mind and firmness of will to be unambiguous when it's not, and the wisdom to know what time it is." (Levine, 1985)

The concept of policy is rich with ambiguity and full of paradox. Policy is a slippery term; it can mean almost anything to anybody at any given time. There are nearly as many definitions of policy as authors writing on the subject. Chapter one provided a definition of public policy:

"a course of action of inaction chosen by public authorities to address a given problem or interrelated set of problems." (Pal, 1987)
Policies seldom have clear boundaries and are always dynamic. Yet despite the ambiguity, interdependencies, and uncertainty, the formulation of policy, explicit or implicit, is absolutely critical to the proper functioning of society. Furthermore, the process of policy formulation is sometimes disorderly, inconsistent, and frustrating; yet, it often leads to easier decision-making. All of this is simply a reflection of the complex world in which we live.

It follows from this complexity that public policy does not fit neatly into the exclusive domain of any one academic discipline. This section will examine some of the diverse intellectual traditions surrounding public policy theory, several common components of public policy making, the inseparable nature of politics and policy, and finally, some specific aspects of forest policy theory.

2.2.1. Intellectual Traditions

The literature on public policy is vast. Friedmann (1987) provides a useful typology of intellectual traditions which have developed from the late 1700's to present times as they relate to planning theory. It is equally useful for public policy theory. He divides this vast body of influential literature into four major traditions: policy analysis, social learning, social reform, and social mobilization.

The policy analysis tradition stems from several schools of thought such as systems analysis, neoclassical economics, and public administration. Practitioners in this tradition "tend to regard themselves as technicians, or more flatteringly as 'technocrats,' serving the existing centers of power - large corporations and the state." Essentially, they are social engineers believing that by use of "appropriate scientific
theories and mathematical techniques, they can, at least in principle, identify and precisely calculate 'best solutions'."

Social learning comprises a second tradition. It "focuses on overcoming the contradictions between theory and practice, or knowing and acting." Theorists in this category believe that social behavior can be changed through "a willingness to admit error and to learn from it."

The third intellectual tradition, social reform "focuses on the role of the state in societal guidance." Macrosociology, institutional economics, and political philosophy are important schools of thought in this tradition. Theorists in this group consider legitimate state intervention to include the promotion of economic growth, the maintenance of full employment, and the redistribution of income.

The last tradition, social mobilization, departs from the other three traditions "by asserting the primacy of direct collective action 'from below'." Theorists in this tradition stem from historical materialism, neo-marxist, utopian, and Frankfurt schools of thought.

The first three traditions, policy analysis, social learning, and social reform, generally address theoretical questions from the perspective of the ruling elite. The fourth tradition "is the only tradition that specifically addresses the powerless and disinherited."

To the public policy researcher, a certain knowledge and understanding of all four traditions is necessary. Friedman's grouping and division of classical literature from economics, political science, sociology, engineering, philosophy, and other fields is both demanding and enlightening. It is demanding in its requirement that the user be familiar with a large body of literature from divergent, if not opposite, disciplines of thought. It is also enlightening in that the sum total of
all four traditions is a reflection of the true complexity of policy formulation, implementation, and analysis.

2.2.2. Models of Public Policy-Making

There are many models of the public policy-making process (Doern and Phidd, 1983; Downey, 1988; Dunn, 1981; Goodin, 1982; Ham and Hill, 1984; Hogwood and Gunn, 1984; Kent, 1989; Lindblom, 1977; Mason and Mitroff, 1981; Patton and Sawicki, 1986; Pal, 1987; Pross, 1986, Stanbury, 1986; Stone, 1988). Most of these models build on a variation of a few general components.

Pal (1987) provides a simple model that includes at least five phases. These are:

- Problem definition or issue identification
- Agenda setting
- Policy formulation
- Policy adoption
- Policy evaluation

In the context of this study, the problem has been defined by several Royal Commissions and other Inquiries in Newfoundland. That is, they identified the need for integrated land-use policy. The fact that no such policy has been formulated would indicate that the issue has not yet passed the agenda setting phase. Pal (1987) makes the point that "agendas are not set in a day, it may take years or even decades to get an issue accepted for serious consideration."

Stanbury (1986) emphasizes two elements of major significance in policy-making. One is the activity of interest groups and the other is the motivation of politicians to get elected and stay in power. Pross (1986) also emphasizes the importance of interest group politics and public policy.
2.2.3. Policy and Politics

A number of modern day policy analysts consider policy and politics to be inseparable (Goodin, 1982; Hogwood and Gunn, 1984; Lin Lueng, 1985; Pal, 1987; Stone, 1988; Starling, 1979; and Forester, 1989). Doern and Phidd (1983) make this point well:

"In the French language the word 'politique' means both politics and policy. The frequent separation of politics and policy in the English language has unfortunate implications. When it is said that something is done for 'political' reasons, too often the implication for the layman is that this stands for excessive partisan behaviour, personal power seeking or even lower forms of skulduggery. When it is said that something is done for reasons of policy, a loftier image emerges, one which reaches beyond personalities and Machiavellian maneuvering into the world of principle... Policy and politics are in many respects the same thing, since both deal with ideas and with the power to actually implement ideas in a world of large structures and institutions and in the face of numerous uncertainties."

Stone (1988) is particularly forceful on including politics in policy analysis, and this was a primary motivating factor for writing the book Policy Paradox and Political Reason.

"...My central argument is that the categories of thought behind reasoned analysis are themselves constructed in political struggle, and nonviolent political conflict is conducted primarily through reasoned analysis. It is not simply, therefore, a matter that sometimes analysis is used in partisan fashion or for political purposes. Reasoned analysis is necessarily political. It always involves choices to include some things and exclude others and to view the world in a particular way when other visions are possible. Policy analysis is political argument, and vice versa." (Stone, 1988)

In the inaugural issue of the journal Land Use Policy, Brett-Crowther (1984) states:

"There is probably no policy which can be justifiably called scientific - not even science
2.2.4. Forest Policy

Traditionally forest policy analysis has been treated largely in a historical and descriptive fashion, emphasizing legislative milestones and other institutional factors (Worrell, 1970; Dana and Fairfax, 1980; Hummel, 1984; Husch, 1987; FAO, 1988). As in other fields of public policy, a great deal of effort has been spent trying to define forest policy (Gane, 1983, 1984; Sedjo, 1984; Westoby, 1983, 1984, 1987). Forest policy research and analysis has been dominated by economists (Ellefson, 1984; International Union of Forestry Research Organization, 1984a and 1984b; Bowes and Krutilla, 1989). In recent years there appears to be a movement away from the purely descriptive economic analysis to a more critical approach that integrates politics into the policy analysis (Alston, 1983; Behan, 1977; Clawson, 1975, 1977; Dargavel, 1988a, 1980; Romm, 1984, 1986a, 1986b; Repetto and Gillis, 1988).

2.3. RELATIONSHIP OF HIGHER EDUCATION TO PUBLIC POLICY

The literature review did not reveal any specific research on the relationship of the higher education system to formulation of integrated forest land-use policy. However, several general commentaries and studies provide relevant theoretical background. I have divided this literature into two groups: those pieces related to higher education, society, and public policy in general; and those pieces more specific to natural resource/environmental policy and higher education.
2.3.1. Higher Education, Society, and Public Policy

"What intellectuals chiefly bring to policy debates, and what chiefly accounts for their influence, is not knowledge but theory... Good theory calls attention to obvious truths that were previously overlooked, finds crucial flaws in existing theories, and reinterprets solid evidence in a new light. And some theories, if adopted, will make us better-off." (Wilson, 1981)

Unfortunately, when it comes to the relationship of the higher education system to formulating public policy, there is no unified body of theory. Clark (1983) provides a possible hint of why this is so in his comprehensive treatise The Higher Education System: Academic Organization in Cross-National Perspective. He states:

"For a long time scholars did not take seriously the province of their own commitment. While disciplined perspectives developed on the economy, the policy, and such realms as the social-class system, only occasional comments by professors or retired rectors were mustered on the workings of systems of higher learning."

Nevertheless, there has been concern from within the higher education system as to its role and place in society (Fairchild, 1933; Newman, 1959; Whitehead, 1967; Wolff, 1969; Holmes et al., 1971; Hopper, 1971a, 1971b; Zeigler and Peak, 1971; D'Oyley, 1973; Karabel and Halsey, 1977; Ritzen, 1977; Baker, 1978; Cameron, 1978; Strike, 1982; Wilson, 1983; Coombs, 1985; Gutman, 1987).

The general role of the higher education system can be interpreted as the accumulation, preservation, expansion, and transmission of knowledge (Shils, 1983). A simpler interpretation is that higher education is a process that includes teaching, research, and service functions.

Figure 2.1 provides a conceptual framework for analyzing the role of academic professionals within the higher education system in general.
Figure 2.1. Role of Academic Professional.

Institutional Colleagues

Supporters of Research

Members of Academic Discipline or Field

Research

Teaching

Service

Students

Clients of Service

Institutional Administration

Constituencies External to Institution

The overlapping functions of teaching, research, and service are emphasized to various degrees by different higher education systems. This is reflected by Kerr's (1982) discussion of the evolving nature and changing aims of universities. He states simply:

"... A university anywhere can aim no higher than to be as British as possible for the sake of the undergraduates, as German as possible for the sake of the graduates and the research personnel, as American as possible for the sake of the public at large. . . ."

The trend in modern universities and degree granting institutions appears to be towards a blending of teaching, research, and service functions.

Teaching

Excellent university teaching can make a difference to public policy (Sherman et al., 1987). Through the centuries, universities have been responsible for educating many of society's leaders and political elites (Altbach, 1977; Clarke, 1985, 1987; Gutmann, 1987). Perkin (1969) goes as far as to state "university teaching is the key profession of the twentieth century."

Clarke (1984b) also emphasizes this point:

"... And since academics prepare nearly all the professional cadres of society, as well as those persons who engage in research and development elsewhere, it is appropriate to view the academic system as the home of the key profession, the one that trains all the others. With as many major avenues of influence there is growing reason to pursue the question of how higher education shapes society."

One study showed that the impact of leadership succession on public policy was strong in both socialist and capitalist states and that it was a powerful mechanism of policy innovation (Bunce, 1981). This suggests the importance of the educational background of new leaders.
Research

Altbach's (1979) book *Comparative Higher Education - Research Trends and Bibliography* provides a comprehensive review of the analytic attention devoted to higher education. On the direction for future research on the relationships between the university and society, he concludes:

"... The impact of the university community and of intellectuals in general on society is also important. The politics of higher education and the ways in which universities and public policy interact should also receive additional analytic attention. . . ."

Feller's (1986) study of state governments, universities, and the utilization of policy-oriented research describes many formal efforts, in the U.S. during the 1970's, to link universities and state government through provision of an array of policy related assistance to the government. He concludes:

"Few of the formal university/state government efforts of the 1970's survive today... It has been replaced in prominence by current concerns with university/industry/government relationships and the role that universities can play in fostering high-technology economic growth."

Lindblom and Cohen (1977), in their book *Usable Knowledge: Social Science and Social Problem Solving*, state:

"In public policy making, many suppliers and users of social research are dissatisfied, the former because they are not listened to, the latter because they do not hear much they want to listen to."

They distinguish between academic social science and professional social inquiry, and focus on the latter's role in social problem solving. Further, they suggest that academic social science may provide the overall organizing framework or perspective for the work of policy-makers, even if
"academic social science in no more than window dressing for policy strategies chosen on other grounds."

Withers (1981) describes the growth in university centres for policy research and their role in pursuing research interests outside the organizational boundaries of traditional departments and disciplines.

Service

Newson and Buchbinder's (1988) The University Means Business focuses on the increasing link between business and academia. They critically review three alternate visions of the university: as an academic haven; as a tool for economic growth; and as a means for social transformation. They point out that what appears to be emerging is the idea of the "service university" which brings together the central thrusts of the first two visions of the university as: "promoter and guardian of academic achievement at the highest level and instrument of high-tech corporate development."

Davidson (1988) describes the university-industry increase in interaction as a threshold of opportunity for the social sciences and humanities. The issues of government-university and business-university roles were debated in the September 1989 issue of Policy Options. Abella (1989) argues that "the role of the academic is to think, and to search; the role of the policy-maker is to decide." On the other hand, McAllister (1989) argues that "this is not a world that permits societies or their universities to get off. We need a new charter for international involvement."

The 1985 meeting of the Association of Commonwealth Universities focused on The University as an Instrument for achieving National Objectives. The central dilemma reported is "how the university community
can make itself relevant and accountable to its society without allowing national aspirations to preempt, or compete with academic integrity and traditions" (Association of Commonwealth Universities, 1985).

In Bok's (1982) Beyond the Ivory Tower: Social Responsibilities of the Modern University, he writes:

"...If professors have lost some of their objectivity by trying to shape the society they purport to describe, they have also gained something in experience and first-hand knowledge."

Finkelstein (1984) reported that in the United States:

"Professors are more likely than the public at large to 'act out' their ideological commitments in the arena of civic life. Ladd and Lipset found that college and university faculty were twice as likely as other college-educated Americans to be active in political campaigns and in public policy groups ... Social scientists, the most politically liberal segment of the professoriate, were twice as likely as faculty in applied fields to be so involved..."

The review of literature suggests that the role of higher education in shaping society is gaining more attention from governments, business, and the academic community (Slaughter, 1985).

2.3.2. Higher Education and Environmental/Natural Resource/Forest Policy

The literature on the relationship of the higher education system to formulation of environmental/natural resource policy is sparse. There are many statements of concern but there is a distinct lack of unifying theory.

Leiss (1972) provides a useful historical perspective on the man-environment relationship, particularly as it relates to use of science and technology to attempt a domination of nature. By implication, the higher education system has, in turn, had a great deal to do with the development of that same science and technology. Holling (1981) developed a model for adaptive environmental assessment and management that attempted to bridge
the gap between science and public policies in several of the natural resource and environmental disciplines.

The United Nations Educational, Scientific and Cultural Organization (UNESCO, 1979) through its international conferences on education has formulated, since 1934, recommendations which "constitute a body of educational doctrine which has stood the test of time fairly well."

Recommendation number 65 adopted in 1968 concerns The Study of Environment in School. The preamble to the recommendation suggests the need for education of teachers for environmental education.


"...There are few institutions outside of universities where one can hope to find this range of expertise. And the very inter-related nature of the problems means that, if they are to be solved, a great many different experts must get together..."

"...In this and in every other area of the whole environmental problem, universities have an important and, I would say, crucial part to play..."

Ten years later Scott (1984) addressed the Thirteenth Congress of the Association of Commonwealth Universities. In his talk on Economic Development and Its Social Consequences, he discussed conservation and development. After discussing the familiar problems and change of attitudes emerging in such documents as the World Conservation Strategy, he concludes:

"All these considerations put you, as educators of the future leaders and decision-makers of the world, in an absolutely crucial role...The future of our world will depend upon their initiative, resourcefulness, and farsightedness. It is up to
their educators to give them the tools with which to display these qualities.

Virtually all university faculties are involved. These issues must be brought before natural scientists, social and political scientists, lawyers, economists, doctors, linguists and geographers, and all these curricula may need revising to take the issues I have been talking about into account. Our goal should be for every educated citizen throughout the world to be aware of the fundamental importance of natural resource conservation to the development process."

One of the major themes of the Seventh General Conference of the International Association of Universities was The Role of Universities in Shaping and Carrying Out Development Policies (IAU 1980). In addressing the theme, Dr. A.Z. Preston highlighted sustainable development policy as a special responsibility of the university:

"Of equal importance is the policy which leads to a 'sustained and sustainable development process.' The disharmony between man and nature has never been so great. . . . All departments, divisions and schools have a role to play and perhaps none greater than ensuring that the human products of the University are appropriately equipped to meet the needs of the society they must serve."

At the same conference one of four discussion sessions was devoted to Universities and the Protection and Utilization of the Natural Environment. In reference to the topic, the introductory speaker, Dr. N. Oker-Blom (IAU, 1980), asked the question:

"What should be done about the decision-makers, those who actually plan our lives for us? . . . . Who is a good decision-maker and who is a good advisor? I don't know, really. But it is a major task of Universities to produce such persons. . . ."

On the last day of the Conference, after five days of sessions, the rapporteur, Dr. J. Renoux, summarized the meetings and among his conclusions stated:

". . . the problem of human environment is today a matter or urgency. The University should study it
Emmelin (1977) conducted a study of environmental education at the university level. He looked at several countries, including Norway, Sweden, France, United Kingdom, Australia, Canada, and the United States. He states: "The majority of environmental education programs at university level clearly have resources as their focus." Further he concludes "It is clear to me that there has been more innovation in higher education in the U.S. and U.K. than in the other countries studied. Response to 'the environmental crisis' has been more rapid and varied in these systems than in others...".

The University of Wisconsin at Green Bay made environmental education the focus of its mission in the early 1970's. It emphasized values, problem solving, trans-disciplinary courses and community action (Weidner, 1972). Scheim (1976) provides a general discussion of the land-grant university and environmental affairs. Martin (1973) provides a critical assessment of the Australian National University Centre for Resource and Environmental Studies and its role in environmental education and research.

Smyth's (1989) article entitled Environment and Higher Education in a Crucial Decade: What is to be Done?, notes that there is still a wide gap between awareness of environmental problems and appropriate action to remedy the situation. He focused on the need to improve the higher education system because of its responsibilities for education of leaders and administrators in government, industry, and commerce; for professor qualifications for planning, engineering, forestry, law, teachers etc.; for research and other important areas.

He states: "Education has not prepared people conceptually to handle systems of such size and complexity..." He concludes: "...The main point
is the need to create quickly a more aware, more understanding, more skillful and more committed citizenry, with leaders competent to put ideas into practice."

Ornstein and Ehrlich (1989) make similar points in New World New Mind: Moving Toward Conscious Evolution. They state:

"Since the world now changes more in a decade than it once did in millenia...adapting to change must be the center of any new kind of teaching."

They argue that biological and cultural evolution are no longer adequate for the pace and scale of problems facing the planet today. Therefore, they suggest that "the time has come to take our own evolution into our hands and create a new evolutionary process, a process of conscious evolution." They call for a different kind of education because "human judgement and humanity's ability to deal with the consequences of its creation lags behind its ability to create." They believe "refashioning how people are educated could have enormous impact for the future of our species."

Michael (1973) made a similar argument for long-range social planning from the social psychology approach to future-responsive societal learning.

Hardin (1985) also makes an argument for a different form of education. He outlines that there has been basically two types of education or "filters": the type leading to literacy and the type leading to numeracy. To these he adds a third type, ecolacy. Ecolacy emphasizes what he coins as the first law of ecology: "We can never do merely one thing." He argues that we must learn to use all three "filters" because "no one filter by itself is adequate for understanding the world and predicting the consequences of our actions."
In 1984 approximately thirty prominent forest policy educators and researchers from the U.S. (one from Canada) participated in a workshop on forest policy education (Sedjo, 1984). In the introductory remarks, J. Muench posed the central question: "When a student graduates from a forestry curriculum, how prepared is he to participate as a professional in the policy process?" There were as many ways of approaching forest policy education as there were participants.

Romm was direct: "My primary purpose in teaching forest policy is to develop a professional ability to participate effectively in resource policy formulation and execution..."

In a subsequent published article entitled Policy Education for Professional Resource Managers, Romm (1984) asks the question: "How should resource policy be taught to university students in the resource management professions?" He discusses teaching policy-as-constraint vs. teaching policy-as-process. In other words, how policies constrain a professional's work vs. how policy processes allocate the resources with which professionals work. He argues that focus on policy as constraint "supports the 'duty syndrome' and deprives students of future capacity to develop independent professional judgements." He concludes:

"It is ironic that professions with such dynamic ecological perspectives tend to treat 'policy' as if embedded in stone. The sense of futility this breeds must add to the reluctance to engage in issues in an effective way."

Cooper (1985) also argues that present and future resource managers "must be more aware of, and receptive to, the art of political compromise." He also suggests that the education must be restructured to accommodate this and other factors. This restructuring could "mean that the master's
degree will be a normal requirement for any job with more than routine responsibilities."

2.4. THE CENTRE-PERIPHERY CONCEPT

In order to understand places like Newfoundland, Tasmania, and Alaska, it is useful to consider the centre-periphery concept. The notion that certain relatively small core areas of the planet greatly influence, if not, dominate the activities of larger peripheral areas is well documented in the literature (McCann, 1987; Holsti, 1987). The theory is known variously to different disciplines as core-periphery, centre-periphery, metropolis-hinterland, heartland-hinterland, or centre-margin model. In his book Heartland and Hinterland, McCann (1987) notes:

"The heartland-hinterland model has been defined by John Friedmann as a 'general theory of polarized growth' which is applicable at all geographic scales: international, national, or provincial."

Indeed in the context of this study I can note all geographic scales. For example, Canada and Australia are peripheral on an international scale while the U.S. is core. On a national scale Newfoundland, Tasmania, and Alaska are all peripheral within their respective federations. On a provincial/state scale, each study area has cores and periphery, for example, the cores of St. John's in Newfoundland, Hobart in Tasmania, Anchorage in Alaska, and the vast amount of peripheral wilderness or sparsely settled areas in each.

McCann (1987) characterizes these heartland or core areas as possessing good accessibility to markets, diversified secondary, tertiary and quaternary industries, and a concentrated population, that is able to influence and usually control important economic, social and political decisions. On the other side of the coin, hinterlands or peripheries rely mainly on primary resource production, have scattered population, and
"restricted political prowess. Hinterlands, therefore, are all the regions lying beyond the heartland whose growth and change is determined by their dependency relationships with the heartland."

In relation to Newfoundland in Canada, this theory has been discussed in detail by Staveley (1987) who concludes "if the Newfoundland example suggests one element more than any other, it is that the relationship is primarily political in nature. Core-periphery structures are frequently described as a set of immutable economic laws; the Newfoundland case suggests that political relationships can be the more potent causes of underdevelopment and dependency." This concept is discussed in detail in Summers' (1987) Ph.D. thesis The Politics of Underdevelopment: Resource Policy and Regime Change in Newfoundland while Pomfret (1977) uses a core-periphery framework in relation to historical school change in Newfoundland, particularly as it relates to religious denominations.

The core-periphery theory has also been applied in Tasmania. Wilde (1981) concludes:

"Core-periphery models give useful insights about the spatial structure and dynamics of the Australian industrial system and the role of Tasmania within it. The state is increasingly at the mercy of non-local economic forces and decisions... The future struggles between the resource-rich periphery and the threatened urbanized core is likely to leave Tasmania in an even weaker economic and political position than the one the state now suffers."

Davis (1985) discusses several major environmental and natural resource issues in which the Tasmanian and Australian governments were at odds. He concludes:

"Economic development is not merely a matter of rational analysis of needs and opportunities. Much depends upon perception of issues and attitudes of mind. The foregoing text described in detail two decades of conflict about natural resources
conservation and development, central to images of 'progress'. At the political level, expediency in the name of promised investment and employment has proven singularly unsuccessful..."

I could not find any literature on Alaska explicitly using core-periphery theory, however, several pieces implicitly utilized the concepts (Weeden, 1989; Morehouse, 1984; Dresge et al., 1977).

Of particular relevance is Brock's (1988) review of core-periphery as it relates to small states and the provision of education. He notes the importance of territorial, demographic and economic criteria and states:

"In an age when the term 'global village' can become an instant cliche, one might reasonably suppose the idea of peripherality to be outdated. But while in the brave new world of communications technology the theory of distance education may seem a panacea, in the real world of educational provision there are many false summits and peripheries lurking for the naive enthusiast of endless outreach. Where a complex human endeavour such as the provision of education is concerned, a simplistic conception of the spatial dimension is inadequate. As the writer has argued elsewhere, the geographical factor in comparative educational study has in general been neglected, or only crudely applied to the analysis. However, one must remember that, like comparative education itself, the centre-periphery concept is susceptible of analysis through the application not only of spatial approaches but also in respect of economics and political science.

2.5. COMPARATIVE ANALYSIS

This section reviews the literature on theory of comparative analysis. First is a general review of literature in several disciplines including sociology, political science, education, and forestry. Next, I review the general literature comparing the countries being studied: Canada, Australia, and the United States. And finally, specific studies comparing Newfoundland and Tasmania are examined.
2.5.1. The General Literature on Comparative Theory

Comparative studies have been in use for some time, particularly in the social sciences. Their emergence began as a perceived need in the social sciences to have a counterpart to the controlled experiment that had well served the physical sciences (Porter, 1970; Marsh, 1970).

Porter (1970) recognized that:

"human societies are in themselves experiments in different ways of living...Despite the gradual obliteration of primitive cultures and increasing similarities of the most advanced societies, human beings still live under a very wide range of conditions and demonstrate a great many forms of adaptation. Thus, the reason for using the comparative method, because it permits the study of the same or similar phenomena, and their fluctuations under a wide variety of conditions, are as strong as they always were."

However, Porter warns that "any comparisons are at best only approximations."

Political scientists also value the comparative analysis approach. Consider the following statement:

"The theoretical structure in political science is not deductively powerful, and hence the vigorous deduction of hypotheses is, with few exceptions, impossible. Most hypotheses that are tested by political scientists are either the loose implications of a rather amorphous theory or are simply the researchers' hunches about a reasonable outcome of empirical research..." (Holt and Turner, 1970)

The quest for a theoretical approach to the study of comparative politics has been ongoing but Bill and Hardgrave (1973) note:

"...Rigorous, systematic, and explicit theories of politics are still in relatively embryonic stages of development. Approaches, however, provide the frameworks within which theories are constructed."
Comparative approaches to education analysis and theory development are also gaining some prominence (Altbach and Kelly, 1986; King, 1985; Watson and Wilson, 1985; Clark, 1984a; Quay, 1985; Altbach, 1979; Cramer and Browne, 1965).

"Properly done, comparative education can deepen understanding of our own education and society; it can be of assistance to policymakers...it can help us understand better our own past, locate ourselves more exactly in the present, and discern a little more clearly what our educational future may be..." (Noah, 1986)

"To this date, there is no general theory of education; rather there are many 'partial' and 'local' theories that purport to explain the relation of schools to society...comparative education is indispensable to the development of a theory of education that will be able to transcend the limitations of current theories that are derived from specific times and places..." (Khoi, 1986)

"Comparative education,...takes the world as its research base and can encompass virtually any methodology that can help to understand an education-related topic in cross-cultural perspective." (Altbach and Kelly, 1986)

In relation to comparative higher education, Clark (1984a) notes:

"Some progress has been made during the past two decades...in exploring systematically the complex realities of different systems of higher education. But such analysis, relatively new, lacks firm footing in universities..."

The literature relating to comparative analysis of forest policies, and land-use in general, is emerging. It is still largely in the descriptive stage, usually a collection of individual countries with little or no mention of comparative theory (Repetto and Gillis, 1988; Richards and Tucker, 1988; Patricios, 1986; Thirgood, 1960).
2.5.2. Comparative Literature on Canada, Australia, and the United States

The literature comparing individual provinces/states of different countries is quite meager but there is a richer literature comparing countries. In particular, the comparisons of Canada and Australia provide a useful example to begin with.

Comparing Canada and Australia

Interest in the similarities between Canada and Australia has grown steadily during the past two decades (Holmes, 1982; Spazzapan and Ternowetsky, 1983; Atchison, 1983; Clement, 1986; Lowe, 1986; Albinski, 1973). The Australian and New Zealand Association for Canadian Studies was formed in 1980 (Page, 1983) held its first conference in 1982 (Crabb, 1983a) and began publication of a journal, Australian-Canadian Studies in 1983.

Page (1983) in a paper entitled Canada and Australia: Points of Contact notes:

"Pierre Trudeau's visit to Australia in 1970 led to a public recognition of mutual interests and common problems, as large nations on the 'rim of the Pacific'. As dispersed, urban-oriented societies with a joint colonial parentage, comparable colonial-imperial heritage, and a comparable federal-parliamentary structure, they share and have shared many problems."

In 1976 a former Canadian cabinet minister, J.W. Pickersgill, stated:

"I have become gradually aware, during the past twenty years, that Australia has more in common with Canada than any other country. We are the only two federations with British parliamentary government. Our history under the British crown is roughly equal in length. Though both economies were originally based on farming, and still depend on exports from the farm for much of their national incomes, both are highly urbanised - Australia even more than Canada. There are wide disparities in the developed wealth and the potential of the Australian states, though not as great as among rich and poor provinces in Canada. Both countries
have problems of federal-provincial or federal-state relations." (The Financial Post, Toronto, 26 June 1976 as cited in Crabb, 1983b).

Crabb (1983b) concludes:

"Perhaps more so than with any two countries in the world, the study of Canada in Australia - as well as the study of Australia in Canada - will bring new insights into the Canadian scene and, at the same time, assist Australians towards a better understanding of our own country and ourselves, to help us in the search for what we are and not simply what we are not."


Place (1989) outlines the similarities of Canada's and Australia's National Forest Strategies.

Comparing Canada-United States and United States-Australia

Garreau (1981) in the Nine Nations of North America describes how Canada and the United States share five regions in common. The literature on Canada-United States is largely of their mutual relations rather than comparison (Mahant and Mount, 1984; Doran and Sigler, 1985). The same is true for much of the literature on the United States and Australia. When comparison are made, it is usually in the context of a variety of countries not just Australia and the United States. Nevertheless, all three - Canada, Australia, and the United States - share the federalist system of governance on comparably sized land masses. Lundquist (1974) compares environmental policies in Canada and the United States.
2.5.3. Comparing Newfoundland, Tasmania, and Alaska

I could not find any studies comparing Newfoundland, Tasmania, and Alaska. However, there have been at least two studies comparing certain similarities between Newfoundland and Tasmania. The first looked at hydroelectric power (Crabb, 1986) and the other at transportation (Lakin, 1980).

In his case study of hydroelectric power in Newfoundland, Tasmania and the South Island of New Zealand, Crabb (1986) states:

"Few would argue with the contention that Canada, Australia and New Zealand are 'subordinate to other countries in the hierarchy of the world economy'. Along with other subordinate or semiperipheral countries, they suffer many problems and experience many advantages, and none more so than Newfoundland, Tasmania, and New Zealand's South Island. They have had to make the best of their locations and the most of their resources to help overcome the problems of their peripheral locations, relative to core regions, both nationally and internationally."

The 1980 Tasmanian Year Book (Lakin, 1980) includes a special 18 page anonymous article entitled: Tasmania and Newfoundland: Island States with much in Common. The majority of the article deals with transportation similarities; road, rail, sea, and air. As well, some general background is provided on physiography, population, employment, and federal government assistance.

In a paper on regionalism and national identity, Crabb (1985) compares Newfoundland and Tasmania. Dr. Crabb has lived in both places (Crabb pers comm, 1988) and his comments are worth quoting at length.

"... I want to concentrate on Tasmania and Newfoundland, two dependent yet very independent islands. What follows is speculative and preliminary.

There can be little doubt that both islands are distinctive territories within their respective federations, ...in economic and related terms, both..."
are underdeveloped and dependent. They are highly dependent on their respective federations - particularly in financial terms - and this finds expression in terms of regional disparities...their dependence on resource exploitation - fishing, farming, minerals, forestry, tourism - and hydro-electric power ... There are just so many problems: high unemployment, the high cost of living, lower incomes, out-migration (which is very selective), rural decline and decay. There is much evidence of disparity with their respective mainlands...

...No one can deny the independent outlooks of the two islands: more than water separates each from 'the other side.' They both have long and unhappy histories: the extermination of the native inhabitants; the convicts of Tasmania, who were not worse off than some of the first British settlers in Newfoundland...

...on both islands there are common features, some of them common to all islands (including mainland Australia). There are feelings of insularity, parochialism, and a slight inferiority. Certainly in the case of Tasmania there is a remarkable ability to blame others for its problems. But there is also a possessive pride, value in prevailing life styles, contentment, and a more human and personal scale of things (particularly in the cities compared with those on the mainlands). The populations are much more homogeneous and perhaps more British than those of the mainlands... 

... These islands and their islanders are different; they are Newfoundlanders or Tasmanians first, Canadians or Australians second. . ."

Neither the Crabb articles nor the Tasmanian Year Book article have compared the education systems of Newfoundland and Tasmania.

2.6. COMMENTS ON THE LITERATURE

The originality of the research topic is indicated by the level of research and scholarly introspection reported in the literature. At a high level of abstraction, there is a significant body of pertinent literature on policy analysis, higher education and society, core-periphery theory, and comparative analysis. This literature base is useful in describing the intellectual framework within which the research problem sets.
Nevertheless, the literature review has revealed a lack of a high level conceptual framework or unifying theory that relates higher education to public policy formulation in general. It follows that the theoretical framework is even less developed for the more specific relation of higher education to environment, natural resources, let alone integrated forest land-use policy. Therefore to help fill this void, this study can begin construction of a conceptual framework that assists in development of a unifying theory relating higher education and public policy.

At a lower level of abstraction, the gaps in the literature are wider. I did not discover any literature specific to Newfoundland, Tasmania, or Alaska that attempted to link higher education and public policy formulation. It is significant that at least two general studies were found comparing Newfoundland and Tasmania. Perhaps more important is that no one has compared all three selected study areas - Newfoundland, Tasmania, and Alaska. The juxtaposition of Newfoundland and Tasmania, as part of two somewhat peripheral federations, with Alaska as part of a once hegemonic and still powerful federation may prove useful.

This empirical comparison of Newfoundland, Tasmania, and Alaska may help clarify possible relations between higher education and public policy in general and specifically to integrated forest land-use policy.

The interplay of these two levels of abstraction may yield greater insights than if just one level were used. The lower level provides a concrete empirical basis on which to build a higher level conceptual framework of a more universal nature. The next chapter will discuss the research design in more detail.
CHAPTER THREE. RESEARCH DESIGN

3.1. INTRODUCTION

The literature review suggests that a single method or research design investigating a policy related research question of this type does not exist. Therefore, the best that can be done is to assemble a modified method or combination of methods that suits the research problem at hand. This is preferable to selecting a method and then fitting the problem to it. However, constructing a new method is also more risky, in that it has not been tried, tested, or accepted. This is one reality of research in general.

In this chapter I will outline the research design utilized in this study. Section 3.2 presents a general discussion of the nature of research. Next, section 3.3 presents some critical assumptions and limitations. In section 3.4 I describe the specific methods used in conducting this research. Finally, the chapter closes with a discussion of the analytic framework for assessing the data.

3.2. WHAT IS RESEARCH?

There are many definitions of what constitutes research. Merriam and Simpson (1984) state simply that:

"research is a systematic process by which we know more about something than we did before engaging in the process. . . . the defining characteristic of research is that it is a systematic, structured, purposeful, and disciplined process of discovering reality. Research is a matter of process, not outcomes."

One common taxonomy of research distinguishes between pure (basic) research and applied research. Phillips and Pugh (1987) find this dichotomy restrictive and propose a threefold classification: exploratory, problem-solving, and testing-out research.
Exploratory research involves "tackling a new problem, issue, topic about which little is known, so the research idea cannot at the beginning be formulated very well." Problem-solving research begins with a particular 'real world' problem and brings "together all the intellectual resources that can be brought to bear on its solution." And finally, testing-out research is an attempt to "find the limits of previously proposed generalizations."

Phillips and Pugh (1987) are quick to point out that testing-out research is the least risky approach in that the researcher is working within an established framework. Conversely, exploratory research is professionally more advanced, providing "little by way of conceptual frameworks." Therefore risks of failure are higher.

This research project began as a problem solving mission, i.e., to answer the questions: Why, after thirty years of high level recommendations, had Newfoundland not yet formulated an integrated land-use policy? and what are the constraints holding back the policy formulation process? It soon became obvious that the nature of the specific problem and complexity of the general policy formulation process all but precluded any neatly bounded solutions.

This initial problem solving approach evolved into an exploratory approach. Based on some empirical observations (Roy, 1982) and partly on intuition, I decided that the higher education system might be one of the weak links in the land-based policy formulation process in Newfoundland. At the same time, an improvement to that system might provide a great potential for long-term pervasive solutions. This exploration led to a search for areas in the world that had several key characteristics in common with Newfoundland and it resulted in the selection of Tasmania and
Alaska. The intent is that a comparison might lead to general observations and insights which are less likely to result from a more parochial study.

3.3. ASSUMPTIONS AND LIMITATIONS

3.3.1. Assumptions

This thesis rests on the basic assumption that many of the opinion leaders, policy advisors, and public policy makers, today and in the future, have or will receive some amount of formal higher education.

A second assumption is that the role of the higher education system in providing appropriate conceptual frameworks for decision-making is crucial to good public policy formulation. Stated differently, the quality of public policy we have today is to a large degree a reflection of how well society has prepared its citizens and leaders to make the tough choices and decisions that were required in the past.

Finally, it is assumed that the higher education system, in particular the university sector, provides one of the few refuges in which competing and conflicting ideas can be explored fully. In other words, free thought and the search for truth is possible - and this is important for controversial subjects such as appropriate land-use policy.

3.3.2. Limitations

Although there are many possible limitations, I will state three major areas of concern.

First, there are few previous studies of a similar scope on which to build. Therefore, I must start almost from the beginning to build an eclectic methodology and theory; and this exploratory process is subject to a large amount of trial and error.

Second, I have a disproportionate amount of first hand experience in Newfoundland compared to Tasmania and Alaska; i.e. years vs. weeks.
Therefore, my understanding of Tasmania and Alaska is less than that of Newfoundland, and based more on documentation than first hand knowledge.

Finally, the inherent nature of the research topic is difficult. It is dynamic, filled with uncertainties, complex interrelationships, large numbers of subjective variables, definitional problems and is set over a long time horizon. In addition, land-use policy can be a very emotionally charged issue subject to severe polarization of views.

3.4. RESEARCH METHODS

It is clear, from a review of the variety of research approaches listed below, that a single precise and unambiguous methodology does not exist for a research problem of this kind.

Comparative Education (Altbach and Kelly, 1986)  
Comparative Higher Education (Altbach, 1979)  
Comparative Higher Education (Clark, 1984a)  
Comparative Research (Holt and Turner, 1970)  
Comparative Studies in Sociology (Porter, 1970)  
Education Research (Merriam and Simpson, 1984)  
Environmental Policy (Lundquist, 1974)  
Forest Policy (Ellefson and Spurr, 1977)  
Geographical Research (Durrenberger, 1971)  
Historian's Fallacies (Fischer, 1970)  
Interdisciplinary Research (Barth and Steek, 1979)  
Land Policy (Manning, 1986)  
Macro-Sociology (Sanderson, 1988)  
Policy Analysis for the Real World (Hogwood and Gunn, 1984)  
Policy Analysis in Education (Downey, 1988)  
Policy Perspective on Higher Education (Cerych, 1984)  
Public Policy Analysis (Dunn, 1981)  
Public Policy Analysis (Pal, 1987)  
Social Measurement and Social Indicators (Carley, 1981)  
Social Research (Bailey, 1978)  
The Art of Scientific Investigation (Beveridge, 1968)  

Upon consideration of the approaches discussed in these documents, I assembled a combination of methods clustered around and integrated into a comparative case study approach. It is interesting that what Porter (1970) said about the comparative approach almost two decades ago may still be true today; "It is surprising, for all that is said about the value of comparison, that a rigorous comparative methodology has not emerged."
This apparent lack of rigorous comparative methodology may partially be due to the unavoidable trade-offs between rigor and relevance. In other words, the relative contrast between scientific reduction-certainty on the one hand and artistic holism-uncertainty on the other. At the same time, it appears that society is increasingly expecting researchers and practitioners to produce relevant answers to the relevant questions that plague modern times; even if some rigor must be sacrificed in the process.

In the book entitled *Educating the Reflective Practitioner*, Schon (1987) expresses the frustration experienced by professionals dealing with the problems of everyday reality. It applies equally well to policy researchers.

"In the varied topography of professional practice, there is a high, hard ground overlooking a swamp. On the high ground, manageable problems lend themselves to solution through the application of research-based theory and technique. In the swampy lowland, messy, confusing problems defy technical solution. The irony of this situation is that the problems of the high ground tend to be relatively unimportant to individuals or society at large, however great their technical interest may be, while in the swamp lie the problems of greatest human concern. The practitioner must choose. Shall he remain on the high ground where he can solve relatively unimportant problems according to prevailing standards of rigor, or shall he descend to the swamp of important problems and nonrigorous inquiry?"

In effect this research project uses a blend of research techniques developed by the social and natural sciences in an attempt to bridge the rigor-relevance chasm while at the same time maintain a systematic, structured and disciplined process. The three principal components of the comparative case study approach are described in the following subsection. These interrelated components are: assembly, review, and analysis of
documents; on-site reconnaissance; and interviews with non-replaceable respondents.

3.4.1. Assembly, Review, and Analysis of Documents

"History is the maverick among disciplines, the misfit, the bull in the china shop. Since everything has a history and history, potentially at least, deals with everything that has ever happened in human society, the historian is a kind of licensed rustler who wanders at will across his scholarly neighbors' fields, poaching their stock and purloining their crops and breaking down their hedges... The historian is not a respectable specialist but a sort of mongrel generalist who scavenges the spoil heaps of the contemporary sciences for old, forgotten, cast-off scraps of insight and information which, to him, will make the past intelligible and the future less surprising." (Perkin, 1984)

Many times during the course of this research, I could identify with Perkin's satirical, yet earnest, description of a historian. Utilizing all the resources at my disposal, I searched out and reviewed as many key documents as possible for each case study area in an attempt to weave a historical context around the research problem.

There are four primary categories of documentation: scholarly and professional literature, official legislation and policy documents, higher education institution publications, and other unpublished documents.

Scholarly and Professional Literature

The first level of information includes books, conference proceedings, student theses, and journals retrieved through traditional library research methods.
Some of the journals consulted were:

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<tr>
<td>Ambio</td>
<td>Natural Resources Journal</td>
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<tr>
<td>Australian Forestry</td>
<td>Renewable Resources Journal</td>
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<tr>
<td>Commonwealth Forestry</td>
<td>Unasylva</td>
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<tr>
<td>Forestry Chronicle</td>
<td>Wildlife Society Bulletin</td>
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<td>Forest Planning Canada</td>
<td>Australian Universities</td>
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<tr>
<td>Journal of Forestry</td>
<td>Comparative Education</td>
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<td>Journal of Forest History</td>
<td>Journal of Canadian Higher Education</td>
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<td>Journal of World Forest</td>
<td>Journal of Higher Education</td>
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<tr>
<td>Resource Management</td>
<td>Tasmania Journal of Education</td>
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<td>Land-Use Policy</td>
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Official Legislation and Policy Documents

The second category of information included official legislation, government policy statements, royal commissions, public inquiry documents, and specific resource management plans. While some of these documents were available through normal library channels, most were retrieved on-site from a variety of government agencies.

Higher Education Institution Documents

The third category included specific documents from institutions of higher learning. These included published course calendars, handbooks, or catalogs as they are known in Newfoundland, Tasmania, and Alaska respectively. It also included annual research reports, and other related documents. These were retrieved either on-site or through correspondence.

Unpublished Documents

The fourth kind of document is sometimes called "grey" literature. This includes unpublished documents that often provide critical information or insights that are not reflected in the other three categories of information. These documents were most often retrieved through the interview process in which individuals would search their own personal files.
3.4.2. On-Site Reconnaissance

I was fortunate during the course of this research to be able to personally visit all three countries and to study the provinces/states (Appendix A). Comparative research on this scale would be very difficult from a vicarious position alone.

The on-site reconnaissance was invaluable in retrieving documents, interviewing appropriate individuals, and providing a first-hand appreciation of the overall local context (Allison, 1971).

3.4.3. Interviews

There are many interview techniques possible (Powney and Watts 1987, Downs et al. 1980). For purposes of this study, I have interviewed only selected individuals, primarily at senior level, in government, industry, education and non-governmental organizations. Also, an attempt was made to interview retired people who have had influence on public policy (Appendix B).

The form of interviewing I used has been termed Elite Interviewing (Manheim and Rich 1981). However, I prefer to use the term Non-Replaceable Respondents to signify the unique and special information each interviewee possesses. Manheim and Rich (1981) make the point that in elite interviewing, it is often best to interview the most central figures late in the study. In the case of Tasmania and Alaska, this was not be possible. However, I made every effort to do this for Newfoundland.

The interviews were exploratory in nature and the questions and length of time depended largely on the interviewee. Almost all interviews led to retrieval of important documents and suggestions on others who should be interviewed.
All three methods - analysis of documents, on-site visits, and interviews - were complementary and necessary components. Each produced leads that were followed up on by mail, telephone, or in person.

3.5. ANALYTICAL FRAMEWORK

"In an age of specialized analysis, there is a prejudice against general questions and general answers: the study of forests is considered best pursued as the study of particular trees. Even as pictures from satellites open our eyes to sweeping vistas, our world view tends to be myopically mired in the magnifying-glass stage. The parts are delineated in excruciating detail, whereas the whole is left for some invisible hand to assemble or is regarded as no more than the sum of its parts." (Schmookler 1984)

In many respects this thesis is an effort to perform an "invisible hand" synthesizing function. For example, chapters four and five and the first part of chapter six provide a contextual backdrop in which a large variety of information has been synthesized over space and time dimensions.

However, the detailed comparative approach in chapter six utilizes a very specific analytic framework for teaching, research, and service functions of the higher education system. A comparative analysis is performed to assess how each of these variables relates to formulation of public policy, in general, and specifically, to integrated forest land-use policy.

Table 3.1 provides a framework for each variable analyzed and the principal information used in this process.

All three variables overlap, but I have attempted to distinguish each. The teaching function is analyzed by faculties, degrees, and individual courses in each institution. This information is obtained through the most recent calendars, handbooks, or catalogs as they are known in Newfoundland, Tasmania, and Alaska respectively.
Table 3.1. Analytical framework for comparative analysis.

<table>
<thead>
<tr>
<th>Higher Education Functions</th>
<th>Components Analyzed</th>
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<tr>
<td>Teaching</td>
<td>- Faculties and departments</td>
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<td></td>
<td>- Directly related degree programs</td>
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<td>- Individual related courses</td>
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<tr>
<td>Research</td>
<td>- Research centres/institutes</td>
</tr>
<tr>
<td></td>
<td>- Individual publications</td>
</tr>
<tr>
<td></td>
<td>- Student theses</td>
</tr>
<tr>
<td>Service</td>
<td>- Policy advice and consulting</td>
</tr>
<tr>
<td></td>
<td>- Conferences, symposiums, and short courses</td>
</tr>
<tr>
<td></td>
<td>- Involvement in related public associations</td>
</tr>
</tbody>
</table>

The research function is assessed through an analysis of annual research reports, publication lists, and bibliographies of books and journals.

The service criterion is the least bounded of the three functions. To a certain degree, it overlaps with teaching and research. For example, continuing education short courses, conferences, and symposiums all having teaching functions, and consulting and participation in Royal Commissions and public inquiries are services which often entail high level research. The service function is also the most difficult to catalog completely. I relied on annual reports, general media accounts, and interviews to assess this criterion and its impact on public policy.

From this analysis came general observations which did not fit neatly into any one function, nevertheless, they were noted and assessed.

The comparative analysis of the teaching, research, and service functions helped to clarify whether there was a direct, indirect or no relationship to formulating integrated forest land-use policy. It also helped to clarify whether the relationship was active, reactive, or indifferent to the policy formulation process altogether.
Based on the results of this comparative analysis, a conceptual framework is outlined in chapter seven which attempts to explain the relationship of higher education and public policy in a wider context.
PART II.

THE GENERAL CONTEXT

CHAPTER FOUR. GLOBAL, INTERNATIONAL, AND NATIONAL CONTEXT

CHAPTER FIVE. GENERAL COMPARISON OF NEWFOUNDLAND, TASMANIA, AND ALASKA
CHAPTER FOUR. GLOBAL, INTERNATIONAL AND NATIONAL CONTEXT

4.1. INTRODUCTION

Although Newfoundland, Tasmania, and Alaska are peripheral province/states with strong independent identities, they do not function in a vacuum. Obviously, their policies are influenced in varying degrees by their respective countries and activities in these countries, in turn, are influenced by, and part of, the larger "global community."

This chapter outlines the basic global, international and national context that is necessary to understand the three case study areas. It is divided into four general sections. Section 4.2 discusses some of the basic aspects of history, settlement, and governance in Canada, Australia, and the United States. Section 4.3 reviews land-use policy as it relates to forests. Section 4.4 examines the higher education system, in general, and section 4.5 reviews forestry education in more detail.

4.2. HISTORY, SETTLEMENT, AND GOVERNANCE

A knowledge of general world history is fundamental to understanding the evolution of the many nation states that presently comprise the globe. This history is well documented and widely available so I will not linger except to highlight a few points as they relate to Canada, Australia, and the United States.

These three nations have their earliest intellectual roots in ancient Greece and share common ties to what is generally known as Western tradition. Furthermore, these three countries share their general origins to what was known as the British Empire. The fact that the United States "broke ranks" with this tradition is significant in the resulting policies, trading patterns, and general world relations. In contrast, Australia adopted the British model most studiously and this fact is reflected in its present day operations. Canada, on the other hand, has evolved from a
mixture of traditions. Its formal ties to the British Empire are well known and have remained strong but have lessened as exemplified by the recent constitutional independence. A second factor, in this hybridization, is Canada's geographical proximity to the United States. The friendly relations are symbolized by the often noted longest undefended border in the world. A third and equally important factor in Canada's history is the French tradition most vividly expressed by the Province of Quebec.

These historical factors and many more account for the present day context of world politics and policy making (Russett and Stan, 1981). They also provide a context for present day natural resource use and management (Myers, 1984).

Today, there are a large variety of political ideologies at work in the world. These ideologies range from democracy to anarchism, Marxism, socialism, fascism, and communism (Baradat, 1988). As well, there are different economic ideas at work (Heilbroner, 1986). In practice, economics and politics are often closely linked, if not the same (Lindblom, 1977).

The discussion here is somewhat simplified in that Canada, Australia, and the United States, all to a certain degree, subscribe to democratic capitalism. That is, they believe that political power comes from the people who are equal individuals possessing a set of unalienable rights. The primary means of distribution of goods in services is through the free market system.

In addition, they are all federations of provinces/states - Canada ten provinces and two territories, Australia six states and two
territories, and the United States fifty states and several territories. They became countries in 1867, 1901, 1776 respectively.

However, there are important differences. Canada and Australia both utilize the Westminster parliamentary-cabinet system (Albinski, 1973; Parkin et al., 1982). The bulk of the political power in this system is vested in the parliament (Baradat, 1988). Policy making is relatively confined to the Prime Minister and Cabinet. Marsh (1980) argues that under this system "public policy making has become disengaged from external influences." However, in Canada, pressure groups have become more influential in recent years (Stanbury, 1986; Pross, 1986). For more Canadian-Australian similarities, consult Spazzapan and Ternowetsky (1983).

In contrast to Canada and Australia, the United States utilizes a presidential-congressional system (Baradat, 1988). The separation of powers, and checks and balances between executive legislative and judicial branches provide a more visible approach to policy making.

Doern and Phidd (1983) provide a concise description of the contrasts between the Canadian and American systems.

"Canada's political origins demonstrate an explicit rejection of the American revolution and an acceptance of the 'peace, order and good government' offered by British traditions and institutions reflected especially in Parliamentary government. At a basic constitutional level this also led to the adoption of a system of responsible Cabinet-Parliamentary government as opposed to the American system which constructed an elaborate array of 'checks and balances' between the three branches of government: the executive, the legislature and judiciary. Canadian political leaders rejected the excesses of the American belief in individual liberty and distrust of government and authority. Even in the 1981 debate which led to an entrenched Charter of Rights, the Canadian system balanced its adherence to basic rights by providing for the right of legislative bodies to override these rights for a limited period of time. While Canada evolved into a
liberal democratic state, it did so with a strong adherence to collectivist norms, whether of the Tory organic community variety or of a later social democratic kind."

All three countries have free market capitalist systems of economic distribution. However, Canada and Australia have historically taken on more Crown or public responsibilities for social programs such as health and education, while the United States has depended on the private sector to a greater extent.

In any democratic system, power stems from the number of voters. Table 4.1 shows the relative populations of the three countries. As a percent of the world's population of approximately five billion, Canada comprises about half of one percent, Australia is even less, and the United States accounts for less than five percent. On the world political stage, all three wield influence far greater than their population numbers alone would suggest.

Table 4.1. Population estimates Canada, Australia, United States, 1800, 1850, 1900, 1960, 1985

<table>
<thead>
<tr>
<th></th>
<th>Canada</th>
<th>Australia</th>
<th>United States</th>
</tr>
</thead>
<tbody>
<tr>
<td>1800</td>
<td>350,000</td>
<td>----------</td>
<td>5,300,000</td>
</tr>
<tr>
<td>1850</td>
<td>2,400,000</td>
<td>800,000(^1)</td>
<td>23,000,000</td>
</tr>
<tr>
<td>1900</td>
<td>5,400,000</td>
<td>3,700,000</td>
<td>76,000,000</td>
</tr>
<tr>
<td>1960</td>
<td>18,200,000</td>
<td>10,500,000</td>
<td>179,000,000</td>
</tr>
<tr>
<td>1985(^2)</td>
<td>25,370,000</td>
<td>15,760,000</td>
<td>239,280,000</td>
</tr>
</tbody>
</table>


Settlement patterns are similar in all three countries in that initial activity began in the east and moved west. To the frontier agrarian societies the expanse of virgin forests encountered were seen largely as hindrance to settlement, not as a source of wealth or enjoyment. Initially, then, forests were cleared and burned to make way for villages
and farms. Later demand for ship timber for the British naval fleet became important and the best trees were marked and cut for this purpose in all three countries.

The early settlement pattern is still reflected today in large urban corridors. In Canada, the Montreal-Windsor core is dominant. In Australia the Sydney-Melbourne belt accounts for more than half of her population. Similarly, the United States Boston-Philadelphia corridor contains a large percent of the population. To a certain degree there is a general west coast movement in all three. This is reflected in several relatively young urban metropolis', Vancouver in Canada, to a lesser extent Perth in Western Australia, and Los Angeles in the United States.

4.3. FOREST LAND-USE AND POLICY

The total land area of the earth (excluding Antarctic, Greenland, and Svalbard) is more than 13 billion hectares, one fifth of this, or 2.6 billion hectares is closed forest (Sedjo and Clawson, 1984; Duffied, 1982). Since there are approximately 5 billion people on earth, this means that there is roughly one-half hectare (one acre) of closed forest for every person on earth.

The distribution of land and forests is not so mathematically neat, in fact, possession of land has been at the centre of many of the world's fiercest battles. Today, most of the planet is divided into nation states (Baradat, 1988; Carnoy, 1984) that are sovereign and, therefore, make policies over how land is distributed. Patricios (1986) provides a useful International Handbook on Land-Use Planning that documents these differences. The journal Land-Use Policy also provides an international forum for professionals interested in land-use policy (Coleman, 1987).
Table 4.2 and Figure 4.1 show the present ownership of forest in Canada, Australia, and the United States. In Canada and Australia, the provinces/states are the major forest land owners. On the other hand, the private sector is more dominant in the United States.

Table 4.2. Productive/commercial forest area by ownership Canada, Australia, and the United States.

<table>
<thead>
<tr>
<th>Ownership</th>
<th>Canada</th>
<th>Australia</th>
<th>United States</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000 ha %</td>
<td>1000 ha %</td>
<td>1000 ha %</td>
<td></td>
</tr>
<tr>
<td>Federal</td>
<td>26,800 11</td>
<td>- 0</td>
<td>43,300 21.4</td>
</tr>
<tr>
<td>Province/State</td>
<td>195,000 80</td>
<td>30,300 73.4</td>
<td>11,700 5.8</td>
</tr>
<tr>
<td>Private</td>
<td>21,900 9</td>
<td>11,000 26.6</td>
<td>147,000 72.8</td>
</tr>
<tr>
<td>Total Forest</td>
<td>243,700 100.0</td>
<td>41,300 100.0</td>
<td>202,000 100.0</td>
</tr>
<tr>
<td>% of Total Land</td>
<td>26.4</td>
<td>5.4</td>
<td>22.0</td>
</tr>
<tr>
<td>Total Land</td>
<td>921,500</td>
<td>768,200</td>
<td>917,000</td>
</tr>
</tbody>
</table>


1Inventoried productive forest land, another 55 million hectares of forest land not yet inventoried.

Figure 4.1. Ownership of productive/commercial forest in Canada, Australia, and the United States.

LEGEND

- Province/State Gov't
- Federal Government
- Private


Each nation has formulated its own policies that govern the use of forests. These range from practically no effective limitation on forest-use in some countries to very elaborate environmental policies that regulate and monitor consumptive and non-consumptive use of all forest lands.

Table 4.3 outlines some of the important global policies and pieces of legislation impacting on land-use in general. Apart from general international agreements and general trade legislation, there are four basic types of policies impacting on forest land-use. These categories of policy are: forest, multiple use, integrated land-use, and conservation-environmental. I will discuss each in turn, highlighting legislation and policies from Canada, Australia, and the United States.

FOREST POLICY

In practice forest policy has been driven primarily by timber policy, in part, because of the obvious material importance of timber products. Tables 4.4 and 4.5 show the relative importance of timber production in Canada, Australia, the United States, and the world. Canada is a net exporter while both Australia and the United States are net importers of forest products.

Timber policy, in theory has been driven by the principle of sustained yield, that is, a particular area is managed to produce roughly equal annual, or regular periodic, yields of timber.
Table 4.3. Some International and global events impacting on land-use policy in Canada, Australia, and the United States.

<table>
<thead>
<tr>
<th>Name, Date</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Convention for the Protection of Migratory Birds 1916</td>
<td>Convention between the United States and Great Britain (on behalf of Canada) to ensure conservation of migratory birds.</td>
</tr>
<tr>
<td>General Agreement on Tariffs and Trade (GATT) 1947 Russett and Starn, 1981</td>
<td>Agreement between many nations, based on free trade and nondiscriminatory policies. Established rules of trade, commerce, and trade negotiations for trade in manufactured goods.</td>
</tr>
<tr>
<td>Man and Biosphere Program 1976 Gilpin, 1986; Myers, 1984</td>
<td>Promoted long term conservation of the world’s representative ecosystems, with their component plants, animals, and micro-organisms. Emphasis on scientific research and constant monitoring of the environment.</td>
</tr>
<tr>
<td>United nations Conference on the Human Environment 1972 Gilpin, 1986; Ward and Dubos, 1972</td>
<td>To serve as a practical means to encourage, and to provide guidelines for, action by Government and International organizations designed to protect and improve the human environment and to remedy and prevent its impairment, by means of international cooperation.</td>
</tr>
<tr>
<td>International Convention for the Protection of World Cultural and Natural Heritage 1972 Gilpin, 1986; Myers, 1984</td>
<td>Convention adopted by UNESCO. Aims to ensure international cooperation for the safeguarding of the globe’s irreplaceable heritage. Each signatory country is required to do all it can to ensure the identification, protection, conservation, preservation, and transmission to future generations of its natural and cultural heritage.</td>
</tr>
<tr>
<td>Convention on Wetlands of International Importance, especially as Waterfowl Habitat 1975 Gilpin, 1986</td>
<td>To create reserves and otherwise protect wetlands that are internationally important for reasons including their habitat value for rare or migratory birds.</td>
</tr>
<tr>
<td>Convention on Migratory Species of Wild Animals 1979 Gilpin, 1986; Myers, 1984</td>
<td>For species that cyclically and predictably cross one or more national jurisdictional boundaries.</td>
</tr>
<tr>
<td>World Conservation Strategy 1980 IUCN-UNEP-WWF, 1980</td>
<td>The aim of the WCS is to help advance the achievement of sustainable development through the conservation of living resources.</td>
</tr>
<tr>
<td>World Commission on Environment and Development 1987 WCED, 1987</td>
<td>Commissioned by the General Assembly of the United Nations to formulate 'A global agenda for change.' The report 'Our Common Future.' The commission’s proposals for institutional and legal change are included in six priority areas: getting at the sources, dealing with effects, assessing global risks, making informal choices, providing the legal means, investing in our future.</td>
</tr>
<tr>
<td>Canada-U.S. Free Trade Agreement 1989</td>
<td>Establishes an improved trading relationship based on more secure and open access to each other’s markets.</td>
</tr>
</tbody>
</table>
Table 4.4. Canada, Australia, United States and world production of roundwood, 1986.

<table>
<thead>
<tr>
<th></th>
<th>Industrial roundwood</th>
<th>Fuelwood and charcoal</th>
<th>Total roundwood</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Logs and bolts</td>
<td>Pulpwood</td>
<td>Other roundwood</td>
</tr>
<tr>
<td>Canada</td>
<td>130,750</td>
<td>42,174</td>
<td>1,370</td>
</tr>
<tr>
<td>Australia</td>
<td>8,144</td>
<td>7,859</td>
<td>1,116</td>
</tr>
<tr>
<td>United States</td>
<td>244,860</td>
<td>126,260</td>
<td>11,469</td>
</tr>
<tr>
<td>World</td>
<td>959,339</td>
<td>393,641</td>
<td>220,924</td>
</tr>
</tbody>
</table>


Table 4.5. Canada, Australia, United States World exports and imports of forest products, 1986.

<table>
<thead>
<tr>
<th>Trade area</th>
<th>Roundwood</th>
<th>Lumber and railway ties</th>
<th>Paper and paperboard</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>U.S. $000 000</td>
<td>Softwood lumber Total</td>
<td>Wood pulp Total</td>
<td></td>
</tr>
<tr>
<td>Exports</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Canada</td>
<td>268</td>
<td>3,505 3,584</td>
<td>328 2,932</td>
<td>4,079 5,029 12,140</td>
</tr>
<tr>
<td>Australia</td>
<td>161</td>
<td>-- 9</td>
<td>3 --</td>
<td>1 33 207</td>
</tr>
<tr>
<td>United States</td>
<td>1,420</td>
<td>640 987</td>
<td>330 1,650</td>
<td>195 1,899 6,286</td>
</tr>
<tr>
<td>World</td>
<td>5,791</td>
<td>8,633 11,386</td>
<td>5,368 9,049</td>
<td>6,677 25,819 57,414</td>
</tr>
<tr>
<td>Imports</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Canada</td>
<td>166</td>
<td>103 280</td>
<td>135 90</td>
<td>-- 471 1,141</td>
</tr>
<tr>
<td>Australia</td>
<td>--</td>
<td>160 219</td>
<td>42 69</td>
<td>102 465 795</td>
</tr>
<tr>
<td>United States</td>
<td>60</td>
<td>2,841 2,997</td>
<td>852 1,581</td>
<td>3,682 5,621 11,111</td>
</tr>
<tr>
<td>World</td>
<td>8,034</td>
<td>9,516 12,628</td>
<td>5,553 9,482</td>
<td>7,025 28,378 64,075</td>
</tr>
</tbody>
</table>

Tables 4.6, 4.7, and 4.8 present some legislative and policy activities important in Canada, Australia, and the United States that impact on forest land-use policy in Newfoundland, Tasmania, and Alaska. For more detail, consult Appendix D.

Table 4.6. Some Canadian legislation and policies impacting on Newfoundland land-use.

<table>
<thead>
<tr>
<th>Name, Date Reference</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Federal Policy on Land Use 1980 Government of Canada, 1982</td>
<td>To ensure that federal policies and programs and the managements of federal lands contribute to the wise use of Canada's land resources.</td>
</tr>
<tr>
<td>Atlantic Canada Opportunities Agency 1987</td>
<td>To stimulate opportunities for sustained economic growth in the Atlantic Region through action, cooperation, coordination and advocacy.</td>
</tr>
<tr>
<td>Canadian Environmental Protection Act 1988</td>
<td>Take both preventative and remedial measures in protecting the environment.</td>
</tr>
<tr>
<td>National Round Table on Environment and Economy</td>
<td>To act as a catalyst, consensus builder, and leader in the pursuit of environmentally sustainable development.</td>
</tr>
</tbody>
</table>

MULTIPLE-USE POLICY

For several centuries, foresters have recognized the pivotal role that forests play in regulating watersheds, stabilizing soil, providing habitat for wildlife, serving as a setting for outdoor recreation as well as timber products.

Carrol (1978) gives examples of multiple-use of forest lands as far back as the Bronze Age and Medieval times. The concept of multiple use, as it is referred to in its modern context, surfaced on the world forestry stage in the late 1950's and early 1960's.
<table>
<thead>
<tr>
<th>Name, Date, Reference</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environment Protection (Impact of Proposals) Act 1974 Australian Environment Council, 1986</td>
<td>To ensure, to the greatest extent practicable, that matters affecting the environment to a significant extent are taken fully into account in relation to the formulation of proposals, the carrying out of works and other projects.</td>
</tr>
<tr>
<td>World Heritage Properties Conservation Act 1983 Aust. Env. Council, 1986</td>
<td>To provide for the protection of certain property that Australia has identified as &quot;natural heritage&quot; or &quot;cultural heritage&quot; within the meaning of the Convention for the Protection of the World Cultural and Natural Heritage.</td>
</tr>
<tr>
<td>National Forest Strategy for Australia 1986 Australian Forestry Council, 1986</td>
<td>To indicate important basic principles and goals associated with the management of Australia’s forests. The Strategy includes statements on Land Use, Protection, Multiple-use, Economics and finance, Research, education and information, International aspects and implementation. Under regulations made under the Export Control Act 1982 approval to export woodchips from Tasmania over a period of 15 years from January 1, 1989.</td>
</tr>
<tr>
<td>Memorandum of Understanding 1986 between Commonwealth of Australia and State of Tasmania</td>
<td></td>
</tr>
<tr>
<td>Lemonthyme and Southern Forests (Commission of Inquiry) Act 1987 Helsham et al., 1988</td>
<td>To enquire into and report upon various matters relating to two areas of Tasmania called the Lemonthyme area and the Southern Forests area, to report whether there are any qualifying areas found to be part of the world heritage as defined in the World Heritage Convention.</td>
</tr>
</tbody>
</table>

In 1960 the theme of the Fifth World Forestry Congress, Multiple Use of Forest Lands emphasized the holistic aspects of forest management. McArdle (1960) stated in his keynote speech that "we must now be forest land managers instead of primarily timber growers." The proceedings of the Seventh World Forestry Congress held in 1972 also contained numerous papers on multiple-use. In 1984 the International Union of Forestry Research Organization (IUFRO) published a Proceedings for Economic Value Analysis of Multiple-Use Forestry (Kaiser et al., 1984). Kaiser and Norbury (1984) conclude:
"The research results on multiple use forestry are starting to provide a rationale for policy makers for managing forest resources. Although difficult to resolve, this rationale is of central importance to forest managers."

Table 4.8. Some United States legislation and policies impacting on Alaska land-use.

<table>
<thead>
<tr>
<th>Name, Date, Reference</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alaskan Statehood Act 1958 Naske and Slotnick, 1987</td>
<td>Admitted Alaska to Union and granted new state authority to select 102.9 million acres over twenty five years.</td>
</tr>
<tr>
<td>Multiple-Use Sustained-Yield Act 1960 U.S.D.A., 1978; Bubany et al., 1982</td>
<td>Declares supplemental purposes for which national forests are established and administered, including outdoor recreation, range, timber, watershed, and fish and wildlife. Declares multiple-use sustained-yield concept as a governing planning principle.</td>
</tr>
<tr>
<td>National Environmental Policy Act (NEPA) 1970 U.S.D.A., 1978; Bubany et al., 1982</td>
<td>Declaration of a national environmental policy calling for the creation and maintenance of conditions under which man and nature can exist in productive harmony.</td>
</tr>
<tr>
<td>Joint Federal-State Land Use Planning Commission 1972 Joint Federal-State LUPC, 1979</td>
<td>To create a framework for the use and protection of Alaska lands and resources in the years to come.</td>
</tr>
</tbody>
</table>

In a recent paper entitled Does Multiple Use Forestry Have a Future?, Anstey (1987) concludes:

"The challenge will be in ensuring that management, whether it is called multiple-use management or not, is able to integrate the values our society expresses to achieve a balance it defines."

While the goal of multiple-use has been recognized for some time, the degree to which it has been achieved varies from country to country and even from region to region within those countries:
In Canada, as in other countries, a great deal of confusion still exists as to the exact meaning of multiple-use (Manning, G., 1980; Smith, 1970). Each person, lay or professional, seems to have a personal definition (Strang, 1983). Definitions aside, there are fertile arguments that Canada is or is not achieving multiple-use forestry. For example, Cuthbert (1986) speaking to a group of Canadian foresters argues "too many of us can't see the forest for the timber." Dunster (1988a, 1988b) and Fulthorpe and Buffinga (1987) also suggest that the goal of multiple-use has not yet been achieved. On the other hand, Jeanes (1987) submits that "multiple-use in the man-made forest is being practiced and people are involved to a far greater extent than the public realizes." Others acknowledge that conflicts still exist and propose methods for reconciliation (Pearse, 1983; Campbell and Pearse, 1984).

In Australia the concept of multiple-use forestry was recognized in the late 1950's and early 1960's (Crane, 1958; Harris, 1960; McGrath, 1962). By the 1970's and 1980's there was some question of the degree to which multiple-use could be achieved (Lucas and Sinden, 1970; Friend, 1980). Richards (1983) states: "There is no doubt that in Australia, as in North America, forest policy for most of this century has been dominated by the doctrine of timber primacy." Reynolds and Sinden (1979) and Davis (1984) propose ways to reconcile conflicts over amenity and non-wood values in multiple-use of woodlands.

The United States government passed the Multiple-Use Sustained Yield Act in 1960 to serve as a planning principle governing the administration of national forests (Bubany et al., 1982). The critics were not long in arriving. Zivnuska's (1961) paper The Multiple Problems of Multiple Use states "multiple use is more a symbol of the problems we face than a simple
method for their solution." Hall's (1963) paper The Myth and Reality of Multiple Use Forestry concludes "present theoretical interpretations of multiple use are based on weak foundations, and professional administrative judgements are heavily dependent on intangible factors." The criticisms continue into the 1980's (Stout, 1983). On the other hand, there are those who defend the concept. For example, Webster and Hacker's (1986) paper Multiple Use: Improving on a Good Idea, and Avoiding a Red Herring points to the need "to separate conflicting uses of forest resources in a more productive manner."

Bowes and Krutilla (1989) in their comprehensive book Multiple-Use Management: The Economics of Public Forestlands "have sought to bring to the economic analysis...an updated theoretical framework" that recognizes that the assumptions underlying market economics often have little or no relevance for multiple-use forestry.

INTEGRATED LAND-USE POLICY

Parallel to, and interrelated with, the multiple-use movement of foresters is the broader land-use movement of urban and regional planners, geographers, and other professions including forestry. There are actually several closely related concepts being promoted. These are known variously as: land-use planning, comprehensive planning, integrated land-use policy, or integrated resource management. While there are subtle differences in each of these, I will treat them here as if they were synonymous - using the term integrated land-use policy.

On a global basis, the concept of integrated land-use policy is appealing in theory, but fraught with difficulty in practice (Barrett and Healey, 1985; Fabos, 1985; Patricios, 1986; Mitchell, 1987; Jeffers, 1988).
The most comprehensive review of integrated land-use policy in Canada is contained in a series of papers in the book Integrated Approaches to Resource Planning and Management (Lang, 1986). In particular, Mitchell's (1986) paper provides a good summary of the evolution of integrated resource management in Canada starting with a number of Canadian forestry conventions in 1906, the Commission of Conservation, and the 1961 Resources for Tomorrow Conference in Montreal as well as efforts by individual provinces. In 1980 the Government of Canada (1982) released a Federal Policy on Land Use. The main goal was "to ensure that federal policies and programs and the management of federal lands contribute to the wise use of Canada's land resources." The first of eleven policy statements is:

"The federal government will pursue the achievement of the policy goal through a cooperative federal/provincial approach, and will support those provincial land-use objectives, policies and programs that it views to be operating in the national interest."

Macenko and Neimanis (1983) summarize and provide an overview of provincial and federal systems of Crown land management for all ten provinces and for federal jurisdictions.

From a forestry perspective, there are several useful documents (Department of Regional Economic Expansion, 1969; Jeffrey et al., 1970). In particular, Dunster (1988b) provides a recent overview of the forestry aspects of land-use planning in Canada.


The most comprehensive attempt at formulation of an Australian land-use policy began on June 5, 1981 when the Senate referred the whole
question of land use to the Senate Standing Committee on Science, Technology and the Environment (SSCSTE). The result of their inquiry was published in their 1984 report Land use policy in Australia. Among other things, the committee concluded that:

"An overall national land use policy is regarded by the Committee as essential for Australia. The policy should consist of a broad general statement outlining principles of desirable national land use, together with a series of specific goals relevant to the principles. The statement should be supplemented by an outline of procedures for achieving the goals." (SSCSTE, 1984)

Specifically, it recommended that the Australian Environment Council establish a Standing Committee on Land Use. Its first two priorities would be "to draft a National Land Use Policy Statement" and "to direct the joint Commonwealth-State effort to standardize and improve the accessibility of land-use information, as part of a national information network." To my knowledge and in my investigations, I could not find any evidence that these recommendations are being implemented.

Constitutionally, the responsibility for land use lies with the individual States. However, the Commonwealth has two direct powers and many indirect powers over land use. It has direct and exclusive control over external affairs and is signatory to international treaties and conventions. Various indirect powers include: control over customs, exports and imports, interstate aviation, income tax, sales tax, grants to States, interstate trade and commerce, banking, funding agreements with State governments, aboriginal land rights and heritage protection legislation, and the Register of the National Estate. In addition, the Commonwealth influences by example. For example, the States often use
commonwealth legislation as guides when drafting their own legislation (SSCSTE, 1984).

The Commonwealth has a number of ministerial councils concerned with various aspects of land use policy, including Australian Councils for: Agriculture, Environment, Forestry, Water Resources, Nature Conservation, Tourism, Minerals and Energy, Aboriginal Affairs, Local Government Ministers Conference and the Planning Ministers Conference.

Other useful references include Ferguson (1974), Burton (1985), Cocks et al. (1986), and Bunkers (1986).

Compared to Canada and Australia, the federal government of the United States owns a large amount of land - roughly one third of the total. Most of this land is in the western states and Alaska, and is managed primarily by the Bureau of Land Management, the U.S. Forest Service, and the National Park Service. Most of the remaining two-thirds of the land is in private ownership of some type, and this is regulated principally by state and municipal governments. Therefore, there is no such thing as a single U.S. land-use policy. Instead, there are numerous policies at federal, state, and municipal levels (Davis, 1976; Portney, 1982; Journal of Forestry, 1982; Carr and Duensing, 1983; Jackson, 1983, 1986; Caldwell, 1987; Garcia, 1987; Plotkin, 1987).

CONSERVATION-ENVIRONMENTAL POLICY

The fourth and most recent movement embraces the broad area of conservation and environmental policy. This policy arena has been influenced by and overarches the three movements previously discussed. The exact issue or event that sparked the movement on a worldwide basis is debatable. However, there is little doubt that the 1972 United Nations Conference on the Human Environment held in Stockholm was a significant
catalyst (Ward and Dubos, 1972; Eckholm, 1982; Daly, 1980; O'Riordan and Turner, 1983a, 1983b; and Repetto 1985, 1986).

A second influential event was the preparation of the World Conservation Strategy (WCS) by the International Union for Conservation of Nature and Natural Resources, IUCN, (1980) in cooperation with the United Nations Environment Program (UNEP) and the World Wildlife Fund (WWF) in collaboration with FAO and UNESCO. This strategy represents a global level consensus on the role of conservation in world development.

"The world conservation strategy is intended to stimulate a more focused approach to the management of living resources and to provide policy guidance on how this can be carried out by three main groups: Government policy makers, conservationists and development practitioners."

The aim is to achieve three main objectives of living resource conservation:

1. "To maintain essential ecological processes and life support systems.

2. To preserve genetic diversity.

3. To ensure the sustainable utilization of species and ecosystems (notably fish, and other wildlife), forests and grazing land, which support millions of rural communities as well as major industries."

The WCS was endorsed by a number of countries who prepared their own National Conservation Strategies (NCS). Canada produced a National Conservation Strategy in 1986 (Pollard, 1987; Pollard and McKechnie, 1986; Canadian Society of Environmental Biologists, 1987), and Australia produced an NCS in 1983 (Selman, 1988; Institute of Foresters of Australia, 1987; Department of Home Affairs and Environment, 1983). As well, the National Forest Sector Strategies in each of these countries endorsed the WCS and NCS principles (Australian Forestry Council, 1986; Canadian Council of
The report of the World Commission on Environment and Development (1987), Our Common Future, endorsed the WCS and stressed that a healthy environment is required for a healthy economy. The Commission was appointed by the United Nations and chaired by the Prime Minister of Norway with commissioners representing senior positions from over twenty countries. The report states:

"... Those responsible for managing natural resources and protecting the environment are institutionally separated from those responsible for managing the economy. The real world of interlocked economic and ecological systems will not change; the policies and institutions concerned must..."

The World Commission defined sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs."

The fact that political decision-makers in the world are officially recognizing the critical interrelationships between a healthy environment and a healthy economy through the concept of sustainable development is having profound effects on the formulation of related policies (Centre for Our Common Future, 1989). The United Nations is preparing for a global conference on environment and development to be held in Brazil in 1992.

Canada is moving ahead swiftly on the goal towards sustainable development (National Task Force on Environment and Economy, 1987; Environment Canada, 1984, 1987; Richardson, 1989). It has set up a National Round Table on Environment and Economy to act as a catalyst, consensus-builder and leader in the pursuit of environmentally sustainable economic development.
Australia is also concerned with sustainable development (Department of Arts, Heritage and Environment, 1985; Selman, 1988).

The United States has been active for several decades in formulating environmental legislation and policies which can be related to sustainable development (Portney, 1982; Rosenbaum, 1985).

In summary, this review of four interrelated policy arenas: forest, multiple-use, integrated land-use, and environmental; provides a brief sketch of the international and national evolution of legislation and policy events that impact significantly on policy formulation in Newfoundland, Tasmania, and Alaska.

4.4. HIGHER EDUCATION SYSTEMS

This section outlines the general history of higher education in the world, with focus on Canada, Australia, and the United States.

4.4.1. Higher Education History and Overview

Some type of higher education has been in existence for several millennia. But it is useful to focus the discussion here on the history of universities, in particular.

No one knows for certain the exact date when universities began.

"Universities, like cathedrals and parliaments, are a product of the Middle Ages. The Greeks and the Romans, strange as it may seem, had no universities in the sense in which the word has been used for the past seven or eight centuries....Only in the twelfth and thirteenth centuries do there emerge in the world those features of organized education with which we are most familiar, all that machinery of instruction represented by faculties and colleges and courses of study, examinations and commencements and academic degrees. In all these matters we are the heirs and successors, not of Athens and Alexandria, but of Paris and Bologna...."

...The fundamental organization is the same, the historic continuity is unbroken. They created the university tradition of the modern world, that common tradition which belongs to all our
institutions of higher learning, the newest as well as the oldest..." (Haskins, 1957)

Universities are among the oldest of existing institutions. Kerr (1982) reports that about eighty-five institutions in the Western world established by 1520 still exist in recognizable forms; of these, seventy are universities. They are "still in the same locations with some of the same buildings, with professors and students doing much the same things, and with governance carried on in much the same ways. There have been many intervening variations on the ancient themes, it is true, but the eternal themes of teaching, scholarship, and service, in one combination or another, continue..."

The basis of liberal arts and scientific education so prevalent today can be traced to the trivium and quadrivium of the early Middle Ages (Neilson and Gaffield, 1986; Winchester, 1988).

"... All scholars were educated in the trivium and quadrivium, the seven liberal arts divided into a triad of humanistic subjects (logic, rhetoric and grammar) and a quartette of scientific ones (geometry, astronomy, arithmetic and musical harmony). All scholars initially regarded this division of thought as merely a methodological convenience, as indeed it was: the trivium focused on verbal analysis, whereas the quadrivium focused on accurate measurement and computation. All scholars used the full range of both sets of intellectual tools...

... Gradually over the centuries, those interested in questions of value resorted to the trivium and those interested in questions of fact resorted to the quadrivium, while theology increasingly receded as a realm of investigation common to both groups. Although this process was masked by a seeming unity of methodology, divisive scholarly judgments manifested themselves in the ranking of the quadrivium as the higher and the trivium as the lower branch of learning..." (Cude, 1987)

In addition to the liberal and scientific branches of education, several of the older professions, such as law and medicine, also have part
of their origins in the early universities. However, the historic path to the present close association between professionalism and higher education is not straight and clear (Moore, 1970). Professional education was shared to a certain degree between the universities and the guilds. With the rise in importance and prestige of many of the professions such as law, medicine, engineering, the association, with the university, became closer (Goodland, 1984; Boaz, 1981; Carson 1977; Bledstein, 1978; Krever, 1978; Wright, 1978; Mayhew and Ford, 1974; Vollmer and Mills, 1966). The early tensions between the universities and the professions are still apparent today in the dichotomy between liberal and professional education (Marsh, 1988). This is particularly true for the so-called new professions such as agriculture, forestry, and business administration (although the latter has gained immensely in popularity (Cheit, 1975)).

Clark (1983) summarizes today's higher education system in cross-national perspective. Although rapid transportation and communications systems have allowed for an increased homogenization of the global community of scholars, there are still distinct differences in the higher education systems of various nations. The United Nation's Educational, Scientific, and Cultural Organization (UNESCO, 1982) publishes a useful World Guide to Higher Education.

4.4.2. Higher Education in Canada, Australia, and the United States

The traditions of higher education in Canada, Australia, and the United States share some common origins which are manifest in the present day structure and operation of their universities. Taken as a whole, the present differences in systems are more cosmetic than substantial in relation to this study. The one major exception would be the public service orientation cultivated by the land-grant university system in the
United States. But even this distinction is narrowing as universities throughout the world move towards closer relations with governments, business, and industry. There is also a trend towards mass higher education (Kapur, 1977).

The following tables provide some comparative data on establishment and current enrollments in higher education in Canada, Australia, and the United States. Higher education in Canada started in 1635, one year earlier than the establishment of Harvard College in 1636 in the United States. More than two hundred years later, the first university was established in Australia (Table 4.9). Since these early beginnings, the number of universities has increased to 69 in Canada, 19 in Australia, and 156 in the United States. The total student enrollment in higher education institutions is now over one million in Canada and Australia, and over twelve million in the United States (Table 4.10).

Canada and the United States have approximately 13 and 19 percent of their labour force qualified with a first degree. Australia has 8 percent (Table 4.11).

4.4.2a. Higher Education in Canada

Harris (1976) provides a detailed history of higher education in Canada. Essentially there have been two histories; one in Quebec and one in English Canada. The English Canada higher education system has been influenced by British, Scottish, French, and American systems. Sheffield et al. (1982) provide a recent description, and Leblanc and Kelly (1987) furnish a review of federal policy on post-secondary education. Other useful background references include Axilrod and Reid (1989), West (1988), Abu-Laban (1989), Sheffield (1982), Harris (1971), Harris et al. (1981), and Harris and Trembley (1960).
Table 4.9. Selected dates in higher education in Canada, Australia, and the United States.

<table>
<thead>
<tr>
<th>Year</th>
<th>Canada</th>
<th>Australia</th>
<th>United States</th>
</tr>
</thead>
<tbody>
<tr>
<td>1600</td>
<td>1635 College de Jesuits (Quebec)</td>
<td></td>
<td>1636 Harvard College</td>
</tr>
<tr>
<td>1700</td>
<td></td>
<td></td>
<td>(1776 Federation)</td>
</tr>
<tr>
<td>1800</td>
<td>1802 1st University Charter Univ. of King's College (NS)</td>
<td>1850 U of Sydney</td>
<td></td>
</tr>
<tr>
<td>1850</td>
<td>(1867 Confederation)</td>
<td>1850 U of Sydney</td>
<td>1862 Morrill Act</td>
</tr>
<tr>
<td>1875</td>
<td></td>
<td>1890 U of Tasmania</td>
<td>1876 Johns Hopkins Graduate School</td>
</tr>
<tr>
<td>1900</td>
<td></td>
<td>(1901 Federation)</td>
<td>1917 U of Alaska</td>
</tr>
<tr>
<td>1925</td>
<td>1942 Memorial Univ of Nfld.</td>
<td>1946 Australian National University</td>
<td></td>
</tr>
<tr>
<td>1950</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1975</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2000</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Primary Source: Harris, 1976, MacMillan 1968, Brubacher and Rudy, 1976
Table 4.10. Tertiary education enrollments, Canada, Australia, and the United States, 1984-85.

<table>
<thead>
<tr>
<th>Institution</th>
<th>Total enrollment</th>
<th>Institution</th>
<th>Total enrollment</th>
<th>Institution</th>
<th>Total enrollment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Canada 1984-85</strong></td>
<td></td>
<td><strong>Australia 1985</strong></td>
<td></td>
<td><strong>United States 1985</strong></td>
<td></td>
</tr>
<tr>
<td>Universities*</td>
<td>739,000</td>
<td>Universities*</td>
<td>174,800</td>
<td>Four-year Universities and Colleges</td>
<td>7,716,000</td>
</tr>
<tr>
<td>Community colleges**</td>
<td>321,600</td>
<td>Colleges of advanced education</td>
<td>195,500</td>
<td>Two-year colleges</td>
<td>4,531,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TAFE colleges</td>
<td>904,500</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total tertiary</td>
<td>1,274,800</td>
<td>Total tertiary</td>
<td>12,247,000</td>
</tr>
<tr>
<td></td>
<td>1,060,600</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*University totals include full-time and part-time undergraduate and postgraduate students.

**Available statistics are for full-time students only. Part-time courses in community colleges are predominantly personal development or continuing education courses for which no certificates or diplomas are awarded.


Table 4.11. Proportion of labour force qualified to first degree level in selected countries.

<table>
<thead>
<tr>
<th>Country</th>
<th>Year</th>
<th>Proportion (per cent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>1981</td>
<td>8</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>1981</td>
<td>7</td>
</tr>
<tr>
<td>Canada</td>
<td>1981</td>
<td>13</td>
</tr>
<tr>
<td>USA</td>
<td>1981</td>
<td>19</td>
</tr>
<tr>
<td>Japan</td>
<td>1980</td>
<td>13</td>
</tr>
<tr>
<td>Federal Republic of Germany</td>
<td>1980</td>
<td>8</td>
</tr>
</tbody>
</table>


In 1977 there were 69 universities and 187 community colleges and other post-secondary institutions in Canada (Sheffield et al., 1982). Dennison and Gallagher (1986) lists 123 public community colleges; 53 public and 30 private other post-secondary institutions.

Higher education in Canada has been the subject of a large number of government enquiries and Royal Commissions (Dept. of Secretary of State, 1989; Goulson, 1981, 1985; Council of Ministers of Education, 1985; Davidson, 1988). Government intervention into (Higher Education Group, 1987) and government funding of (Dennison, 1987) higher education have also
been frequent topics in recent years while several studies and commentaries have been critical of the quality of post-secondary level education in general (Bercuson et al., 1984; Crude, 1987; Frye, 1988; Paquet and von Aur-Muehlen, 1987; Stalker, 1988; and Symone, 1975, 1978).

There have also been several conferences and surveys on the future prospects of higher education (Shere and Duhamel, 1987; Tausig, 1988).

4.4.2b. Higher Education In Australia

Traditionally the term 'higher education,' as used in Australia has meant only courses offered in Commonwealth-funded universities and Colleges of Advanced Education (Dawkins, 1987). The term 'tertiary education' is used for all programs beyond the secondary level. There are 19 universities, 46 colleges of advanced education, and a variety of other institutions offering some form of higher education.

MacMillan (1968) provides a history of Australian Universities.

"Seen from abroad Australian universities look very like one another. With the sole exception of the Australian National University in Canberra, which started with different aims from the others, all the universities are rather similar in structure to the English provincial or the Scottish universities."
(From Forward by J.A.L. Matheson in MacMillan, 1968)

"...The University of Western Australia possibly shows more signs of American influences than any other Australian foundation. Certainly, the earliest proposal for its establishment in the 1880's was redolent of the exploitation of the western U.S.A. by the railway barons..."
(MacMillan, 1968)

Other useful background references include Keeves (1987), Gallagher (1982), Gross and Western (1981), Williams (1978), and Harman and Smith (1972).
A policy discussion paper on higher education circulated by the Hon. J.S. Dawkins (1987) sparked off a series of papers and debates (Anderson, 1988; Bourke, 1988; Karmel, 1988; Beswick, 1988; Hilmer, 1988; and Stone, 1988a). The issues are complex and hinge on government intervention and appropriate funding mechanisms. This topic is discussed by Harman (1987).

4.4.2c. Higher Education in the United States

In 1983 there were 3,282 institutions of higher education in the United States. Of these 156 were universities, 1,856 other four-year institutions and 1,270 two-year colleges (Windschuttle, 1988a).

Brubacher and Rudy (1976) provide a detailed history of higher education in the United States. The early origins are British and Scottish. German influence was great in development of the graduate school and the research role. But the land-grant university was uniquely American. Some other general background references are: Trow (1988), Bok (1986, 1982), Keller (1983), Kerr (1982).

Two historical events are particularly important, the American research and graduate university and the land-grant university.

In 1862 the U.S. Congress passed the Morrill Act which offered land-grants to each State as an endowment to support and maintain at least one college that would teach agriculture, mechanical arts, and other related liberal and practical subjects. Extension services and field stations were set up to supply farmers with the newest techniques (Pawl et al., 1984).
"As one president of a land-grant institution observed during the 1930's: 'The state universities hold that there is no intellectual service too undignified for them to perform.'

For several decades, private institutions lagged behind the land-grant example. As late as 1940, most of them remained rather detached from society, carrying on their research and educating their students without much traffic with the outside world. During the next five years, however, the demands of a global conflict led all universities to participate in the national war effort. Ironically it was through the development of weapons that academic scientists proved how valuable their talents could be to the modern industrial state. The lesson was not lost on our political leaders..." (Bok, 1982)

"...the concept and function of the land-grant university have not significantly changed in this century. The diminishing of their uniqueness is due to the adoption by other institutions of the basic concepts of the land-grant idea: democratization of education; applied or mission-oriented research conducted to benefit the people of the states; and service rendered directly to these people through extension agents, short courses, and continuing education..." (Anderson, 1976)

Other useful references on the land-grant university system include Thackrey (1971), Wahlquest and Thornton (1964), Nevins (1962), Eddy (1963), and Morril (1960).

A second important event in U.S. higher education was the founding of all-graduate universities with emphasis on research. The first of these was Johns Hopkins University in Baltimore in 1875. The first president, Daniel C. Gilman, set out to recruit the "best scholars in the world, not the most magnificent buildings." He wanted to spend his funds for "men, not bricks and mortar" (Brubacher and Rudy, 1976). This sparked a trend in which the old liberal-arts colleges evolved into full-scale universities.
"The modern university, with its attention to research and specialization and its acceptance of the more utilitarian studies on an equal footing with the traditional classical curriculum, did not come to the fore without a challenge. Conservatives like Yale's President Noah Porter insisted that the form and content of the traditional college had served the nation well. They saw no reason for major change. Opposing the traditionalists were the presidents of some of America's most prestigious institutions: Eliot of Harvard, Barnard of Columbia, White of Cornell, and Gilman of Johns Hopkins. Daniel Coit Gilman was perhaps first among the champions of the university movement. He had helped found the Sheffield Scientific School at Yale, served as president of the University of California, was instrumental in establishing Johns Hopkins as the first all-graduate American university, and in 1875 became its first president. . ." (Binder, 1970.)

The concept of the graduate school and research university has remained strong (Clifford and Guthrie, 1988; Smith, 1985; Rosenzweig and Turlington, 1982). Higher Education in the United States has been the subject of numerous commission reports and other commentaries. For example, the Carnegie Commission published a litany of statements, reports, books and other studies on "almost every issue, type of institution and specific problem of higher education" (Mayhew, 1973).

Bloom's (1987) *The Closing of the American Mind - How Higher Education has Failed Democracy and Impoverished the Souls of Today's Students* is one of the latest in a series of books, reports, and papers criticizing the American higher education system and calling for a renewed excellence (Gardner, 1988; Altbach et al., 1985; Altbach, 1985; Astin, 1985; Association of American Colleges, 1985, Blatt, 1982; Schuman, 1982).

Herron (1988), in the book *Universities and the Myth of Cultural Decline*, has severely criticized several of the critics; in reference to Bloom, he states "the rhetoric of crisis typically proves more powerful than critical intelligence."
4.5. HIGHER EDUCATION AND FORESTS

This section is divided into two subsections. The first reviews the general background of higher education as it relates to forests. Next, is a more specific outline of forestry education in Canada, Australia, and the United States.

4.5.1. General Background

Professional education related specifically to forests can be traced to Germany in the late 1700's when V. Zanthier, Cotta, and Hartig started "master schools" in 1763, 1785, and 1789 respectively. Several forestry schools started in Russia in the 1800's; by 1908 the Imperial Forest Institute was the largest in the world with 42 professors and instructors and 500 students. France established a forestry school in 1825 and Sweden's State Forest Institute began in 1828. Japan started forestry education in 1882. In Great Britain, a forestry chair was established at the University of Edinburgh in 1887. In North America B.E. Fernow started forestry education in the U.S. in 1898 at Cornell University, and in Canada in 1907 at the University of Toronto (Fernow, 1913). Australia's forestry education can be traced to Adelaide in 1911 (Carron, 1977).

Today there are approximately 439 university programmes and 786 non-university forestry programs in the world (Table 4.12). The number of universities offering forestry degrees in Canada, Australia, and the United States is seven, two, and forty-seven (accredited) respectively (Table 4.15).

The 1971 World Consultation on Forestry Education and Training, held in Stockholm and sponsored by the Food and Agriculture Organization of the United Nations (FAO, 1972a), was the first world conference on forestry
Table 4.12. Number of university and non-university level schools and centres for studies in forestry by major region.

<table>
<thead>
<tr>
<th>Region</th>
<th>University</th>
<th>Non-University</th>
</tr>
</thead>
<tbody>
<tr>
<td>Africa</td>
<td>27</td>
<td>64</td>
</tr>
<tr>
<td>Near East</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>Europe</td>
<td>100</td>
<td>255</td>
</tr>
<tr>
<td>Latin America</td>
<td>62</td>
<td>70</td>
</tr>
<tr>
<td>Asia/Pacific (excl. Australia)</td>
<td>156</td>
<td>289</td>
</tr>
<tr>
<td>Australia</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>North America</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Canada</td>
<td>6</td>
<td>26</td>
</tr>
<tr>
<td>United States</td>
<td>77</td>
<td>65</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>439</strong></td>
<td><strong>786</strong></td>
</tr>
</tbody>
</table>

Source: Compiled from World List of Forestry Schools, Food and Agriculture Organization, 1986, Rome.

education. The consultation, attended by 260 participants from 74 countries, set an ambitious objective to:

"review critically the present situation of forestry education and training in the world and draw conclusions as to how forestry education and training can make the fullest contribution to world forestry development."

It emphasized the role of forestry in socio-economic development and its contribution to

"the ecological balance of the human environment. The consultation resulted in an exchange of ideas and information across language, geographical and socio-economic barriers to an extent never before attained in this field."

More than 40 technical papers were presented by distinguished speakers on almost every conceivable aspect of forestry education (FAO, 1972a).
Westoby's paper entitled *Forestry Education: To Whom and for What?*, later reprinted in a book of his collected writings (Westoby, 1987), summarized the purpose of forestry education in an interesting manner:

To help men and women (mostly young, but not exclusively so) prepare themselves so that they may:

i) advise on the formulation of resources policies, especially in relation to forests and related wildlands, which reconcile the short- and long-term needs of the community for the goods and services which those lands can provide;

ii) translate those policies into plans; and

iii) implement those plans.

The FAO has had a keen interest in forestry education for over three decades. Starting with a FAO panel on education in forestry whose first meeting was held at Oxford in 1956, the panel was converted to an Advisory Committee in 1964, and it has since had 13 sessions. These sessions were held in Venezuela, Thailand, Spain, Germany, Nigeria, Sweden, Argentina, Finland, Italy, Indonesia, Japan, Kenya, and Mexico (FAO, 1985). In the most recent session in Mexico, J.P. Lanly, Director of FAO's Forest Resources Division, drew attention to

"...the imbalance between university education and technical and vocational training, to the need to train foresters at all levels and, more generally, to the necessity to adjust forestry training to the real needs of the world." (FAO, 1985)

In a paper at the same session entitled *How Good is Forestry Education Today?*, Dourajeanni (1986) was more explicit about the role universities should play.

"Although foresters, particularly in continental Europe and Latin America, have always felt responsible for the conservation of nature and natural resources, and although the forestry sector in these regions is also responsible for protected areas, wildlife and sometimes even soil and water..."
conservation, foresters have always regarded conservation as a secondary aspect of their profession - so much so that many of their responsibilities in this field have gradually passed to other professionals. The substantive work that has been done in the last two decades is more a result of individual enthusiasm than of a conscious decision taken by the forestry sector. This attitude on the part of professional foresters has done much to reduce the social impact of forestry in a world where environmental concern is growing rapidly. . . Academic ingenuousness is shown in the idea, so common among academic staff, that scientific research is free of political overtones and compromising motives; however, a gigantic portion of the budgetary cake and of research workers' time is devoted to research that serves essentially to enable a few people to make more money, while providing ever fewer jobs. In addition, because it does not have its own funding, most university research is for sale to the highest bidder, i.e. usually large industry. A university should ask itself which social sectors it is serving. It must know whether it is serving society as a whole or whether the service it provides is to meet risky immediate interests instead of widespread and permanent social interests."

The Multilingual Forestry Terminology Series (Ford-Robertson, 1971) provides a clear definition for forestry as:

"The science, the art and the practice of managing and using for human benefit the natural resources that occur on and forest lands."

Yet, despite the best intentions of hundreds of forestry educators over the centuries, the profession of forestry is struggling to balance legitimate uses of the forest that are in conflict (DeSteiguer and Merrifield, 1979). The following statements reflect that foresters do not have an easy job and that education lies at the core of any possible approaches to making it better.

"...Caught in the struggle between conflicting interests, the forester... is being accused of narrowmindedness and of favoring one type of forest use to the disadvantage of others. Due to the very nature of his technical training, the forester is
now being attacked as not qualified to pass judgment on the proper objectives of forest management. It is claimed that such policy decisions should be made by sociologists, psychologists or others more finely attuned to the needs of man." (Kephart, 1970 as cited by Cheit, 1975)

"...The forester's job seemingly is impossible. He no longer makes his decision in the diffused light of professional education and technical competence, for he works directly in the strong glare of conflicting public opinions and, often in conflict with strong inputs from other professionals. His administrative position is changing from a well-defined block in an organization chart to participation in an endless succession of task forces and ad hoc committees. Today's management decisions are truly people-oriented. And the forester as a member (and possibly a leader if he earns that position) of a new team of environmental planners and managers must become increasingly knowledgeable of and sensitive to all of the 'people-forest' interactions..." (Spurr and Arnold, 1971)

Also, consider the words of a European trained, turned North American, silviculturist as he opened his talk to a silviculture conference held in Newfoundland in 1983:

"...In many parts of the world, but perhaps most notably in Europe, tree planting is the most important function of the forester in the eyes of the general public; the Forester is seen as something of a caring, tending, gentle craftsman. In North America, however, the popular image of the forester has generally been that of the lumberjack, a rather bluff, rough, well-meaning if somewhat destructive character; nowadays, this picture is tinged with shades of the forester as a slightly maniacal, anti-ecological raper of the countryside and indiscriminate sprayer of forests, pregnant women, and little children with deadly chemicals. We might do well to cultivate the gentle tree-planting image a bit more..." (Richardson, 1983)

There are many reasons for this general ambivalence towards foresters and the image they project. Part of the answer can be found on university campuses where forestry has seldom achieved the general prestige of many
other disciplines and professions. For example, compared with professions such as theology, law, medicine, university education for foresters has remained a relatively poor cousin (Cheit, 1975).

Within the profession itself there have been criticisms that education has been too technical (Black, 1967; Heiberg, 1960; Reed, 1984b, 1985; Richardson, 1974; Rumsey and Duerr, 1975; Schmithusen, 1983; Thirgood, 1988, 1989; Wikstrom, 1987; New Zealand Institute of Foresters, 1987). In her address entitled What is and What Should be Taught in University Forestry Policy Courses?, Fairfax (1984) states:

"A technician, according to Emerson, is a person who understands everything about his job except its meaning and its place in the world. Neither society nor the forest resources at issue will be served if universities are merely training technicians..."

Figures 4.2 and 4.3 were prepared for the health profession, but they serve forestry equally well. Abrahamson (1981) argues that there has been a false dichotomy of two major components in education for health professions and professions generally (Figure 4.2). One component consists of the underlying body of science necessary for the practice of the profession. The other consists of a collection of techniques, skills, and/or abilities of the practice itself. This has resulted in assumption that graduates must become one or the other: a scientist or a technician. He argues that it is more useful to look at professional education as a trichotomy (Figure 4.3). In this model "the practice of a profession involves the application of sciences to the solution of problems."

This model does not address some of the concerns noted above that see foresters ill-equipped to resolve conflicts involving different values. This is the art side of the profession that is perhaps best addressed through more education in liberal arts and humanities. The engineering
Figure 4.2. The (false) dichotomy of professional education.

Figure 4.3. The (true) trichotomy of professional education.

profession has completed a detailed study on this aspect and sees improvement in this area as a critical need (Johnston et al., 1988). This matter will be raised again in chapter seven.

Another reason for the apparent lack of appreciation for foresters may simply be a function of small numbers. There are approximately 100,000 professional foresters in the world today (Paille, 1988). This number comprises roughly 0.002% of the world's population of 5 billion. With such a small number of professionals, with an infinitely large responsibility, unevenly distributed over the world's forest region, this could be a valid reason why the world's forests have sometimes been, and continue to be, abused on a relatively large scale (Repetto and Gillis, 1988).

To put this in perspective, the estimates of the world's closed forests range from 2.56 to 4.85 billion hectares, depending on definition (Sedjo and Clawson, 1989; Duffied, 1982). This means that in the world today, there is approximately one forester for every 26-49,000 hectares of forest. The United States has the largest number of foresters but even their numbers pale compared to other professions.

"Forestry is a small profession. A recent analysis indicates 'there are something over 20,000 foresters in the United States.' The total number of graduates of forestry schools is also small. . . In fact, the total number of undergraduate degrees in the entire 70-year history of American schools of forestry is still under 50,000, or just slightly more than the 41,000 students who earned bachelor of engineering degrees in 1970 alone. This total of 44,674 bachelor's degrees in forestry is less than one-half the total number of bachelor's degrees earned in 1970 by students of business administration." (Cheit, 1975)

The numbers of foresters in Canada and Australia is far less than in the United States (Table 4.13).
Table 4.13. Number of members in forestry societies Canada, Australia, United States.

<table>
<thead>
<tr>
<th>Society</th>
<th>Country</th>
<th>Number of Members</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canadian Institute of Forestry</td>
<td>Canada</td>
<td>2,310</td>
</tr>
<tr>
<td>Asso. of B.C. Professional Foresters</td>
<td>Canada</td>
<td>2,428</td>
</tr>
<tr>
<td>Ordre des Ingénieurs Forestiers du Quebec</td>
<td>Canada</td>
<td>1,634</td>
</tr>
<tr>
<td>Ontario Professional Foresters Association</td>
<td>Canada</td>
<td>919</td>
</tr>
<tr>
<td>Institute of Foresters of Australia</td>
<td>Australia</td>
<td>1,400</td>
</tr>
<tr>
<td>Society of American Foresters</td>
<td>United States</td>
<td>19,833</td>
</tr>
</tbody>
</table>


Despite the reasons for a relatively poor image, the fact remains that, today foresters are no longer alone in the woods. Many other professions and disciplines have been drawn into the forest, for a multiplicity of reasons. At the Seventh World Forestry Congress the following statement was made in the summary:

"More effective teaching of forest management must be achieved if foresters are not to be replaced in the field of management by graduates from other disciplines concerned with social sciences" (FAO, 1972b).

Table 4.14 provides an index of the number of universities offering related degrees in Canada, Australia, and the United States. The number of universities offering environmental degrees far outstrips those with forestry, even though environmental programs have a history of less than thirty years. A study on the influence of these other disciplines on forest policy formulation would be interesting. In fact, a world
conference drawing together these and other disciplines to discuss higher education as it relates to the planet's forests would seem relevant. Perhaps the upcoming United Nations International Conference on Environment and Development in 1992 (Centre for Our Common Future, 1989) would be an appropriate forum to raise this matter.

4.5.2. Forestry Education in Canada, Australia, and the United States

Having presented the general context of forestry education, I will now describe briefly the status of forestry education in Canada, Australia, and the United States.

Table 4.15 provides some historical dates of early forestry education at the university level in the three countries. Canada has seven,
### Table 4.15. Selected Events in University level forestry education history in Canada, Australia, and the United States.

<table>
<thead>
<tr>
<th>Year</th>
<th>Canada</th>
<th>Australia</th>
<th>United States</th>
</tr>
</thead>
<tbody>
<tr>
<td>1890</td>
<td></td>
<td></td>
<td>1898 Cornell Univ. (discontinued 1903)</td>
</tr>
<tr>
<td>1900</td>
<td></td>
<td></td>
<td>1900 Yale Univ (Grad School)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1904 Harvard Grad School discontinued, Oregon State</td>
</tr>
<tr>
<td>1910</td>
<td>1907 U of Toronto&lt;br&gt;1908 U of New Brunswick&lt;br&gt;1910 Laval Univ (French)</td>
<td>1911 Australian Forestry School Adelaide moved to Canberra in 1927</td>
<td>1906 Penn State, U Georgia&lt;br&gt;1907 U Wash, Wash State&lt;br&gt;1909 Idaho, Colorado State</td>
</tr>
<tr>
<td>1988</td>
<td>7</td>
<td>2</td>
<td>47 (accredited)</td>
</tr>
</tbody>
</table>

Sources: Garrett, 1971; Carron, 1977, 1985; Graves and Guise, 1932; Dana et al., 1963.
4.5.2a. Forestry Education in Canada

The history of forestry education in Canada has been chronicled by Garrett (1971) and Sisam (1982). At present there are seven universities offering degrees in forestry (Table 4.15); two of these, Laval and Moncton, are given in French. Five of the seven, U.N.B., U of T, Laval, U of A, and U.B.C. offer the full range of degrees from B.S.F. to Ph. D. There are approximately twenty-six non-university level programmes (Table 4.12). As of 1988, five of these were recognized as Forest Technician Education Programmes by the Society of American Foresters (SAF, 1988).

It has been said that "without question the most influential figure in the development of forestry education, not only in Canada but in North America" was B.E. Fernow (Harris, 1976). As early as 1894 Fernow had discussions concerning forestry education with the director of the Kingston School of Mines which was affiliated with Queen's University. In 1903 he gave a series of ten lectures on forestry at the same University. That same year, the Queen's senate approved a four year B.Sc.F. degree programme. But through a series of events, this course never got underway. Instead the University of Toronto established a forestry programme in 1907 with Fernow as Dean (Harris, 1976). The University of New Brunswick established a forestry programme in 1908 and Laval University did the same in 1910, followed by the University of British Columbia in 1921. It was fifty years before the next university forestry programme was introduced at the University of Alberta in 1970 and Lakehead expanded from a two-year technician programme to include a four-year B.Sc.F. in 1971.
university forestry degree offered in French was started by the Université de Moncton at Edmonston, New Brunswick in 1984.

In Canada there have been many concerns expressed about the role of forestry schools in universities and their function in training professional foresters. MacMillan's (1957) speech The Profession and Practice of Forestry in Canada 1907-1957 states:

"It is possible that the leaders and teachers of the profession in the forestry schools have been shy about appearing to criticize the forest policies of the province, upon which the university depends for money, or the great forest-industry companies - in other words, 'to bite the hand that feeds them.' If so, some detour must be found around that road block."

Nordin (1983) expresses much the same frustration twenty-six years later:

"The forestry resources community historically has not been politically alert and that is one of the major reasons why progress towards intensive forest management has been so slow...Let us not perpetuate this weakness and let us make sure that our forestry schools graduate professionals who are technically and socially competent and who are politically astute."

During the past thirty years, there have been many discussions concerning forestry education in Canada. In 1960 a Joint Forestry Convention between the Canadian Institute of Forestry and la Corporation des Ingenieurs Forestiers de la Province de Quebec was held on the theme of Forestry Education in Canada. The conference divided forestry education into five main sections: primary and secondary schools, specialized schools (technical), universities, extension forestry, and public education (Allen, 1960).

In 1963 the Canadian Pulp and Paper Association (1963) organized a symposium and panel discussion of Deans of Forestry on the Preparation of
Future Canadian Forest Managers. That same year, a series of papers on Training and Education in the Technological Age were presented at the 1963 Annual Meeting of the Canadian Institute of Forestry. Place (1964) summarized a panel discussion consisting of the Deans of Forestry who spoke on the topic: "what sort of man should the new forestry graduate be?" One dean stated that he should possess "analytical ability, a concern to learn from experience, skill in communication, and a personal philosophy or ethical foundation for professional life."

Place emphasized the role of professional education.

"...it should teach men how to think and find information for themselves. Thinking is hard work and most of us are lazy, therefore the student must continually be faced with problems and situations that force him to think. The one thing professional education should not do is yield to pressure to train narrow specialists competent in the techniques of the moment..."

Under recommendations, he made the following statement:

"...It seems ridiculous in a country whose greatest industry depends on its forests that our forestry schools should be such poor cousins to schools of agriculture and engineering..."

Ten years later, A National Statement by the Schools of Forestry at Canadian Universities (Science Council of Canada, 1973) was prepared. It included the following statement:

"It has been said that the Schools of Forestry were the original environmentalists but that they have allowed others to occupy their share of this field. It has also been said that the Schools and the other environmental groups in the universities and elsewhere all want the opportunity to solve the same problems. The Schools do need to recover lost ground in environmental matters, and they do need to participate with the other groups in regard to priorities and projects. It should be remembered that professional forest scientists are well equipped by training to participate in the multi-disciplinary activity of forest management. It remains for the Schools to take stronger positions
of leadership in bringing both scientists and disciplines together."

Also, it was stated that the university forestry schools "have three main functions: education, research and community service." In connection with education "the Schools 'first duty' is to provide professional education at the undergraduate and graduate levels for future forest resource managers, forest and wood scientists, and forest engineers." On the topic of community service, it was said that "the Schools do not yet have adequate resources to accept these responsibilities and opportunities fully" (Science Council of Canada, 1973).

Sisam's (1982) book entitled Forestry and Forestry Education in a Developing Country includes the following comments made in 1981 by Dean Nordin of the University of Toronto on future manpower needs of Canadian forestry:

"...as we adopt more intensive management practices there will be the need for at least 8,000 more management foresters over the next decade and some 1,600 additional personnel qualified as research scientists and skilled specialists. . . As background to this it is pointed out that today the United States with a somewhat smaller area of productive forest than Canada has ten times the number of professional foresters."

Murphy (1986) points out that "there are seldom enough funds for education and training, therefore, collaboration" between the forestry schools and the forestry and forest products sectors "is an efficient means of reciprocal help."

Recently, the National Forest Sector Strategy for Canada (CCFM, 1987) made two recommendations concerning forestry education at the post-secondary level.

"It is recommended that the Association of University and Technical Forestry Schools of Canada develop national strategic plans, including
accreditation, to improve the effectiveness of facilities and programs.

It is recommended that provincial and federal agencies and forest industries identify and develop mechanisms by which the major university programs serving the forest sector may be enabled to play the dynamic and vital roles expected of them."

Nordin (1988) prepared a report entitled A National Process of Accreditation for Canadian University Baccalaureate Programs in Forestry. He states:

"Canada does not have a national process for the accreditation of university baccalaureate programs in forestry. . . forestry graduates, therefore, do not have the professional acceptance nationally now enjoyed by professional engineers."

The Association of B.C. Professional Foresters (1986) has prepared Procedures for Accreditation and Academic Standards. It lists standards for many subjects in forestry, but does not specify forest policy or integrated forest land management. The standards it lists under Forest Land Management include a review of related policy and some aspects of related forest land uses, but the majority of objectives deal with timber management.

Reed (1984a) in a speech to the 1983 annual meeting of the Canadian Institute of Foresters lists ten commandments for professional foresters. One of these is "Stand by your forestry school." He asks several questions: "Are you actively monitoring and supporting your forestry faculty with respect to faculty depth, research capability, course content? Can they really prosper without your support?"

Baskerville (1988) states:

"The forestry profession is under siege. Professionalism of foresters is being challenged from the outside and from within. It is my contention that the undergraduate curriculum is at the root of the problem. The forestry undergraduate curriculum needs restructuring in
rather broad terms if forestry is to survive as a profession. . . Most of the problems that beset our profession have their root in the persistence of the one size fits all curriculum, and the notion of an all purpose professional. . .”

Thirgood's (1988) article Present Realities and Future Possibilities for Forestry Education, states:

"...they must improve their general education so they can take their place in the greater society. . . It is no longer sufficient that they be trained in their craft; they must also be educated in the fullest sense.

To meet these needs, the future direction of Canadian forestry education needs a thorough airing, public discussion, and debate. In all this, we must keep in mind that, historically, university graduates in general have been valued, not because of their specialist competences, but because they have been taught to think, and have learned ways of examining and expressing ideas that have not been common among those lacking the university experience. . .

. . . Forestry can be likened to a three-legged stool. With notable exceptions, we have traditionally provided only two of the legs, those of science and technology. The third 'people' leg of liberal arts and social science, students have been left to carve for themselves. The resulting lack of symmetry and equilibrium has often had dire consequences. We have to redress the balance without throwing the scientific baby out with the bath water..."

In another article Canadian Forestry Education - Where are We Heading?, Thirgood (1989) notes the shift in forestry education

"...from the seasoned forester-teacher to the forest scientist-researcher-teacher and, concomitantly, increased, even narrow, specialization...the selection of faculty members today emphasizes academic background and scholarly achievement far more than it does professional experience, no matter how distinguished or wide ranging...too often we have theorists teaching that which they have never practiced. The Ph.D., the publication list, the refereed journal and the research grant reign supreme."
4.5.2b. Forestry Education in Australia

Professional level forestry education in Australia has been evolving since 1911, and has gone through a number of changes over the years (Carron, 1977 and 1985; Lawrence, 1969). Presently two institutions, the Australian National University and Melbourne University, offer the full range of degrees in forestry from B.Sc.F. to Ph.D. In addition, there are seven non-university programs in forestry (Table 4.12).

As in Canada, the concern for a general professional education versus that of a narrow specialist has been expressed in Australia. In 1949 a report Higher Forestry Education in Australia made by a sub-committee appointed by the Institute of Foresters of Australia made the following comment on need for education in the humanities:

"Forestry education should provide for a minimum of specialisation up to the matriculation standard. During this period the foundations of the basic subjects of physics, chemistry and mathematics should be laid, but for the rest the humanities, and not science subjects are required to give the widest possible stimulus to the mind. It is often said, and with much truth, that there is nobody more restricted in outlook than the scientist, and this fact should be taken into consideration in planning the early training." (IFA, 1949)

A review of the 1988 University handbook reveals that although it may be encouraged through electives, there are no requirements to take philosophy, sociology or other humanities at either ANU or Melbourne forestry programmes (Australian National University, 1988a, 1988b; The University of Melbourne, 1988).

Ovington's paper Continuing Education in Forestry for a World Environment of Rapid Technological, Economic and Social Change comments on the changing roles of forests and foresters and notes:

"...in contrast, the structural pattern of forestry education has remained relatively stable reflecting the conservative approach of many educators... the
Position of forestry educators may be further weakened by insidious academic pressures which tend to isolate them from practising foresters, so their courses become less realistic...

Papers by Bachelard (1975), Fearnside (1975), Richards and James (1975) make similar statements concerning the need for structural change in forestry education to allow a greater association between professional work and formal education.

An indicator that perhaps forestry education has not kept up to societal needs is reflected in the fact that today there are 11 universities offering bachelors, 12 offering masters and, 4 offering doctoral degrees in environmental studies compared to only 2 universities with forestry education (Table 4.14). This is interesting because environmental studies only came into being in Australian universities in the early 1970’s (Blake and Cock, 1987).

The need for foresters to become more involved in the policy making process has been stressed by several concerned professionals (Baur, 1978; Dunstan, 1986).

In particular, West’s (1985) paper, The Need for the Forestry Profession to Speak out in the Public Debate, concludes:

"...in concentrating on the technical solutions to land-use problems, foresters have failed to give adequate and necessary attention to trying to understand the political framework within which resources are being allocated, and judgements made...foresters have too often been the possessive recipients of decisions made by others..."

A survey of the membership of the Institute of Foresters of Australia (I.F.A.) found that 97.7 percent of the respondents indicated that the IFA should be actively involved in forest policy issues and activities through such mechanisms as promotion of and participation in public debates, and preparation of submissions and policy statements. The majority of these
respondents (91.5%) received their professional education in Australia (Jennings and Bacon, 1983).

The need for education in multiple-use management and policy is recognized by the Australian National University (ANU).

"At ANU the staff teaching forest management believe that unless multiple-use management is practised in the native forests in an enlightened, professional and environmentally and socially acceptable way, timber production in these forests may cease. The staff is therefore committed to helping students and the profession explore all facets of the complexities of multiple-use management..." (Turner, 1987)

4.5.2c. Forestry Education in the United States

The history of forestry education in the United States has been chronicled in detail by Graves and Guise (1932), Dana and Johnson (1963). Other useful histories are provided by Bramble (1963) and Clepper (1971). At present there are 47 accredited professional forestry degree programmes and 31 recognized forest technician education programmes in the United States (SAF, 1988). The FAO World List of Forestry Schools (1986) lists 77 university level and 65 non-university level programs of forestry in the United States.

Ch Beit (1975), in writing about the forestry profession and forestry education in the United States, makes the following statement:

"... No group of professionals has been more fervently self-critical or reflective about their mission and the best way to achieve it..."

This statement is supported by the plethora of conferences and detailed commentaries on forestry education in the United States.

For example, the proceedings of The Roanoke Symposium (SAF, 1969) a two day national symposium on undergraduate forestry education, provides a comprehensive assessment of the profession and education.
Another example is the Forestry Curriculum Development Project sponsored by the Council of Forestry School Executives. Many of the papers were subsequently published in the February 1975 Journal of Forestry under the heading Improvement and Change in Resource Management and Forestry Education (Society of American Foresters, 1975).


In relation to multiple use there are several useful pieces including: Vaux (1975), Hagenstein (1975), Beuter (1975), and the Society of American Foresters (1973, 1980). Two pieces are particularly interesting.

In the first article entitled Resource Availability, Environmental Constraints and the Education of a Forester, Krutilla (1977) provides an interesting perspective:

"The profession may have been outpaced by events. Indeed, under the influence of Professor H.H. Chapman, the issue of whether forestry education should confine itself principally to timber management, as he advocated (1942-1944) or to multiple use management, as advocated by H.T. Gisborne of the Forest Service (1943), was decisively settled in favor of the former at the Biloxi meeting of the Society of American Foresters in 1951. In any event, it was not until some years following passage of the Multiple Use Sustained Yield Act that the Council of Forestry School Executives realized that the new legislation implied some need for curriculum reform in the training of professional foresters."
The second article is Cooper's (1985) Education Requisites for Leadership in Multi-Resource Forest Land Management. He states:

"Education in the natural resources, particularly forestry and wildlife, has traditionally emphasized the basic sciences and technical courses in resource management. Present and future natural resource managers must be more adept at dealing with people, the communications and management skills, multi-resource integrative skills than are current practitioners. In addition they must be more aware of, and receptive to, the art of political compromise than most present resource managers are...education must be restructured. Such restructuring may well mean that the master's degree will be a normal requirement for any job with more than routine responsibilities."

In a recent article, Forestry Education and the Profession's Future, Duncan et al. (1989) report on their study which identified six major issues facing forestry education through 1999:

- Attracting high quality students
- Improving teaching quality
- Strengthening curriculum
- Clarifying the forester's role
- Continuing education and extension needs
- Improving forestry's public image

They note that over the past 25 years "the proportion of tenured or tenure-track faculty holding a doctorate has increased significantly."

Furthermore, many of the faculty "ally themselves with their counterparts in another academic discipline or scientific subject rather than with the professional forestry community." Among other things the authors recommend that new faculty members:

- have two or more years of professional non-academic experience
- show commitment, respect, and enthusiasm for professional practice in forestry
- be committed to a broad education for professionals in forestry

On forestry's poor public image, they recommend that "the premises of professionals regarding the education of foresters must be examined
critically." They pose the question "Does this education provide adequate leadership skills to deal with contemporary renewable natural resource issue?" From their survey, they believe there is considerable doubt and that "an important step in rebuilding the profession's image would be to regain the perception of foresters as stewards of the public interest."

They conclude that "much is at stake in our evolving forestry education, for schools and for the profession" and that "foresters should be more actively involved in the future of the profession as expressed in forestry education."

In summary to chapter four, it should be obvious that the global, international, and national context to integrated forest land-use policy and higher education is extremely complex and would require more extensive analysis to do it adequate justice. Nevertheless, this brief sketch should provide the basic foundation that is necessary to examine Newfoundland, Tasmania, and Alaska.
CHAPTER FIVE. GENERAL COMPARISON OF NEWFOUNDLAND, TASMANIA, AND ALASKA

5.1. INTRODUCTION

This chapter provides a general comparison of Newfoundland, Tasmania and Alaska as a contextual backdrop for the more detailed comparative analysis of the higher education systems to follow in chapter 6. Section 5.2 is a general description of physiography, highlighting some similarities in location, climate, and land forms. Next, section 5.3 provides a general history of settlement, population growth, and governance. Section 5.4 presents the economic picture. Then, section 5.5 supplies more detail on the forest land and its use. Finally, section 5.6 furnishes an overview of the forest policy situation, accentuating some of the more troublesome issues.

5.2. PHYSIOGRAPHY

Figure 5.1 depicts Newfoundland, Tasmania, and Alaska in relation to each other and as part of their respective countries. It would be difficult to find on the globe three more distant jurisdictions that have so much in common. Newfoundland lies at the eastern-most extreme of North America, while Alaska is located at the opposite westerly extreme. Tasmania lies at a similar latitude as Newfoundland, but in the southern hemisphere at the southeastern extreme of Australia. Longitudinally, Tasmania almost intersects with the mid-longitude of Alaska.

From east to west Newfoundland and Alaska are seven time zones apart. Tasmania is an additional four time zones from Alaska and across the International date line where a calendar day is lost.

Newfoundland and Alaska can be subdivided into several regions. Newfoundland consists of two geographically separate land bodies: the Island of Newfoundland and continental Labrador. Alaska has many regions
Figure 5.1. Map of the world showing Newfoundland, Tasmania, and Alaska.
but the areas with forest lands are: interior, southcentral, and southeast Alaska.

In terms of total land area, Alaska as a whole is by far the largest of the three study areas. However, southeast Alaska, the area with the most intense forest land-use, is very comparable in size to insular Newfoundland and the island State of Tasmania (Table 5.4). Southeast Alaska also shares the insular nature, being almost entirely engulfed by glaciers to the east and Pacific Ocean to the west. It is, for the most part, accessible only by air or sea.

All three jurisdictions have a rich diversity of land forms and vegetative types, including forest, bog, fen, tundra, and rock barrens. Alaska and Tasmania have several navigable rivers; Newfoundland is not so fortunate. But like the other two, Newfoundland has many deep water sheltered bays.

All three locations are mountainous. The Appalachian mountain chain extends throughout western Newfoundland and much of eastern Labrador. In some places, the barren rocks seem to explode out of the sea forming spectacular fiords. Alaska's mountains are unsurpassed in North America with Mount McKinley being higher than anything on the continent. Tasmania is also covered with many jagged mountains. The effects of glaciation are easily apparent in all three terrains.

Proportionally, Tasmania has the most land suitable for extensive agricultural production; Alaska is next, and Newfoundland has the least amount.

Overall Tasmania has the best climates for growing vegetative crops. However, parts of southeast Alaska come near to equaling Tasmania's vegetative season. Alaska, by far, has the largest extremes in climate
from the temperate rainforest to the arctic tundra. Sections of all three have a maritime climate, as well as some areas with subarctic and continental conditions. Tasmania has only small areas that could be considered continental. Parts of Labrador have an arctic climate (Table 5.1).

Table 5.1. Climatic comparison, Tasmania, Newfoundland, and Alaska.

<table>
<thead>
<tr>
<th>City, town or region</th>
<th>Mean temperature (°C), middle month of-</th>
<th>Highest recorded temp. (°C)</th>
<th>Lowest recorded temp. (°C)</th>
<th>Annual precipitation (mm)</th>
<th>Annual snowfall (cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Winter</td>
<td>Summer</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Belle Isle</td>
<td>-9.6</td>
<td>9.4</td>
<td>22.8</td>
<td>-35.0</td>
<td>893</td>
</tr>
<tr>
<td>Gander</td>
<td>-6.1</td>
<td>16.5</td>
<td>35.6</td>
<td>-31.1</td>
<td>1,078</td>
</tr>
<tr>
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<td>-3.8</td>
<td>15.3</td>
<td>30.6</td>
<td>-23.3</td>
<td>1,512</td>
</tr>
<tr>
<td>Hobart</td>
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<td>16.5</td>
<td>40.8</td>
<td>-2.8</td>
<td>633</td>
</tr>
<tr>
<td>Launceston</td>
<td>6.5</td>
<td>16.5</td>
<td>37.4</td>
<td>-7.0</td>
<td>720</td>
</tr>
<tr>
<td>Queenstown</td>
<td>6.9</td>
<td>14.8</td>
<td>36.6</td>
<td>-6.2</td>
<td>2,416</td>
</tr>
<tr>
<td>Southeast</td>
<td>-6.7</td>
<td>12.8</td>
<td>32.2</td>
<td>-20.0</td>
<td>3,860</td>
</tr>
<tr>
<td>South Central</td>
<td>-10.6</td>
<td>12.8</td>
<td>30.0</td>
<td>-38.9</td>
<td>508</td>
</tr>
<tr>
<td>Interior</td>
<td>-21.7</td>
<td>13.3</td>
<td>33.9</td>
<td>-54.4</td>
<td>330</td>
</tr>
<tr>
<td>Arctic Slope</td>
<td>-23.8</td>
<td>6.7</td>
<td>25.6</td>
<td>-48.9</td>
<td>102</td>
</tr>
</tbody>
</table>

(Source: Tasmania and Newfoundland, Lakin, 1980; Alaska, Johnson and Jorgenson, 1963)

5.3. HISTORY, SETTLEMENT, AND GOVERNANCE

Discovery

The early history of Newfoundland, Tasmania, and Alaska is chronicled by Rowe (1980) and Mannion (1977), Robson (1983, 1985), and Naske and Slotnick (1987), respectively.

Newfoundland was the first of these three to be discovered by European explorers. The Norsemen or Vikings are believed to have occupied the northern-most part of the Great Northern Peninsula sometime near the year 1000 (Tuck, 1985). However, prior to this relatively new knowledge,
it was Cabot’s voyage of 1487 that was often taken as the first European
discovery of Newfoundland. Whether he actually set foot on shore is still
uncertain. In any event, over one hundred years passed before continuous
English settlement in Newfoundland started in 1610 (Rowe, 1980).

It was not until some thirty-two years later, in 1642, that Tasmania
was discovered by Captain Abel Tasman who was sailing under a Dutch flag.
Formal possession was taken by the British in 1788 and first settlement,
consisting mostly of male convicts, began in 1803 (Robson, 1983).

The first discovery of Alaska in 1741 is thought to have been made by
the Danish navigator Vitus Bering who, at the time of this historic voyage,
was serving Russia. Between the late 1700’s and 1867 scores of Russian
settlements were set up. But the total Russian population "never attained
much more than seven hundred at its height" (Naske and Slotnick, 1987).
Alaska was purchased from Russia by the United States in 1867.

Aboriginals

Aboriginals are known to have lived in all three areas several
millennia before white Europeans ever set foot on their soils.

There is evidence that a people known as the Maritime Archaic Indians
occupied the island of Newfoundland as much as eight thousand years ago.
As well, Dorset Eskimo were present over two thousand years ago (Tuck,
1985). More recently, the Beothuks or Red Indians, whose population
hovered at about one thousand, "inhabited the Island for an unknown period
of time and became extinct, probably in the 1920’s" (Rowe, 1980). Today,
small native populations of Naskapi and Montagnais Indians and Inuit still
occupy Labrador.

In 1876 the Tasmanian aboriginals, like Newfoundland’s Beothuks, also
went extinct due to similar circumstances, including deliberate
extermination and introduced diseases such as tuberculosis. Prior to European settlement their population is estimated to have been between 4-6 thousand (Robson, 1983). Recently, Tasmanians with partial aboriginal ancestry are struggling for recognition (Ryan, J., 1981; Clark, J., 1983).

Unlike insular Newfoundland and Tasmania, many of the Native peoples of Alaska still thrive today. Among them are the coastal Indians (Tlingits, Haidas, Tsimshians), the Athapaskans, the Aleuts, and the Eskimos. However, drastic reductions, due to disease and foreign hostility, also occurred. For example, the Aleut population, estimated to have been as much as 15-25 thousand, was reduced to approximately nine hundred in the year 1848. In 1880 almost 99 percent of Alaska's population of 33 thousand were Native. In 1970 there were about 50 thousand Native people living in Alaska, comprising less than one-fifth of Alaska's total population (Naske and Slotnick, 1987).

Population

Table 5.2. presents the population estimates for Newfoundland, Tasmania, and Alaska for selected dates between 1650 and 1985. Historically, Newfoundland has had the largest non-aboriginal population. However, Alaska's population increased dramatically after World War II and again with the development of oil fields in Prudhoe Bay during the 1970's. Tasmania presently has the smallest population of the three. Today, each has approximately a half million people.

The population distribution is worth noting for its urban tendencies. Newfoundland's population is more rural than Alaska or Tasmania. Nevertheless, approximately 40 percent of Newfoundland's population live in 14 urban centres of greater than 5 thousand people. The remainder live in 709 communities of less than 5 thousand. Thirty-two percent of the total
population live in 631 villages of less than 1,000 people (House et al., 1986). There are two cities, St. John's and Corner Brook, with populations of approximately 130 thousand and 30 thousand, respectively.

Table 5.2. Population in Newfoundland, Tasmania, and Alaska.

<table>
<thead>
<tr>
<th>Place</th>
<th>Newfoundland</th>
<th>Tasmania</th>
<th>Alaska*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2,000</td>
<td>5,000</td>
<td>7,000</td>
</tr>
<tr>
<td></td>
<td>N/A</td>
<td>43,000</td>
<td>100,000</td>
</tr>
</tbody>
</table>

All numbers rounded to nearest 100.

*Alaska aboriginal population 1880-33,000 (99%); 1890-25,354 (79%); 1900-29,542 (46.5%); 1970-50,554 (16.8%).

Tasmania's population is roughly 75 percent urban concentrated in three main areas: Hobart-Glenorchy has 132 thousand people, Launceston - 63 thousand, Devonport - 19 thousand, and Burnie has 19 thousand people (Lakin, 1981).

Similarly the majority of Alaskans, roughly 74 percent, are urban dwellers. In 1984, 46 percent (240,600) lived in Anchorage, 13 percent lived in the Fairbanks area. Approximately 26 percent of Alaskans live in
Governance

The historical path to independent governance in each area furnishes some interesting reading. Perhaps Newfoundland went through the most twists and turns before finally becoming the tenth Canadian province in 1949. In the early days of the ship fishery, the fishing admiral system and surrogate judges maintained some sort of order. In 1832 representative government was attained. But it was not until 1855 that Newfoundland was granted Responsible Government in which the real power lay in the elected assembly and not the British appointed Governor.

After a series of misfortunes, including World War I and the Great Depression, Newfoundland found itself in dire straits. Responsible Government was suspended by Britain in 1934 and under the recommendation of a Royal Commission, a seven man Commission of Government was appointed to oversee an economic and political reconstruction. This system lasted for fifteen years. Then, World War II brought on relative economic prosperity due to the construction and operation of three U.S. military bases (MacLeod, 1986). This provided the backdrop in which two referendums were held in the summer of 1948 to determine governance.

There were three options on the first referendum: remain with Commission of Government, enter Confederation with Canada, or return to Responsible Government. The Commission was easily defeated in the first vote. "The results were 69,400 for Responsible Government, 64,066 for Confederation and 22,311 for Commission of Government (Rowe, 1980)." Despite many common ties with Canada (MacLeod, 1982), the result of the second referendum was close with Confederation winning: 78,323 to 71,334.
A fourth option which never made it onto the referendums was the so-called Economic Union with the United States. The idea was promoted by a number of prominent Newfoundlanders but "Although a number of American senators were sympathetic to the concept, the idea was never given serious consideration in Washington (MacKenzie, 1986)." The controversy surrounding confederation is still evident (Jackson, 1986).

The history of disagreement between Quebec and Newfoundland over the Labrador boundary started in 1763, was lessened somewhat by a decision in 1927, but still remains an issue (Budgel and Staveley, 1987).

In contrast to this rather turbulent history, Tasmania's early governance was quite orderly. This is somewhat ironic considering its roots as a convict outpost. Tasmania attained the status of a self-governing colony in 1856. It became a state of the Commonwealth of Australia in 1901 (Wettenhall, 1968; Townsley's 1976, 1988).

Alaska, like Newfoundland, has a much younger independent status. Several unsuccessful statehood bills were introduced in 1916 and 1943, but it was not until 1959 that Alaska became the 49th state (Fischer, 1975). Prior to this, it was a territory of the United States dating back to the $7.2 million purchase from Russia in 1867 (Naske and Slotnick, 1987; Alaska, State of, 1988; McBeath and Morehouse, 1987).

Despite their official status as either Province or State, all three remain relatively weak partners in their respective federations.

5.4. ECONOMY AND INFRASTRUCTURE

General

The initial economic incentives for occupying each location were straightforward. In the case of Newfoundland, the English, French, and Portuguese were in search of one main commodity: fish - lots of cod fish
from the rich Grand Banks. The English had other plans for Tasmania. It served as an outpost to rid the homeland of petty criminals. However, the ideal agricultural potential was soon discovered and capitalized on and exports began only a few short years after initial settlement. The Russians were primarily interested in Alaska's fur resource along with some limited mining.

Although the economies of these peripheral areas have diversified somewhat since these early beginnings, there is still a predominant reliance on primary resource extraction with only minimal secondary processing.

Newfoundland's fishery still dominates the economy in terms of employment in the goods-producing sector. In comparison however, contributions to the Gross Domestic Product (G.D.P.) are actually greater from the mining sector, and forestry contributes just slightly less to the G.D.P. than the fishery. Agriculture accounts for only a small percentage of both employment and G.D.P. The high unemployment rate, particularly during the winter, is the most pervasive and persistent characteristic of Newfoundland's economy. In the past decade there has been a certain unfulfilled euphoria of the potential riches from undeveloped offshore oil fields (House et al., 1986; Cabinet Secretariat Executive Council, 1987; Economic Council of Canada, 1980). Military presence, while substantial during World War II (MacLeod, 1986), is all but imperceptible except in local areas, most notably Goose Bay and Gander.

A similar story can be told for Tasmania where mining, forestry, and fishing are also very important to the local economy. The most noticeable difference lies in the importance of the agricultural sector. Production
of fruit, wine, milk, cheese, and wool are only a few of the rich diversity of products stemming from the many small independent farms (Lakin, 1981).

In Alaska, fur was the original incentive for Russian settlement in the 1700's. However, it was some twenty odd years after the American purchase in 1867 that Alaska's economy boomed. It was the famous gold rush of the 1890's that gave impetus to Alaska's first population boom. Between the years 1890 and 1910 the non-native population increased six fold, from 4 thousand to over 30 thousand. The second boom came with World War II and the heightened military presence and the construction of the famed Alaska highway (Naske and Slotnick, 1987). At 30 percent, the military still accounts for the largest single employer in Alaska's basic industry employment. Federal civilian employers account for another 23.5 percent. Although petroleum accounts for 12 percent of employment, it amounts to a significant 88 percent of all value added of Alaska's basic industries (Institute of Social and Economic Research, 1987a). Like Newfoundland and Tasmania, the fishing, forestry, and mining sectors are also important to Alaska's economy. Agriculture accounts for only a small share of the total economy (Goldsmith, 1987; Institute of Social and Economic Research 1987b; Rae, 1987).

The United States is a dominant destination for much of the raw materials produced in Newfoundland, Tasmania, and Alaska. In the case of Tasmania, the single largest trading partner is Japan, accounting for over 40 percent of Tasmania's exports. In general, Alaska's location has also meant some trade with Pacific rim countries, particularly Japan, with its near insatiable demand for unprocessed fish, mineral, and timber commodities.
Tourism

The importance of tourism is increasing in each of the study areas. Table 5.3 supplies a partial breakdown of visitors during similar periods. Comparatively, Alaska has the most visitors, just over one half million in the summer of 1988. However, my impression is that Tasmania's tourist industry is more diversified, catering to a wider variety of interests from gambling, to historic sites to wilderness experiences. Alaska draws large sight-seeing numbers as well as many sports fishermen and big game hunters. Ironically, Newfoundland is nearest to the largest potential market of visitors, yet it draws, by comparison to Tasmania and Alaska, the smallest number of tourists. It is only a few air hours from the massive Boston-New York City-Washington, D.C. population corridor and the large Montreal-Detroit urban belt. The distinctive qualities of Newfoundland such as sight-seeing, historic and wilderness opportunities are comparable, if not in some cases better, than Alaska and Tasmania¹.

Energy and Transportation

In terms of energy, Newfoundland and Tasmania are particularly dependent on hydro-electric power generation (Crab, 1986). Many areas of Alaska also depend on this form of power but petroleum is plentiful and available.

Transportation systems to and within these somewhat distant localities is of paramount importance (Lakin, 1980; Alaska Department of Labor, 1988). Obviously ocean transport was the first means of transport and continues to be an important means for trade and travel. Newfoundland

¹As a bit of anecdotal evidence, while in Alaska I met a Boston area couple who had been travelling in Alaska for two months. It turns out that they had been visiting Newfoundland every summer for 15 years except this one to Alaska. They told me that a great deal of time in their Alaska trip was spent discussing their return trip to Newfoundland for next summer. They went as far as indicating that Alaska had little on Newfoundland in almost every respect - a feeling that echoed my own sentiments.
### Table 5.3. Percentage visitors by place of origin and main purpose of visit to Newfoundland, Tasmania, and Alaska.

<table>
<thead>
<tr>
<th>Province/State Place of Origin</th>
<th>Newfoundland</th>
<th>Tasmania</th>
<th>Alaska</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Automobile</td>
<td>Air</td>
<td>Winter</td>
</tr>
<tr>
<td>Total Est. No.</td>
<td>81,382</td>
<td>57,749</td>
<td>340,000</td>
</tr>
<tr>
<td>Canada</td>
<td>72.8</td>
<td>84.1</td>
<td>2.9</td>
</tr>
<tr>
<td>United States</td>
<td>26.3</td>
<td>11.7</td>
<td>92.7</td>
</tr>
<tr>
<td>Other Country</td>
<td>0.9</td>
<td>4.2</td>
<td>4.4</td>
</tr>
<tr>
<td>Total Percent</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

| Main Purpose of Visit         |              |          |        |          |
| Visiting friends and relatives| 37.5         | 44.7     | N/A    | 24.1      | 13.2     |
| Vacation/Pleasure             | 47.0         | 9.6      | 73.5   | 24.4      | 69.4     |
| Business/Other                | 15.5         | 45.7     | N/A    | 51.5      | 17.4     |
| Total Percent                 | 100.0        | 100.0    | 100.0  | 100.0     |


Note: See Appendix C.5-C.8 for more detail.

is approximately 175 kilometres from its nearest accessible provincial neighbor, Nova Scotia. Tasmania is over twice that distance from its nearest state, Victoria. In contrast, it is over 1,100 kilometres from parts of southeast Alaska to the nearest U.S. city of Seattle. Ferry travel is most extensive and frequent in Alaska, especially southeast Alaska. Tasmania has only one ferry that runs twice or three times a week. Newfoundland has several ferry runs per day except in summer when an extra ferry is added and the schedule is increased. It also has several internal ferries, notably the south coast and Labrador ferries.

River navigation in the Yukon, Tanana, and Kushakwin is important to shipping in Alaska. Tasmania has only a couple of short navigable rivers. Shipping by river is practically nonexistent in Newfoundland.
The second major form of transportation was railways. All three areas built narrow gauge railbeds in the late 1800's. Newfoundland permanently closed its 1,500 kilometer route in the fall of 1988. Tasmania still operates approximately 850 kilometers of narrow gauge railroad. Alaska closed then reopened its 177 kilometer White Pass-Yukon route; primarily for tourism purposes. It also operates a 770 kilometer stretch from Seward (near Anchorage) to Fairbanks.

Road transport is becoming increasingly important in Newfoundland, Tasmania, due primarily to its smaller geographic size, perhaps has the best road system of the three. The famed Alaskan highway is largely paved but permafrost provides a constant engineering and maintenance challenge.

Newfoundland has five major airports, two of which are international. Tasmania has four major airports, one is international. Alaska must take the per capita world record with 988 airports and air strips and 110 seaplane bases. Of these, three are international airports.

5.5. FOREST LAND

The previous discussion on economy indicated that forestry was very important but not the dominant economic sector in either of the three study areas. However, most economic breakdowns consider forestry only as a source of primary and secondary timber products. The many contributions of forest land to the general welfare of the province/state rarely factor into these general economic portrayals. For example, items such as watershed protection, climate modification, wildlife habitat, or as a general backdrop to scenic landscapes do not show up in measures attributable to forestry when calculating the gross domestic product. These items and many more related to forest lands are, nevertheless, very real contributors to overall economic and social welfare of the populace.
Having said this, the analysis that follows will focus on those forest lands capable of supplying commercial quantities of timber. This may appear contradictory, but it simply reflects the reality that many, if not all, of the severe conflicts over forest land-use occur on areas that have potential to grow or already possess commercial timber supplies. Section 5.6 will address some of these conflict issues in more detail.

Table 5.4 presents a comparison of the total land base and productive forest land base in Newfoundland, Tasmania, and Alaska. In terms of total land, Alaska is four times as large as Newfoundland and Labrador and almost twenty-four times the size of Tasmania. A more detailed analysis of the land base reveals that insular Newfoundland, Tasmania, and south coastal Alaska are more comparable at 9.9, 6.3, and 13.4 million hectares, respectively.

Further analysis of these three subregions reveals that the amount of productive forest land area is very similar at 3.1, 2.2, and 2.3 million hectares, respectively. This point is illustrated in Figure 5.2.

Species composition of the forest land base is predictably quite different. Tasmania's southern hemisphere position makes its tree species composition entirely different from the species found in Newfoundland and Alaska. In fact, there are no native genera in common between Tasmania and the two northern hemisphere areas. Almost half of all commercially important tree species in Tasmania are in the eucalyptus genus (Appendix C.3). On the other hand, Newfoundland and Alaska actually have seven tree species in common - birch, larch, white and black spruce, balsam poplar, and trembling aspen (Appendix C.4). In Newfoundland, balsam fir and black spruce are the principle commercial species. In Alaska, white spruce,
sitka spruce, western hemlock, and western red cedar are the principle commercial species in the southeast.

The size and volume of individual trees is also quite different. Tasmania has a few trees that are almost 100 metres tall, whereas, Alaska's tallest trees are approximately 50 metres and Newfoundland's trees rarely exceed 25 metres in height.

Table 5.4. Total land area and productive forest land in Newfoundland, Tasmania, and Alaska.

<table>
<thead>
<tr>
<th>Forest</th>
<th>Total Land</th>
<th>Productive Forest</th>
<th>% Productive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Newfoundland</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insular</td>
<td>9,957.2</td>
<td>3,129.4</td>
<td>31.4</td>
</tr>
<tr>
<td>Labrador</td>
<td>27,000.0</td>
<td>3,611.8</td>
<td>13.4</td>
</tr>
<tr>
<td>Total Newfoundland</td>
<td>36,957.2</td>
<td>6,740.2</td>
<td>18.2</td>
</tr>
<tr>
<td>Tasmania</td>
<td>6,300.0</td>
<td>2,200.0</td>
<td>34.9</td>
</tr>
<tr>
<td>Alaska</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coastal</td>
<td>13,400.0</td>
<td>2,300.0</td>
<td>17.2</td>
</tr>
<tr>
<td>Interior</td>
<td>134,800.0</td>
<td>9,100.0</td>
<td>6.8</td>
</tr>
<tr>
<td>Total Alaska</td>
<td>148,200.0</td>
<td>11,400.0</td>
<td>7.7</td>
</tr>
</tbody>
</table>

Newfoundland - Dept. of Forestry, 1989. Personal Comm. (35 m$^3$/ha.)

Tasmania - Forestry Commission, 1985. (High quality Eucalypt meters height greater than 41 m.; low quality Eucalypt meters height greater than 15 m. less than 41 m.)

Alaska - Alaska Geographic, 1985. (1.4 m$^3$/ha./year)

(all productive/commercial land defined according to local standards)

Ownership distribution in all three areas is dominated by the public sector. Over three quarters of all productive forest in insular Newfoundland and Tasmania, and almost three quarters in Alaska, are
Figure 5.2. Productive forest land in Newfoundland, Tasmania, and Alaska.
Table 5.5. Percentage productive forest ownership in Newfoundland, Tasmania, and Alaska.

<table>
<thead>
<tr>
<th>Province/State</th>
<th>Newfoundland</th>
<th>Tasmania</th>
<th>Alaska</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Insular</td>
<td>Labrador</td>
<td></td>
</tr>
<tr>
<td>Federal</td>
<td>88%</td>
<td>100%</td>
<td>76.9%</td>
</tr>
<tr>
<td>Private</td>
<td>2%</td>
<td>-</td>
<td>0.0%</td>
</tr>
<tr>
<td>Total</td>
<td>100.0%(^{N1})</td>
<td>100%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Total Area 1,000 ha.</td>
<td>3,129.4(^{N2})</td>
<td>3,611.8</td>
<td>2,200.0</td>
</tr>
</tbody>
</table>

Source:  
\(^{N1}\)Dept. For. Res. and Lands, 1980a.  

NOTES:  
Newfoundland's provincial forest land largely licensed or leased to two pulp and paper companies.  
Tasmania state forest lands largely allocated through timber concessions to several large forest companies. Percentage calculated for total forest land 2,988.4 assumed to be proportional for 2,200.0 forest with commercial potential.  
Alaska's federal forest land in Southeast in long term contract with two pulp and paper companies.

Even though the bulk of the productive forest lands are publicly owned, the majority of the timber harvesting rights have been granted to private industry in the form of long term agreements. Primarily these agreements are in connection with pulp and paper interests. In Newfoundland, there is a complex system of timber leases and licenses ranging from 25 to 99 year renewable rights (Munro, 1978). In Tasmania, the primary arrangements for allocating timber rights are termed timber concessions and are granted for many decades, if not perpetual time periods (Pearse, 1987b; Kemp, 1982; Walker, 1982; Meadows, 1982). The U.S. Forest Service in Alaska granted long term contracts to several pulp and paper
Companies on its National Forest lands. This is particularly interesting since normal allocation procedure on National Forest lands, in the lower 48 states, is by competitive timber sales (Rakestraw, 1981).

Newfoundland does not have any officially designated Provincial Forest other than defacto forests on unallocated crown land. Tasmania has 1.5 million hectares of designated State Forests which are managed for a variety of purposes (Cunningham, 1982). Alaska has two National Forests, Tongass and Chugach, containing 1.5 million hectares of commercial forest. It also has two State Forests, Tanana and Haines, containing approximately 180 thousand hectares of commercial forests (Appendix C.1).

The whole subject of allocating timber rights in these three areas is very complex and filled with parallel situations and solutions. In the context of core-periphery theory, this would make a fascinating case study in itself.

Table 5.6 summarizes some brief historical notes concerning forest industry. For example, Newfoundland and Tasmania both have three pulp and paper mills while Alaska has two. Sawmilling is least developed in Newfoundland and most developed in Tasmania. Of particular note is Newfoundland's domestic cutting pattern based on traditional harvest rights granted in a strip of perimeter land stretching three miles inland from high water mark. This "three mile limit" was originally reserved for use by fishermen. In recent years, this tradition and the attitudes associated with it, have moved inland beyond the three mile zone resulting in increased conflicts between domestic and commercial utilization (Roy, 1989).

Silvicultural activity is greater in Newfoundland and Tasmania than it is in Alaska. For example, in Newfoundland for the period 1975-1984
over 7 thousand hectares were planted and more than 21 thousand hectares were precommercially thinned (Hayden, 1986). In Tasmania for the period 1970-1984 over 11 thousand hectares were planted (Forestry Commission Tasmania, 1985). Alaska has used artificial regeneration only to a limited extent. Precommercial thinning in the Tongass National Forest is scheduled at 2.5 thousand hectares per year (Sampson et al., 1983).

Employment relating to timber is presented in Table 5.7. Direct and indirect forest employment is greatest in Tasmania where estimates range from 19-24 thousand people in 1983-84. Newfoundland has the second highest number with estimates ranging between 13-19 thousand. Employment estimates for Alaska are significantly less at roughly 4.4 thousand.

Table 5.6. Some brief historical notes concerning pulp and paper and sawmilling in Newfoundland, Tasmania, and Alaska.

<table>
<thead>
<tr>
<th></th>
<th>Newfoundland</th>
<th>Tasmania</th>
<th>Alaska</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pulp and paper</td>
<td>1909 Grand Falls</td>
<td>1938 Burnie</td>
<td>1954 Ketchikan</td>
</tr>
<tr>
<td>mills still in</td>
<td>1925 Corner Brook</td>
<td>1941 Boyer</td>
<td>1959 Sitka</td>
</tr>
<tr>
<td>operation</td>
<td>1980 Stephenville</td>
<td>1970 Wesley</td>
<td></td>
</tr>
<tr>
<td>Sawmilling</td>
<td>1890 1st large sawmill</td>
<td>1824 1st water powered mill</td>
<td>1889 11 sawmills in operation in South East</td>
</tr>
<tr>
<td>Past</td>
<td>1911 Decline in sawmilling</td>
<td>1844 1st steam powered</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1982-83) 7 mills greater than 500,000 f.b.m. (1,180 m³)</td>
<td>1859 22 mills 1890's Expansion (1978-79)</td>
<td>(1984) 6 mills greater than 20 MMBF</td>
</tr>
<tr>
<td></td>
<td>63 mills 100,000-500,000 f.b.m. (236-1,180 m³)</td>
<td>3 mills greater than 30,000 m³</td>
<td>15 mills 2-19 MMBF</td>
</tr>
<tr>
<td></td>
<td>1708 mills less than 100,000 f.b.m. (236 m³)</td>
<td>21 10,000-30,000 m³</td>
<td>150 mills less than 1 MMBF</td>
</tr>
</tbody>
</table>
Quantifying other uses of forest land is an uncertain exercise (Walker, 1984). At best, for purposes of this study, general indicators are used to gauge the relative importance of non-timber uses. Two indicators are used; amount and use of conservation lands, and utilization of big game forest species.

Conservation lands which contain forest, but prohibit timber harvesting range from 3.5 percent of the total land base in Newfoundland to 28 percent in Tasmania to in excess of 35 percent in Alaska (Table 5.8 and Appendix C.2). In all three areas, there is continued pressure to set aside more land which excludes extractive uses. Newfoundland has the least amount of conservation land reserved, and it also appears to have the least amount of general public pressure to reserve more.

Table 5.7. Forestry employment in Newfoundland, Tasmania, and Alaska.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Logging</td>
<td>2,170</td>
<td>2,450</td>
<td>1,200</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>4,210</td>
<td>5,900</td>
<td>2,000</td>
</tr>
<tr>
<td>Subtotal Direct</td>
<td>6,380</td>
<td>8,350</td>
<td>3,200(^{A1})</td>
</tr>
<tr>
<td>Subtotal Indirect</td>
<td>6,400</td>
<td>10,650</td>
<td>1,165(^*)</td>
</tr>
<tr>
<td>Total</td>
<td>12,780(^{N1})</td>
<td>19,000(^{T1})</td>
<td>4,365(^{A2})</td>
</tr>
<tr>
<td>Other Total Est.</td>
<td>18,000(^{N2})</td>
<td>23,800(^{T2})</td>
<td></td>
</tr>
<tr>
<td></td>
<td>19,000(^{N3})</td>
<td>22,000(^{T3})</td>
<td></td>
</tr>
</tbody>
</table>

Sources:  
\(^{N1}\) Hayden, 1986.  
\(^{N2}\) Poole et al., 1981.  
\(^{N3}\) Dept. of For. Res. and Lands, 1980a.  
\(^{T1}\) Tarlo and Miller, 1985.  
\(^{T3}\) Forestry Commission, 1985, 1987b.  
\(^{A1}\) Berman, 1984.  
\(^{A2}\) Dept. of Comm. and Eco. Dev., 1988.

\(^*\)Subtotal indirect is difference between A1 and A2.
Table 5.3 presented the general visitor statistics for Newfoundland, Tasmania, and Alaska (also see Appendices C.5 through C.8). In Newfoundland, 67 percent of all visitors visited Gros Morne National Park, and 50 percent visited Terra Nova National Parks both of which contain large areas of forested land. Similarly, 66 percent of Tasmanian visitors were involved in general sightseeing and touring, and several hundred thousand visited National Parks with forest lands. In Alaska, 62 percent of overseas visitors went to Portage Glacier, which meant they had to pass through at least part of the Tongas National Forest.

There are an interesting variety of mammals and other wildlife in Newfoundland, Tasmania, and Alaska. As with tree species, Tasmania contains many species not found in the northern hemisphere. Most famous, or infamous to outsiders, is the Tasmanian Devil, among other marsupials is the wallaby, a small kangaroo. Also unique is the duck-billed platypus (Appendix C.9). Alaska and Newfoundland have a large number of species in common, among which the moose and caribou share relatively high popularity (Appendix C.10).

Big game hunting of forest species is popular in all three locations. In Newfoundland, over 50 thousand people apply for big game licenses. In Alaska, over 80 thousand residents and 8.5 thousand non-residents obtain big game licenses. In Tasmania, over 6 thousand wallaby licenses are issued (Appendix C.11). Harvest of animals is notable. Newfoundlanders harvest in excess of 12 thousand moose annually, while Alaska's take was about 6.6 thousand in 1984. In 1986, there were over 600 thousand wallabies taken in Tasmania (Appendix C.12).
Table 5.8. Some conservation lands in Newfoundland, Tasmania, and Alaska.

<table>
<thead>
<tr>
<th></th>
<th>Newfoundland (Island only)</th>
<th>Tasmania</th>
<th>Alaska</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td># ha managed by</td>
<td># ha managed by</td>
<td># ha managed by</td>
</tr>
<tr>
<td>National Parks</td>
<td>2  220,500 F</td>
<td>13  851,051 S</td>
<td>15  20,000,000 F</td>
</tr>
<tr>
<td>Provincial/State Parks</td>
<td>75  23,563 P</td>
<td>88  21,351 S</td>
<td>107 1,260,758 S</td>
</tr>
<tr>
<td>Wildlife, Wilderness and Ecological Reserve</td>
<td>7  109,262 P</td>
<td>160  910,436 S</td>
<td>16 31,186,836 F</td>
</tr>
<tr>
<td>Total of the lands</td>
<td>353,325</td>
<td>1,782,838*</td>
<td>52,447,594**</td>
</tr>
<tr>
<td>% of Total Land Base</td>
<td>3.5</td>
<td>28.3</td>
<td>35.4</td>
</tr>
<tr>
<td>Total Land Base</td>
<td>9,957,200</td>
<td>6,300,000</td>
<td>148,200,000</td>
</tr>
<tr>
<td>Defacto</td>
<td>large</td>
<td>mod.</td>
<td>large</td>
</tr>
</tbody>
</table>


Notes: F = Federal Government Department
P/S = Provincial or State Government Department
* Excludes State Forests
** Excludes National Forests, State Forests and 32 million ha. of Bureau of Land Management Land.
Numbers are true reflection of Island of Newfoundland, but only a partial reflection of Tasmania and Alaska where amount of actual conservation land is much higher.

5.6. Forest Policy


In chapter four the global and national legislation impacting on local resource management was outlined in tables 4.3 and 4.6-4.8. As well, Appendix D provides a more detailed review of individual pieces of legislation and specific policies.

All three jurisdictions are significantly affected by national legislation and policy. For example, Newfoundland is affected in the most subtle way through regional development funding agreements, needed to
implement forest policy. As well, the Federal-Provincial Task Force on Forestry laid the foundation for the Forest Management (Land Taxation) Act of 1974.

Tasmania has many pieces of legislation but in the last fifteen years major land-use policy decisions have been heavily influenced, if not dictated, by intervening federal policy and legislation. This includes the process leading to the Environmental Impact Statement on Tasmania Woodchip Exports Beyond 1988, the Lemonthyme and Southern Forests (Commission of Inquiry) Act of 1987, and most recently the proposed Wesleyvale Newsprint mill, a failed joint venture between Australia's North Broken Hill Group and Canada's Noranda (Liepa, 1989).

Federal involvement in regards to Alaska's land-use policy has been direct (Federal Field Committee, 1966; Read et al., 1979). This is due to the fact that the federal sector owned all of Alaska's land before 1959. The following acts are among those having overwhelming impact. The Statehood Act of 1959, The 1960 Multiple Use and Sustained Yield Act, The Alaska Native Land Settlement Act of 1971, The National Forest Management Act of 1976, The Federal Land Policy and Management Act of 1976, and The Alaska National Interest Lands Conservation Act of 1980. To a lesser extent the states Forest Resources and Practices Act of 1978 was influenced by federal legislation and policy, and this has impacted on the way state forest lands are managed.

Tables 5.9, 5.10, and 5.11 supply an overview of some of the local legislation and policy relating to land use.

Newfoundland, Tasmania, and Alaska each have pieces of legislation and policies governing single land-use sectors such as timber, wildlife,
Table 5.9. Some Newfoundland legislation and policies related to land-use.

<table>
<thead>
<tr>
<th>Name, Date, Reference</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crown Lands Act 1970</td>
<td>Principal piece of legislation directing allocation of lands to a variety of uses.</td>
</tr>
<tr>
<td>National Parks (Lands) Act 1973</td>
<td>Allow for the acquisition of lands for national parks.</td>
</tr>
<tr>
<td>Sheppard et al., 1973</td>
<td>Newfoundland Federal-Provincial Task Force on Forestry 1973. To draw technical conclusions and evaluate alternative approaches which the Province may use in formulating forest policy.</td>
</tr>
<tr>
<td>Land Capability - Land Use committee of the Federal/Provincial Task Force on Forestry Romaine et al., 1973</td>
<td>To provide an overview analysis of the Province's resources, with particular reference as to their capabilities and land use. To identify problem areas, priorities, and future study needs.</td>
</tr>
<tr>
<td>Forest Land (Management and Taxation Act) 1974</td>
<td>To encourage good husbandry of the forest resources of the Province by a tax arrangement that benefits persons who manage their forest lands. Established management units and plans.</td>
</tr>
<tr>
<td>Royal Commission on Forest Protection and Management 1980 Poole et al., 1981</td>
<td>To review the status of the forest industry and the intensity of forest management within the Province and identify conditions necessary for the long term viability of the industry and the sustained flow of forest products and services for the economic and social well being of our people.</td>
</tr>
<tr>
<td>Environmental Assessment Act 1980</td>
<td>To facilitate the wise management of the natural resources of the province and to protect the environment and quality of life of the people of the province.</td>
</tr>
<tr>
<td>Wilderness and Ecological Reserves Act 1980</td>
<td>To provide for natural areas in the Province to be set aside for the benefit, education and enjoyment of present and future generations in the Province.</td>
</tr>
<tr>
<td>Interdepartmental Land Use Committee (ILUC) 1983 Fugate, 1986</td>
<td>Evolved from the Crown Lands Committee. A Memorandum in Council stated ILUC would become the body which would coordinate government's resource development activities by acting as a clearing house for development programs, policies, legislation and proposed administrative and/or planning boundaries, to integrate resource and land uses through the development of land use policies and regional Crown Land Plans.</td>
</tr>
<tr>
<td>Forestry Act</td>
<td>To be brought before the House in 1990.</td>
</tr>
</tbody>
</table>
recreation, and agriculture. The degree to which these are integrated and mutually supportive or in direct conflict is variable.

Of the three, Alaska has the closest thing to a comprehensive land-use policy - still this is not described by any single piece of legislation. Newfoundland has made the least progress towards integrated land-use policy. A development plan for 1980-1985, Managing all our Resources, was a good attempt to set targets for each department (Gov. of Newfoundland and Labrador, 1980). Although the Integrated Resource Planning Workshop in 1989 (LeDrew, 1989) clearly reaffirmed the need for and consensus of senior public land managers to formulate some form of integrated land-use policy. The Forest Practices Acts in Tasmania and Alaska both advocate integrated forest land-use. There is no similar piece of legislation or policy in Newfoundland.

The administrative structure needed to implement existing legislation and policy is varied in each study area. In Newfoundland, the provincial Department of Forestry and Agriculture has primary responsibilities for management of forest lands. However, its traditional autonomy is being challenged by other departments such as the Department of Environment and Lands.

The stated philosophy of the forestry department is clear:

"...Many foresters would claim to be managers of the resource for all its products and services including the wood, wildlife habitat, recreational and outdoors environment, watershed values and any other related tangibles and intangibles. Although this would be a highly desirable approach, in Newfoundland, and for that matter in most of Canada, that is neither practised nor is it perceived by the public to be the current management role of the foresters..." (Department of Forest Resources and Lands, 1980)
Federal involvement is indirect but pervasive through Forestry Canada and the Forest Resource Development Agreements (FRDA’s) that provide funding for all aspects of forest management.

In Tasmania, the Forestry Commission is the lead state agency responsible for forest land matters. Although several other Departments such as Parks and Wildlife also have significant responsibilities.

Table 5.10. Some Tasmanian legislation and policies related to land use.

<table>
<thead>
<tr>
<th>Name, Date, Reference</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forestry Act 1920 Aust. Env. Council, 1986</td>
<td>Establishes the Forestry Commission to manage all State forests and timber reserves and forest products of other Crown Lands</td>
</tr>
<tr>
<td>Hydro-Electric Commission Act 1944 Aust. Env. Council, 1986</td>
<td>The HEC has wide powers to acquire or lease land, fell and remove timber, and enter land to remove materials required for the construction or repair of works.</td>
</tr>
<tr>
<td>Timber Promotion Act 1970</td>
<td>Establishment of a Tasmanian Timber Promotion Board for the promotion of the use of wood, and for the making of funds available to the Board for that purpose.</td>
</tr>
<tr>
<td>Environment Protection Act 1973 Aust. Env. Council, 1986</td>
<td>Generally protect the State's environment, prevent and control pollution, and coordinate all activities, public and private to protect and improve the environment.</td>
</tr>
<tr>
<td>The Forest Landscape - Visual Management System 1983 Forestry Commission, Tasmania, 1983</td>
<td>To provide landscape management guidelines that are incorporated into operational plans to control the final visual look of harvest activities.</td>
</tr>
<tr>
<td>Forest Practices Act 1985 Forestry Commission, Tasmania, 1987a</td>
<td>The Forest Practices Code provides a set of basic standards to protect environmental values during forest operations. The Code is concerned with soils, water quality and flow, native plants and animals, landscapes, archaeological features and limestone cave country.</td>
</tr>
</tbody>
</table>
The Forestry Commission makes the following statement of philosophy:

"The World Conservation Strategy defines conservation as the wise use of natural resources, on a sustainable basis, to meet the needs of both present and future generations. The Forestry Commission endeavours to manage the State Forests to meet the needs of the whole community. This involves balancing wood production with protection and a wide range of recreational demands. The Commission believes that it is applying the philosophy of the World Conservation Strategy to the management of Tasmania's State Forests."

(Forestry Commission, Tasmania, 1985.)

In Alaska, a large number of Federal, State, and Native corporations are involved in forest land planning (Gallagher, 1987). The federal legislation governing all U.S. National Forest lands has historically had the greatest impact. The Multiple-Use, Sustained Yield Act of 1960 states:

"It is the policy of the Congress that the national forests are established and shall be administered for outdoor recreation, range, timber, watershed, and wildlife and fish purposes." (U.S.D.A., 1978)

More recently the turn over of large tracts of forest lands to the State of Alaska and Native Corporations has meant some departures from the original federal legislation. In the case of state legislation, the Forest Resources and Practices Act of 1978 maintains the spirit and thrust of the federal approach. In the case of Native lands, there appear to be large deviations as significant forest area is liquidated and exported to Japan in the form of raw logs and unprocessed woodchips.

Overall Newfoundland's legislation is the least coherent and most filled with unresolved conflicting mandates, although a new Forestry Act has been in preparation since 1981 and will, presumably, address this problem at some level. Not surprisingly, Alaska's legislation is the most comprehensive, reflecting the prevalence of extensive U.S. legislation.
Table 5.11. Some Alaskan legislation and policies related to land use.

<table>
<thead>
<tr>
<th>Name, Date, Reference</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constitution of the State of Alaska</td>
<td>Article VIII Natural Resources. Section 1. It is the policy of the State to encourage the settlement of its land and the development of its resources by making them available for maximum use consistent with the public interest. 18 sections including Section 4 on Sustained Yield. Fish, forests, wildlife, grasslands, and all other replenishable resources belonging to the State shall be utilized, developed, and maintained on the sustained yield principle, subject to preferences among beneficial uses.</td>
</tr>
<tr>
<td>1959 Harrison, 1982; Constitution as Amended, 1984</td>
<td></td>
</tr>
<tr>
<td>Forest Resources and Practices Act</td>
<td>Article 1. Section 10. Declaration of intent. The legislature declares that (1) the forest resources of Alaska are among the most valuable natural resources of the state, and furnish timber and wood products, fish and wildlife, tourism, outdoor recreation, water, soil, air, minerals and general health and welfare (2) economic enterprises and other activities and pursuits derived from forest resources warrant the continuing recognition and support of the state, etc. Establishes a 3-way working relationship between the Alaska Department of Fish and Game, the Department of Natural Resources, and the Department of Environmental Conservation.</td>
</tr>
<tr>
<td>1978</td>
<td></td>
</tr>
</tbody>
</table>

The major forest land use issues are outlined in tables 5.12, 5.13, 5.14. Appendix E outlines the extent to which the higher education system has been involved in these specific issues as well as some more generic issues. Newfoundland's issues are primarily of regional concern and importance, although in the case of the pine marten vs. logging issue in the Little Grand Lake area, there is limited national attention. On balance, the largest single environmental issue has been over aerial spraying of pesticides. This issue was largely put to rest by the 1981 Royal Commission on Forest Protection and Management (Poole et al., 1981) which recommended a forest protection program that included chemical pesticides. The use of herbicides has been subjected to the EIA process more intensely than use of insecticides (Dept. of Forest Resources and Lands, 1986). Milne (1988) presents thirteen strategic forest sector issues in Newfoundland. The six top ranking issues identified are:

1. Effect of forestry practices on the environment.
2. Loss of forests from fire insects and disease.
3. Uncertain wood supply versus demand.
4. Forest land alienation due to poor comprehensive land-use planning and a reliance on single-use rather than multiple-use management.
5. Inadequate understanding of intensive forest management practices.
6. Need for improved forest legislation and policy on land tenure, private woodlots, domestic cutting, and government funding of forestry.

Of the three, Tasmania has, without question, attracted the most international attention. Primed by the hydro conflicts on Lake Pedder,

Table 5.12. Some specific land use issues in Newfoundland.

<table>
<thead>
<tr>
<th>Issue Reference</th>
<th>Significance</th>
<th>Problem in Brief</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spruce Budworm (Poole et al., 1981)</td>
<td>Regional</td>
<td>Aerial spray application with chemicals become a widespread public issue.</td>
</tr>
<tr>
<td>Herbicide Use (Roy, 1983) (Gov't Nfld. et al., 1986)</td>
<td>Regional</td>
<td>Prepared use of herbicides in silviculture operations becomes a widespread public issue. Required to go through EIS process.</td>
</tr>
<tr>
<td>Main River Road and Bridge (Dunster, 1987)</td>
<td>Regional</td>
<td>Proposed road and bridge river area with potential World Heritage values</td>
</tr>
<tr>
<td>Pine Marten (Tucker, 1988)</td>
<td>Regional/National</td>
<td>The effects of forest harvesting on pine marten in western Newfoundland. Harvesting plans required to go through EIS process.</td>
</tr>
</tbody>
</table>

Gordon and Franklin Rivers, the environmental movement has successfully orchestrated international attention on the woodchips to Japan issue, the protection of large areas of forest as World Heritage Sites, and most recently, the pulp mill proposal in the Wesleyvale area (Bates, 1986; Cullen, 1987; Cassells and Valentine, 1988; Institute of Foresters of Australia, 1986, 1983; Legislative Council, 1984). There are also a large number of resource issues in Alaska (Kresge et al., 1977; Leaske, 1985; Morehouse, 1984, 1987).
Table 5.13. Some specific land use issues in Tasmania.

<table>
<thead>
<tr>
<th>Issue Reference</th>
<th>Significance</th>
<th>Problem in Brief</th>
</tr>
</thead>
<tbody>
<tr>
<td>Franklin Dam Case (Coper, 1983) (Green, 1981)</td>
<td>National/International</td>
<td>Claimed to be perhaps the most important constitutional law decision since the creation of the federal system of government in Australia. Commonwealth of Australia (anti-dam) vs. State of Tasmania (pro-dam) under the World Heritage Properties Conservation Act 1983. Result: No dam was built.</td>
</tr>
<tr>
<td>Commission of Inquiry into the Lemonthyme and Southern Forests (Helsham et al., 1988)</td>
<td>National</td>
<td>Commonwealth initiative to determine if there are qualifying areas under the World Heritage Properties Conservation Act 1983 in the Lemonthyme and Southern Forest. State refused to cooperate with inquiry initially but later did cooperate. Particularly Tall Eucalypt forests.</td>
</tr>
<tr>
<td>Wesley Vale Pulpmill Proposal (Liepa, 1989)</td>
<td>National/International</td>
<td>A failed joint venture between Canadian Noranda Forest Products Inc. and Australia’s North Broken Hill Holdings Ltd. due to uncertainty about environmental standards.</td>
</tr>
</tbody>
</table>

Table 5.14. Some specific land use issues in Alaska.

<table>
<thead>
<tr>
<th>Issue Reference</th>
<th>Significance</th>
<th>Problem in Brief</th>
</tr>
</thead>
<tbody>
<tr>
<td>State Lands (Alaska Dept. of Natural Resources, 1987)</td>
<td>National</td>
<td>The territorial and statehood land grants provided Alaska with a potential land entitlement of between 148 million and 162 million acres. The land selection process was critical.</td>
</tr>
<tr>
<td>Conservation Lands (Cahn, 1982)</td>
<td>National</td>
<td>Section 17(d)(2) of ANSCA set aside 80 million acres of public lands to be studied for possible establishment as national parks, wildlife refuge, national forests, or national wild and scenic rivers. Resulted in ANILCA 1980.</td>
</tr>
<tr>
<td>Susitna Valley Forestry (Alaska Dept. of Natural Resources, 1988; Phipps, 1988)</td>
<td>Regional</td>
<td>Proposed timber sale in Susitna Valley generated widespread public comment. As a result an inter-agency planning team and a citizen's advisory committee were formed.</td>
</tr>
</tbody>
</table>
The largest forest related issue in Alaska receiving sustained national attention has been the Tongass National Forest issues in Southeast Alaska (U.S. General Accounting Office, 1988). Regionally, the Susitna Valley Forest is receiving intense attention, especially from Anchorage based interests (Phipps, 1988).

The impact of various environmental groups on forest land-use policy is worth noting. Appendix J outlines the major environmental groups operating in each province/state (also section 6.6.3). In general, Newfoundland's groups have had the least impact on policy and the weakest organization. Tasmania's groups have been the most effective politically, to the point of presently holding the balance of power in the State government through the "Green Party." Alaska has 61 different environmental groups, many are staffed with well educated professionals and there are several effective lobby efforts both nationally and with the State.
PART III.
RESULTS AND DISCUSSION

CHAPTER SIX. COMPARATIVE ANALYSIS OF NEWFOUNDLAND, TASMANIA, AND ALASKA'S HIGHER EDUCATION SYSTEM

CHAPTER SEVEN. DISCUSSION TOWARDS A THEORY
CHAPTER SIX.
COMPARATIVE ANALYSIS OF NEWFOUNDLAND, TASMANIA, AND
ALASKA’S HIGHER EDUCATION SYSTEMS

6.1. INTRODUCTION

Given the physical and cultural background provided in chapters four and five, it is time to examine the specifics of the higher education system and how it may relate to formulating integrated forest land-use policy in Newfoundland, Tasmania, and Alaska.

This chapter begins with an overall description, in section 6.2, of the present higher education system found in each province/state. The remainder of the chapter focuses on the degree-granting sector with a particular emphasis on the universities. These are the flagship institutions of the higher education system. They are Memorial University of Newfoundland, the University of Tasmania, and the University of Alaska at Fairbanks.

Section 6.3 compares the formation and evolution of the degree-granting institutions in each study area. This is followed by a detailed analysis of the teaching, research, and service functions, as they relate to formulation of integrated forest land-use policy. Section 6.4 presents the related teaching functions under the broad headings of faculties and departments, degree programs, and individual course content. The related research functions are discussed in section 6.5 under research centres and institutes, individual faculty member research, and student thesis research. Section 6.6 provides an analysis of the related service functions in terms of policy advice and consulting; conferences, symposiums, and short courses; and involvement in public associations. Some additional observations, made during the course of the thesis research, are presented in section 6.7. In particular, the role of idea champions is noted and discussed. Section 6.8 furnishes a summary and
overall comparison of the teaching, research, and service functions as they relate to integrated forest land-use policy in Newfoundland, Tasmania, and Alaska.

Finally, chapter six is closed with an epilogue that contains some specific implications for Newfoundland.

6.2. THE PRESENT SYSTEM

The systems of higher education found in Newfoundland, Tasmania, and Alaska to a certain degree reflect the systems found in Canada, Australia, and the United States. For example, Newfoundland's system, like Canada's, exhibits some elements of both British and American styles. Tasmania, like most of Australia, has by and large adopted the British model of higher education. And Alaska has followed, to a large extent, the land-grant tradition of the United States, beginning with a school of agriculture that has developed into a multi-university.

Nevertheless, the local systems are not mere clones of their respective federations, rather they have evolved in their own distinct way to meet particular circumstances. Recently Newfoundland, Tasmania, and Alaska, for a variety of reasons, have initiated a significant reform and restructuring of their respective higher education systems. This process is by no means complete and there is still a certain degree of instability and uncertainty in each province/state.

In Newfoundland, a major restructuring has taken place since 1986. What has emerged is a three tiered system consisting of Memorial University, three Institutes of Applied Arts and Technology, and five Community Colleges. The system has evolved from a highly centralized system, with near complete control by a single provincial government department to a relatively decentralized system with nine separate
presidents and board of governors (Department of Career Development and Advanced Studies, 1985, 1987). A large percent of the funding for this system comes from transfer payments from the federal government.

Memorial University is the only degree granting institution in the Province. However, a recent Presidential Committee (1989) recommended that a satellite campus in Corner Brook, Sir Wilfred Grenfell College, be allowed to develop four-year programs for the general degrees of B.A. and B.Sc., emphasizing multi-disciplinary and interdisciplinary principles. The newly elected Government of Newfoundland (April 1989) has pledged itself to upgrading the Grenfell College into a four-year institution, as well, it has announced its intention to re-examine the whole higher education system in Newfoundland.

The present system of tertiary education in Tasmania consists of the University of Tasmania, the Australian Maritime College, the Tasmania State Institute of Technology, and five Technical and Further Education (TAFE) campuses. Funding for these is provided primarily through the federal commonwealth government.

This system stems from a 1980 rationalisation of higher education partly to equalize "extraordinary jealousy between the North and the South, specifically, between Launceston and Hobart" as well as to improve higher education in Tasmania (Byers and Caro, 1981). Degrees are granted in all but the TAFE institutions which are basically technical and vocational schools. However, the University of Tasmania is the only comprehensive institution offering a full range of courses, research, and services.

A recent Federal Government Policy Statement on Higher Education (White Paper) has served as a catalyst for discussions towards formation of a single cohesive university in Tasmania. A joint committee of existing
institutions is considering a number of options for a new university. The councils of the University of Tasmania and the Tasmania Institute of Technology have agreed on a statement of intent to amalgamate, and the Australian Maritime College agreed to be part of tripartite discussions in 1989 (University of Tasmania, 1989).

The public sector of Alaska's higher education system has also recently undergone a major reorganization. It has changed from an extremely decentralized system to a centralized comprehensive university system which absorbed 11 community colleges and 13 Rural Education Centers (Office of Institutional Research 1988a, 1988b; Alaska Commission on Postsecondary Education, 1988).

The central administration is located at the University of Alaska-Fairbanks, and it directly administers the bulk of the community colleges and rural education sites. The two other branches, University of Alaska-Anchorage and University of Alaska at Juneau, are each responsible for a few community colleges (Office of Institutional Research, 1988a, 1988b).

The underlying reason for this move is made clear by the following statement made by the president of the University of Alaska:

"In the spring of 1986, as the price of oil plunged dramatically from $28 per barrel in early January to an eventual low of approximately $10 in August and as state revenue and University funding also declined, it became clear that there was an urgent need to examine carefully the present organization and funding of the University of Alaska. As early as March, members of the Board of Regents raised questions about the future viability of the University in an environment of reduced funding that might last for several years. This concern grew more urgent as the legislative appropriation called for an 8.9 percent reduction in FY87 University spending compared with the FY86 level." (O'Dowd, 1986)
Alaska also has two private degree granting institutions, Alaska Pacific University in Anchorage awards bachelors and masters degrees and Sheldon Jackson College in Sitka confers bachelors degrees.

The bulk of the discussion that follows will focus on Memorial University of Newfoundland, the University of Tasmania, and the University of Alaska at Fairbanks because they are the oldest, most established part of the higher education system in each province/state. In addition to general stature, they are also the best suited to direct comparison in terms of teaching, research, and service functions. Other degree granting institutions will be brought into the discussion when applicable. For example, the role of the University of Alaska-Anchorage has been increasing in recent years, therefore, it will be highlighted where appropriate.

6.3. THE EVOLUTION OF THE DEGREE GRANTING SECTOR

6.3.1. General Background

The status of the higher education systems today is a reflection of the historical circumstances that have shaped their evolution. The early history of higher education in Newfoundland, Tasmania, and Alaska is chronicled by Rowe (1976) and MacLeod (In Press), French (1973), and Cashen (1972), respectively.

The graphs in Figure 6.1 compare the year of first settlement, the year the university was established, and the year each Province/State became part of their federation.

Newfoundland was first to be settled, first to achieve a population of 100 thousand and 400 thousand, but last to establish a degree granting institution. The establishment of higher education in Newfoundland was relatively late in comparison with first settlement in the early 1600's. In 1925, with financial support of the Carnegie Corporation in the United
Figure 6.1. Comparison of establishment of degree granting institution with first settlement, population, and confederation by year.
States, Memorial University College was opened in St. John's as a two-year college with courses in English, mathematics, French, Latin, German, chemistry, and physics. When Newfoundland joined Canada in 1949, one of the first actions of the newly elected Provincial Government was to establish a full degree granting university. In 1949 Memorial University College became Memorial University of Newfoundland (Rowe, 1976). The total population in the Province that year was approximately 340 thousand. It remains today as the sole degree granting institution in the Province.

The University of Tasmania in Hobart was founded in 1890, eleven years before Tasmania joined with other jurisdictions to form the commonwealth of Australia in 1901. The University was authorized to award degrees immediately in arts, science, law, and medicine (French, 1973). However, it was not until 1893 that actual teaching began with three lecturers and six students. Still, in comparison to Newfoundland, this was relatively rapid considering the first settlement had only started in 1803 and that the total population of Tasmania in 1890 was only about 145 thousand.

A second degree granting institution was established in the 1970's in what is presently known as the Tasmanian State Institute of Technology (1988). It offers associate diplomas, bachelors degrees, and graduate diplomas in several general academic fields. It also offers a masters degree in education.

Alaska was relatively quick to establish a degree granting institution. The Americans purchased Alaska in 1867 and by 1917, more than forty years prior to statehood, with a total population of less than 60 thousand the Territorial Legislature officially accepted a U.S. government
land grant and created the Alaska Agricultural College and School of Mines in Fairbanks.

The College began teaching in 1922 with six faculty and twelve students. The programs of instruction were agriculture, home economics, civil engineering, general science, and mining. By 1935 the College had grown to 150 students and 18 teachers, and the name was changed to the University of Alaska (Cashen, 1972). Two more degree granting campuses of the University of Alaska were established; one in Juneau in 1956 and the other in Anchorage in 1970. Both offer bachelor level programs and a few select masters programs.

In addition, two private degree granting institutions established themselves. Alaska Pacific University in Anchorage opened its doors in 1960 (APU, 1987) and now offers bachelors and masters degrees. Sheldon Jackson College, in Sitka, became a four year college in 1977 although it had an organized two year college program since 1944 (SJC, 1989).

6.3.2. Student Population

Figure 6.2 illustrates the growth of student populations at Memorial University, the University of Tasmania, and the University of Alaska at Fairbanks since their establishment. The University of Tasmania had a head start over the other two and its student body remained, for the most part, higher until 1960. In that year, Memorial University student numbers topped both Tasmania and Alaska, and it has remained so every year to the present. By 1985 Memorial's student population was nearly three times larger than the University of Tasmania or the University of Alaska at Fairbanks. Although Memorial was last to reach degree granting status, in terms of student numbers, it quickly caught up and left the others behind.
Figure 6.2. Student population changes from start of institution to 1985 by five year increments for M.U.N., U of Tas, and U.A.F.

1895 - 1955
1960 - 1990


See Appendix F for more detail.
In the case of the University of Alaska at Fairbanks, the relatively slower growth in student population is due to establishment of other degree granting institutions. For example, the University of Alaska at Juneau was established in 1956 and the Alaska Pacific University was started in 1960. However, it was the creation, in 1970, of the Anchorage campus of the University of Alaska that really cut into Fairbank's numbers. Anchorage, by far the bigger of the two cities, has a larger potential student base and many students elect to stay home in Anchorage rather than travel to Fairbanks.

Figure 6.3 shows the total population growth in Newfoundland, Tasmania, and Alaska. Newfoundland has always had a larger population than Tasmania or Alaska. Tasmania was second until the late 1970's when Alaska's population topped it as a result of increased population growth caused by the oil boom.

Figures 6.4 and 6.5 illustrate some comparative aspects of student population versus total population growth. The relative rate of change between student population and total population is shown for intervals between 1940 and 1985. Memorial's student population grew faster than the general population in all but the 1970-80 interval. In the interval 1960-70, student population grew just over 40 times the rate of total population.

Similarly, the University of Tasmania has, for the most part, grown faster than total population but at a more moderate pace than Newfoundland.

The University of Alaska at Fairbanks pattern is quite different. During the 1940-50 period, student population grew at 1/8 the rate of the total population. This was due primarily to a large influx of military personnel during World War II. Again, in 1970-80 student population grew
Figure 6.3. Population changes in total general population in Newfoundland, Tasmania, and Alaska for period 1890 to 1985.

Figure 6.4. Relative rate of change between student population and general population for ten year intervals between 1940 and 1980, and five year interval between 1980 and 1985 for Newfoundland, Tasmania, and Alaska.

Relative rate = Stud. pop. chg./Gen. pop. chg.

(See Appendix F.4 for more detail)

Figure 6.5. Percent of the general population enrolled at M.U.N., U of Tas, and U.A.F. for selected years between 1940 and 1985.

% of General Population

LEGEND

Newfoundland
Tasmania
Alaska

(See Appendix F.5 for more detail)
at only 1/11 the rate of the general population. This was due to two factors: establishment of the Anchorage campus and the increase of total population due to the 1970's oil boom.

The percent of the total population enrolled at Memorial, U. of Tas., and U.A.F. is shown in Figure 6.5. Initially, Newfoundland's percentage was small but by 1985 had grown to almost 2.6 percent of the total population compared to the University of Tasmania at 1.2 percent and U.A.F. less than 1 percent. Again, the creation of U.A.A. decreased Fairbanks percentages after 1970.

Table 6.1 and Figure 6.6 present the total enrolments of students in all degree granting institutions in Newfoundland, Tasmania, and Alaska for 1986. Newfoundland's only degree granting institution had over 15,000 students. Tasmania's total student population, in its two degree granting institutions, was just over 8,500. The total number of students enrolled in Alaska's five degree granting institutions was approximately 11,600 with the majority in U.A.F. and U.A.A. The number of foreign students was similar in Newfoundland and Tasmania at 429 and 413, respectively. Alaska had the least number of foreign students at 226. However, Alaska had slightly more graduate students at 1,216 than Newfoundland with 1,100 or Tasmania with 875. Newfoundland students receiving bachelors degrees was significantly larger than either Tasmania or Alaska at 2,008, 704, and 791, respectively. However, Alaska graduated 293 masters students compared to 155 in Newfoundland and 76 in Tasmania. Interestingly, Tasmania had the most Ph.D. graduates at 21 compared to Newfoundland's 16 and Alaska's 9.
Table 6.1. Enrolment statistics and degrees granted by province/state institutions in 1986.

<table>
<thead>
<tr>
<th>Institution</th>
<th>Enrolment degrees</th>
<th>Enrolment</th>
<th>Degrees</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Part-time</td>
<td>Full-time</td>
<td>Grad</td>
</tr>
<tr>
<td>Newfoundland*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M.U.N.</td>
<td>4,320</td>
<td>10,743</td>
<td>1,100</td>
</tr>
<tr>
<td>Tasmania2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U. T.</td>
<td>2,289</td>
<td>3,479</td>
<td>668</td>
</tr>
<tr>
<td>T.S.I.T.2a</td>
<td>1,583</td>
<td>1,287</td>
<td>207</td>
</tr>
<tr>
<td>Total Tas.</td>
<td>2,872</td>
<td>4,766</td>
<td>875</td>
</tr>
<tr>
<td>Alaska3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U.A.F.</td>
<td>1,430</td>
<td>3,167</td>
<td>502</td>
</tr>
<tr>
<td>U.A.A.</td>
<td>2,082</td>
<td>2,261</td>
<td>444</td>
</tr>
<tr>
<td>U.A.J.</td>
<td>1,227</td>
<td>396</td>
<td>1743a</td>
</tr>
<tr>
<td>A.P.U.</td>
<td>393</td>
<td>404</td>
<td>96</td>
</tr>
<tr>
<td>S.J.C.</td>
<td>22</td>
<td>218</td>
<td>-</td>
</tr>
<tr>
<td>Total Alaska</td>
<td>5,154</td>
<td>6,446</td>
<td>1,216</td>
</tr>
</tbody>
</table>

Sources:
3a Office of Institutional Research, 1988a.

Key:
M.U.N. = Memorial University of Newfoundland
U.T. = University of Tasmania
T.S.I.T. = Tasmania State Institute of Technology
U.A.F. = University of Alaska-Fairbanks
U.A.A. = University of Alaska-Anchorage
U.A.J. = University of Alaska-Juneau
A.P.U. = Alaska Pacific University
S.J.C. = Sheldon Jackson College
Figure 6.6. Full and part-time enrolments by degree granting institution in 1986.

TEACHING, RESEARCH, AND SERVICE FUNCTIONS

Although Newfoundland lagged behind Tasmania and Alaska in developing a degree-granting institution, in terms of total student numbers, it was quick to catch up and then exceed the other two by a wide margin. With this backdrop in place, it is now appropriate to examine the teaching, research, and service aspects of the degree-granting institutions as they relate to formulation of integrated forest land-use policy.

6.4. TEACHING IN RELATION TO FOREST LAND-USE POLICY

Teaching is the raison d'etre for most institutions of higher education. What is the level of exposure, through teaching, that students attending degree granting institutions in Newfoundland, Tasmania, and Alaska are likely to receive in relation to forest land-use policy formulation? This section examines this question using three basic methods. First, a comparative analysis is made, from a general historical perspective, of the development of various faculties and departments within each institution. Second, I review the degree programs that are related to natural resources and policy formulation. And finally, the results of a content analysis used to identify each individual related course/subject are presented.

Taken together all three of these methods serve only as indicators of the level of exposure, through formal teaching of related concepts and subject matter, that students might encounter at each institution. None of these methods is sensitive enough to detect actual learning taking place in formal or informal student-teacher interaction; or the lasting impact that it may or may not have on a student's decision-making ability. Furthermore, some seemingly unrelated courses or events may actually, in some cases, have a greater impact than courses or events that appear
directly related. Therefore, these indicators, while useful for a relative comparison of institutions between province/states, should be used with caution in drawing specific conclusions about individual institutions.

6.4.1. Faculties and Departments

The order of establishment of various faculties and departments within an institution reflects, to a certain degree, the initial tone and philosophy of the institution.

Table 6.2 presents the historical establishment of some faculties and departments at the universities in each study area. Memorial University of Newfoundland inherited the programs established by Memorial University College. In 1949-50, the year of transition between the two-year college and the degree-granting university, the following programs were offered: two years in arts and science, two years in pre-medical and pre-dental work, three years in engineering, two years in household science, and three years in education. Building on these, M.U.N. established in the 1950's departments of philosophy, geology, physical education, business education, psychology, and sociology. In 1957 a two-year pre-forestry program was initiated and in 1958 graduate level education began in marine biology. In the 1960's several professional schools were established such as social work, nursing, engineering and applied science, and medicine.

The University of Tasmania followed a similar pattern with several notable exceptions. A faculty of law was established from inception of the University. In 1960 a faculty of agriculture science was added and in 1974 a board of environmental studies established graduate education in that field (Centre for Environmental Studies, 1988). The University of Alaska at Fairbanks emphasized professional schools from the start with agriculture, home economics, civil engineering, mining, and business
<table>
<thead>
<tr>
<th>Year</th>
<th>Newfoundland M.U.N.</th>
<th>Tasmania U. of Tas.</th>
<th>Alaska U.A.F.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1890</td>
<td>1890 Faculties of arts, science, law</td>
<td>1890 Faculties of arts, science, law</td>
<td>1917 Land Grant</td>
</tr>
<tr>
<td>1900</td>
<td>1919 Faculty of Commerce</td>
<td>1919 Faculty of Commerce</td>
<td>1922 Agriculture, Home Economics, Civil Engineering, General Science, Mining</td>
</tr>
<tr>
<td>1910</td>
<td>1922 Faculty of Engineering</td>
<td>1922 Faculty of Engineering</td>
<td>1923 Business Administration</td>
</tr>
<tr>
<td>1920</td>
<td>1925 Memorial University College (2 year college)</td>
<td>1925 Memorial University College (2 year college)</td>
<td>1935 Anthropology</td>
</tr>
<tr>
<td>1930</td>
<td>1949 Memorial University of Newfoundland</td>
<td>1949 Memorial University of Newfoundland</td>
<td>1956 (U of A-Juneau)</td>
</tr>
<tr>
<td>1940</td>
<td>1952 Dept. of Philosophy</td>
<td>1952 Dept. of Philosophy</td>
<td>1970 (U of A-Anchorage)</td>
</tr>
<tr>
<td>1955</td>
<td>1956 Psychology, Sociology</td>
<td>1956 Psychology, Sociology</td>
<td>1975 School of Agriculture and Land Resources Management (SALRM)</td>
</tr>
<tr>
<td>1957</td>
<td>1957 Two-year Pre-Forestry</td>
<td>1957 Two-year Pre-Forestry</td>
<td>1980 SEA grant</td>
</tr>
<tr>
<td>1958</td>
<td>1958 Graduate level marine biology</td>
<td>1958 Graduate level marine biology</td>
<td></td>
</tr>
<tr>
<td>1960</td>
<td>1960 Agriculture Science</td>
<td>1960 Agriculture Science</td>
<td></td>
</tr>
<tr>
<td>1966</td>
<td>1966 School of Nursing</td>
<td>1966 School of Nursing</td>
<td></td>
</tr>
<tr>
<td>1967</td>
<td>1967 Faculty of Engineering &amp; Applied Science</td>
<td>1967 Faculty of Engineering &amp; Applied Science</td>
<td></td>
</tr>
<tr>
<td>1967</td>
<td>1967 Faculty of Medicine</td>
<td>1967 Faculty of Medicine</td>
<td></td>
</tr>
<tr>
<td>1975</td>
<td>1975 School of Music</td>
<td>1975 School of Music</td>
<td></td>
</tr>
<tr>
<td>1975</td>
<td>1975 School of Music</td>
<td>1975 School of Music</td>
<td></td>
</tr>
<tr>
<td>1980</td>
<td>1985 School of Pharmacy</td>
<td>1985 School of Pharmacy</td>
<td></td>
</tr>
<tr>
<td>1980</td>
<td>1988 School of Fine Arts (Corner Brook)</td>
<td>1988 School of Fine Arts (Corner Brook)</td>
<td></td>
</tr>
</tbody>
</table>

**Source:**
- Rowe, 1976
- M.U.N.-Circle of Excellence
- Wettenhall, 1968
administration. In 1975 U.A.F. consolidated its land based programs under a single School of Agriculture and Land Resources Management.

The present distribution of faculty numbers at each institution is a useful indicator of the relative potential for student exposure to land-based renewable resource concepts and subject matter. Table 6.3 provides the number of faculty in selected professional schools and related disciplines at M.U.N., U. of Tas., and U.A.F.

For the land-based renewable resource professions, it is not surprising that the University of Alaska, a land-grant institution, has a relatively large number of related faculty in several departments or divisions. For example, there are fifteen faculty members in agriculture, seven in forestry, six in resource management, and twenty-five associated with wildlife. The University of Tasmania also has a large agriculture department with forty-seven faculty. There are three faculty members assigned specifically to environmental studies.

In contrast, Memorial University has only one faculty member specific to land-based renewable resources - a single professor of forestry.

By comparison, all three institutions have strong business, engineering, and geology faculties.

Biology is a large faculty at M.U.N., combining botany and zoology. Whereas these disciplines are divided among other faculties at U. of Tas. and U.A.F. At U. of Tas., there are separate departments for botany and zoology. At U.A.F. these disciplines are grouped into one wildlife and biology department.

Geography is prominent at both Memorial University and the University of Tasmania, but is a relatively small component of the University of Alaska.
Table 6.3. Number of faculty by rank in selected professional schools or related disciplines at Memorial University of Newfoundland, University of Tasmania, and University of Alaska-Fairbanks.

<table>
<thead>
<tr>
<th>Professional School or Discipline</th>
<th>University of Newfoundland (1988-89 Calendar)</th>
<th>University of Tasmania (1989 Handbooks)</th>
<th>University of Alaska-Fairbanks (1988-89 Catalog)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>P Asso Assi Lec Other Total P R Lec Tut Other Total P Asso Assi Other Total</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Land Based Renewable</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agriculture</td>
<td>1 3 5 1 37 47</td>
<td></td>
<td>1 5 5 4 15A</td>
</tr>
<tr>
<td>Environmental Stud.</td>
<td>3</td>
<td></td>
<td>3A</td>
</tr>
<tr>
<td>Forestry</td>
<td>1 1</td>
<td></td>
<td>1 2 4 - 7A</td>
</tr>
<tr>
<td>Resources Mgmt.</td>
<td>2 2 2 - 6A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wildlife</td>
<td>12 6 5 2 25B</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Other Professions</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Law</td>
<td>1 1 14 3 2 21</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Business Admin.</td>
<td>5 9 14 5 -</td>
<td>33 1 1 5 1 4 12B</td>
<td>4 9 4 2 19</td>
</tr>
<tr>
<td>Engineering</td>
<td>26 14 13 - 12</td>
<td>65 3 - 27 2 31 63</td>
<td>8 8 6 - 22</td>
</tr>
<tr>
<td>Geology</td>
<td>14 10 13 - 18</td>
<td>55 1 3 6 - 8 18</td>
<td>13 15 8 9 45C</td>
</tr>
<tr>
<td><strong>Related Disciplines</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biology</td>
<td>12 20 8 -</td>
<td>40 -</td>
<td></td>
</tr>
<tr>
<td>Botany</td>
<td></td>
<td>C</td>
<td>B</td>
</tr>
<tr>
<td>Economics</td>
<td>5 4 2 2 -</td>
<td>13 1 1 11 4 11 28B</td>
<td>2 3 5 2 12</td>
</tr>
<tr>
<td>Geography</td>
<td>7 12 5 -</td>
<td>24 1 1 6 3 5 16D</td>
<td>1 1 1 - 3</td>
</tr>
<tr>
<td>Political Science</td>
<td>1 11 3 -</td>
<td>15 1 - 9 2 - 12</td>
<td>2 1 3 - 6</td>
</tr>
<tr>
<td>Zoology</td>
<td>1 1 - 7 1 3 12</td>
<td></td>
<td>B</td>
</tr>
<tr>
<td><strong>Notes:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A Included in Biology</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A Part of Geography since 1988, 30 other faculty from other Departments contribute to Env. Stud.</td>
<td>1</td>
<td>1</td>
<td>11</td>
</tr>
<tr>
<td>B Part of Economics and Commerce Faculty</td>
<td>7</td>
<td>12</td>
<td>5</td>
</tr>
<tr>
<td>C Included in Botany or Zoology</td>
<td>1</td>
<td>11</td>
<td>3</td>
</tr>
<tr>
<td>D Excludes Environmental Science</td>
<td>A -</td>
<td>7</td>
<td>1</td>
</tr>
</tbody>
</table>

Notes: A Included in Biology    A Part of Geography since 1988, 30 other faculty from other Departments contribute to Env. Stud. B Part of Economics and Commerce Faculty C Included in Botany or Zoology D Excludes Environmental Science A Part of School of Agriculture and Land Resource Management B Biology, Botany, Zoology all in Dept. of Biology and Wildlife C Includes Geology, Geophysics, Dept. of Mineral and Geological Engineering (Excludes Petro. Eng.)

P = Professor, Asso = Associate Professor, Assi = Assistant Professor, L = Lecturer, R = Reader, Tut = Tutor, Other = Lab Technicians, etc.
In the case of professional forestry education, none of the institutions ever established a full forestry faculty, department or degree program. However, there are strands of evidence that indicate an early interest and each institution has transfer of credit arrangements with one or more out-of-province/state institutions.

The first president of Memorial University College, J.L. Paton, was aware of the need for forest related education in the early 1930's. The following statement written in a letter by Paton highlights this awareness.

"I was walking with the owner through a forest he owned - fine spruce timber. We came upon a patch which was smothered with moth - trees blasted with them. 'Is this our old enemy, the goat - tailed?' said I. 'I don't know' said he. 'What are you going to do about it?' 'I don't know.' And he was an intelligent educated man. Only there was no guidance for him." (as cited by MacLeod, In Press)

The second president of Memorial University College, A.G. Hatcher, wrote to the president of the University of New Brunswick (U.N.B.) in 1935 concerning the matter of forestry education. The reply noted similarities between U.N.B.'s first three years in forestry and Memorial's first two year's of engineering, suggesting that a transfer of credits would be possible. In 1939 the engineering professor at Memorial recommended putting forestry engineering in the calendar, but nothing came of it (MacLeod, In Press).

The first special lecturer in geography, H.B. Goodridge, joined Memorial University College in 1946. He had studied forestry (1919-20) at the University College of North Wales in Bangor (Macpherson, 1983).

Clause 8 l.c. of the 1949 Act establishing Memorial University of Newfoundland states the University shall provide facilities for the prosecution of original research "and especially the application of science to the study of fisheries and forestry."
In a survey of Memorial University of Newfoundland made at the request of the Board of Regents, Newton (1951) recommended:

"That a course in pre-forest engineering be added to the programme of the Faculty of Engineering, and the Faculty of Arts and Science establish a course of studies for forest biologists."

Following this recommendation and a similar one made by the 1955 Royal Commission on Forestry (Kennedy et al., 1955), a two-year forestry diploma was approved in 1956 (Memorial University Senate Minutes, October 30, 1956). In 1957 the University Senate approved an arrangement with the University of New Brunswick whereby the graduates of the M.U.N. diploma course could enter into the third year of U.N.B. Bachelor degree programme in forestry (M.U.N. Senate Minutes, February 5, 1957). The first instructor was a Norwegian, F. Frost, brought to Newfoundland by the Provincial government. The forestry diploma was terminated in 1969 after which the programme was designated as pre-forestry and awarding of diploma’s was discontinued (M.U.N. Calendar, 1970-71).

Prior to this arrangement with U.N.B., there were at least three Newfoundlander’s who obtained degrees in forestry. R. Pike of Harbour Grace began his studies at U.N.B. in 1918 and F. Hayward of St. John’s went through the University of Toronto beginning in 1929 (MacLeod, 1987). In addition, G. Saunders graduated from U.N.B. in 1959.

From the inception of the M.U.N.-U.N.B. transfer arrangement in 1957, there have been at least 90 Newfoundlanders who have completed professional forestry studies at the University of New Brunswick. Of these, at least 46 are practicing their profession in Newfoundland (Appendix H.3.Nfld.b). As Table 6.3 indicates, there is only one faculty member specific to forestry (In the fall of 1989, a second person was hired).
In the case of the University of Tasmania, there is less evidence of direct interest in forestry education. A botany course was initiated as part of the science faculty in the 1890's, and it is likely there was some interest in that aspect of forestry. In an Interstate Conference held in Sydney in 1911, the question was raised whether establishment of a Chair of Forestry at one of the universities might be appropriate. The Tasmanian government botanist at the time argued against it but noted "that there was no system of educating and training foresters in Tasmania" (Carron, 1985).

Presently, students can spend one year at the University of Tasmania and transfer to the Australian National University forest degree programme. This arrangement is the same for all Australian Universities (Patton, Personal Communication, 1988). I could not obtain empirical estimates for Tasmanian transfer students, but my impression, based on discussion while in Tasmania, is that the vast majority of professional foresters are not originally native to Tasmania. There are no faculty specifically designated for forestry at the University of Tasmania.

Early interest in forestry education at the University of Alaska is also sketchy. One faculty member had an initial interest in forestry. Before moving to Alaska, I. Skarland completed "the equivalent of a junior college education in forestry in his native Norway." He graduated with a B.A. from University of Alaska in 1935 and M.A. and Ph.D. at Harvard. He headed University of Alaska's anthropology department for twenty years before his death in 1965 (Cashen, 1972).

Presently, the University of Alaska at Fairbanks offers a degree in Natural Resource Management with an option in forestry. For those seeking a professional degree in forestry, transfers can be arranged into several accredited universities in other states. I could not obtain empirical data
on the number of transfers, but my interviews held in Alaska indicate that
the vast majority of practicing foresters in Alaska were born elsewhere and
moved up after their professional education was completed.

6.4.2. Related Degree Programs

The second level of analysis of the teaching function concerns related degree programs.

Table 6.4 presents the degree programs related to land-based renewable resources (excluding agriculture) at the degree granting institutions in Newfoundland, Tasmania, and Alaska.

Newfoundland does not offer any directly related degree. However, as discussed in section 6.4.1, Memorial University does have a two-year

Table 6.4. Land based renewable resource* degrees by university or college.

<table>
<thead>
<tr>
<th></th>
<th>Bachelors</th>
<th>Masters</th>
<th>Ph.D.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Newfoundland M.U.N.</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Tasmania U of Tas</td>
<td>--</td>
<td>Environmental Studies</td>
<td>Environmental Studies</td>
</tr>
<tr>
<td>T.S.I.T.</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td></td>
<td>Nat Res Mgmt (3 options)</td>
<td>Nat Res Mgmt</td>
<td></td>
</tr>
<tr>
<td>U.A.A.</td>
<td>--</td>
<td>Public Administration (Regional Planning Certificate)</td>
<td>--</td>
</tr>
<tr>
<td>U.A.J.</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>A.P.U.</td>
<td>Natural Resources Concentration</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>S.J.C.</td>
<td>Natural Resources Mgmt. and Development (2 options)</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

* Agriculture not included in this analysis, is offered at UAF and U of Tas.
pre-forestry arrangement with the University of New Brunswick. The University of Tasmania offers Environmental Studies at masters and Ph.D. levels.

By far, Alaska institutions offer the largest number of directly related degrees. The University of Alaska at Fairbanks offers bachelor and masters degrees in Natural Resources. The bachelor degree has three options: Natural Resource Management, Natural Resource Management/Agriculture, and Natural Resource Management/Forestry. The latter does not qualify as a professional forestry degree but a student can take a two-year pre-forestry program and transfer to several accredited forestry institutions in other states.

U.A.F. also offers wildlife management at bachelor, masters, and Ph.D. levels. The bachelor program has two options: Research Biologist or Management Biologist.

The University of Alaska at Anchorage School of Public Affairs offers graduate level professional certificate in Regional Planning which emphasizes resource policy.

In addition, Alaska Pacific University offers an interdisciplinary bachelor degree with a Natural Resources concentration in which a student can select from four emphasis areas: natural resources, earth science, natural resource development, or pre-engineering.

Sheldon Jackson College offers a bachelor's degree in Natural Resource Management and Development with two options: resource management and outdoor recreation.

Another way to represent these findings is by means of a comparative rating system. To do this, I subjectively assigned 10 marks for each related bachelor's degree, 15 for masters, and 20 for Ph.D. The assumption
is that a Ph.D. level graduate is more influential in policy formulation than a bachelor's graduate. Hence, the hierarchical rating scheme.

Table 6.5 and Figure 6.7 present the results in tabular and graphic forms. On a comparative basis, Alaska with 105 marks stands out as having more related degree programs than Tasmania with 35 marks and Newfoundland with 0 marks. Also, this shows that Alaska has a wider range of offerings at bachelors, masters, and Ph.D. levels, whereas Tasmania does not have any offerings at the bachelors level.

6.4.3. Content Analysis of Individual Courses

A third, more specific, means for analyzing the teaching function as it relates to formulating integrated forest land-use policy is by analysis of individual course content. To do this I examined the course descriptions in the official calendars, handbooks, and catalogues for Newfoundland, Tasmania, and Alaska, respectively. These descriptions usually consist of a concise one or two sentence explanation of course content, and therefore, provide a limited impression of what a course actually entails. In order to do a detailed content analysis, several additional steps would be required, including an examination of detailed course outlines; a review of assessment procedures such as examinations, term papers and projects; an inspection of the textbooks and required readings; and finally an interview with the course instructor. Considering the hundreds of courses involved, the latter approach, although more reliable, is beyond the reach of this study.

In the first sweep of the calendars, I selected all courses that appeared to be relevant to this study. Appendix G provides this initial listing of courses and their official descriptions. From this list, I
Table 6.5. Comparative rating of degrees related to land-based renewable resource management by institution in Newfoundland, Tasmania, and Alaska.

<table>
<thead>
<tr>
<th>Institution</th>
<th>Bachelors</th>
<th>Masters</th>
<th>Ph.D.</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Newfoundland M.U.N.</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>0</td>
</tr>
<tr>
<td>Tasmania U. of Tas.</td>
<td>--</td>
<td>15</td>
<td>20</td>
<td>35</td>
</tr>
<tr>
<td>T.S.I.T.</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>0</td>
</tr>
<tr>
<td>Subtotal Tasmania</td>
<td>--</td>
<td>15</td>
<td>20</td>
<td>35</td>
</tr>
<tr>
<td>Alaska U.A.F.</td>
<td>20</td>
<td>30</td>
<td>20</td>
<td>70</td>
</tr>
<tr>
<td>U.A.A.</td>
<td>--</td>
<td>15</td>
<td>--</td>
<td>15</td>
</tr>
<tr>
<td>U.A.J.</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>0</td>
</tr>
<tr>
<td>A.P.U.</td>
<td>10</td>
<td>--</td>
<td>--</td>
<td>10</td>
</tr>
<tr>
<td>S.J.C.</td>
<td>10</td>
<td>--</td>
<td>--</td>
<td>10</td>
</tr>
<tr>
<td>Subtotal Alaska</td>
<td>40</td>
<td>45</td>
<td>20</td>
<td>105</td>
</tr>
</tbody>
</table>

10.0 Each related bachelor’s degree (Options not counted).
15.0 Each related Master’s degree (options not counted).
20.0 Each related Ph.D. degree (options not counted).

Figure 6.7. Comparative rating of degrees related to land-based renewable resource management by institution in Newfoundland, Tasmania, and Alaska.
subsequently organized the courses, by use of key words, into two broad groups.

The first broad group was compiled from courses containing the key word "policy." This group was then further subdivided into courses on general public policy and courses on natural resource policy.

The second broad group was compiled from courses containing the key words "forests," "forestry," "land-use," "natural resources," and "environment." This group of courses was further subdivided into four subgroups: forests - biophysical, forest management, land-use planning, and natural resource-environmental management.

The results of this grouping for all degree granting institutions in Newfoundland, Tasmania, and Alaska are in Appendix G.4. For purposes of this section, I will focus on the results for Memorial University, the University of Tasmania, and the University of Alaska-Fairbanks. The following three tables present, by university and faculty, those courses that are related to integrated forest land-use policy formulation. The first table (6.6) includes the most directly related courses to policy formulation. The second table (6.7) presents the courses which are specific to forest management and land-use planning. And the third table (6.8) is a list of courses that provide important contextual background to natural resource or environmental management.

Table 6.6 presents the number of courses relating to general public policy or natural resource policy offered by specific faculties or departments at Memorial University, the University of Tasmania, and the University of Alaska.

All three institutions offer general public policy courses through their political science faculty or department. These are mid to upper
Table 6.6. Courses relating to general public policy or natural resource policy offered by institution and faculty.

<table>
<thead>
<tr>
<th>University</th>
<th>Faculty/Dept.</th>
<th>General Public Policy</th>
<th>Natural Resource/Environment Policy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Memorial University</td>
<td>Political Science</td>
<td>3730 Intro to Policy Analysis</td>
<td>B9313 Natural Resource Management</td>
</tr>
<tr>
<td>Business</td>
<td></td>
<td>4730 Public Policy in Nfld.</td>
<td>(G)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4790 Policy Analysis in Canada</td>
<td></td>
</tr>
<tr>
<td>University of Tasmania</td>
<td>Political Science</td>
<td>RAD206B Public Policy Process 1</td>
<td>CEC370 Economics of Natural</td>
</tr>
<tr>
<td>Economics</td>
<td></td>
<td>RAD209E Public Policy Process 2</td>
<td>Resources</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td>EED833 Policy-Making and the Management of Change in Education (G)</td>
<td>Law425 Environmental Law</td>
</tr>
<tr>
<td>Law</td>
<td>Environmental Studies</td>
<td></td>
<td>BES821 Environmental Values (G)</td>
</tr>
<tr>
<td>University of Alaska-Fairbanks</td>
<td>Political Science</td>
<td>PS210 Alaska Government and Politics</td>
<td>Econ335 Intermediate Natural Resource Econ</td>
</tr>
<tr>
<td>Economics</td>
<td></td>
<td>PS212 Intro to Public Admin</td>
<td>Econ635 Resource Economics (G)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PS403 Public Policy</td>
<td>Econ636 Resource Economics (G)</td>
</tr>
<tr>
<td>School of Agriculture and Land Resource Management</td>
<td></td>
<td></td>
<td>ALR400 Natural Resource Policies</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>ALR401 Natural Resource Legislation</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>ALR680 Environmental Decision-Making(G)</td>
</tr>
</tbody>
</table>

(G)=Graduate level course

level undergraduate courses that are required primarily by political science majors. Therefore, unless other students specifically seek these courses as electives, they are unlikely to be exposed to the concepts discussed in these courses.

The more specialized courses concerning natural resource/environment policy are offered by a variety of faculties. For example, Memorial University offers one graduate level course in Natural resource management
The University offers one graduate level course in Natural resource management through its business faculty. At the University of Tasmania three separate faculties: economics, law, and environmental studies, offer one course each. The environmental values course is graduate level. The University of Alaska offers six courses, three of these (2 graduate) are through the economics department and three (1 graduate) are through the School of Agriculture and Land Resource Management. All of the natural resource policy related courses are either upper division undergraduate or graduate level. The significance of this is that unless a student is specializing, they are unlikely to be exposed to the concepts and subject matter discussed in these courses.

Table 6.7 presents the courses that had key words relating to forest management or land-use planning. In the case of forest management, there is only one course offered at each institution that treated the subject in detail and it was an upper division undergraduate course. The situation is similar for land-use planning; most courses are either graduate level or upper level undergraduate. Other courses treating the subject as a minor part of a more general course are noted by an asterisk.

Again, the implication from this analysis is that unless students are specializing, they are unlikely to be exposed to concepts relating to this subject matter area relating to forest management or land-use planning.

The most general listing of courses relating to the broad area of natural resource or environmental management is presented in Table 6.8. It should be noted that specific courses treating only marine, mineral or otherwise non-renewable resources were excluded from this list.

Since the categorization is broader, there are more faculties involved and a wider variety of courses at a larger variety of levels. For
Table 6.7. Courses relating to forest management or land-use planning offered by institution and faculty.

<table>
<thead>
<tr>
<th>University</th>
<th>Course Number and Name</th>
<th>Course Number and Name</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Forest Management</td>
<td>Land-Use Planning</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Memorial University</td>
<td>4070 Forestry Economics</td>
<td>3400 Lands and Seas of North Atlantic</td>
</tr>
<tr>
<td>Economics</td>
<td>4400 Geographical Analysis of Resources*</td>
<td>6203 Econ Geog IV: Land Use Patterns Analysis (G)*</td>
</tr>
<tr>
<td>Geography</td>
<td>4410 Research Seminar in Resources*</td>
<td></td>
</tr>
<tr>
<td>Forestry</td>
<td>2021 Intro to Forestry II*</td>
<td></td>
</tr>
<tr>
<td>University of Tasmania</td>
<td>CEC370 Economics of Natural Resources*</td>
<td>Law213 Land Law</td>
</tr>
<tr>
<td>Economics</td>
<td>EED468 Rural Science in Education*</td>
<td>Law425 Environment Law</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Law</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Geography</td>
<td>SGG331 Vegetation Management</td>
<td></td>
</tr>
<tr>
<td>Environ. Studies</td>
<td>BES812 Resources, Technology and Energy (G)*</td>
<td></td>
</tr>
<tr>
<td>Zoology</td>
<td>SBZ160 Concepts of Biology*</td>
<td>MSS402 Land Development Planning</td>
</tr>
<tr>
<td>Engineering</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Univ. Alaska-Fairbanks</td>
<td>WF417 Wild Mgmt: Forest and Tundra</td>
<td>PS263 Alaska Native Politics*</td>
</tr>
<tr>
<td>Political Science</td>
<td>ALR430 Forest Management</td>
<td>Econ335 Intermediate Natural Resource Economics*</td>
</tr>
<tr>
<td>Economics</td>
<td>ALR400 Natural Resource Policies*</td>
<td>Bio1104 Natural History of Alaska*</td>
</tr>
<tr>
<td>Biology and Wildlife</td>
<td>ALR641 Natural Resource Applications of Remote Sensing (G)*</td>
<td>ALR410 Natural Resources Legislation</td>
</tr>
<tr>
<td>School of Agriculture and</td>
<td>ALR430 Land-use Planning</td>
<td>ALR430 Land-use Planning</td>
</tr>
<tr>
<td>Land Resource Management</td>
<td>ALR630 Planning Theory (G)</td>
<td>ALR631 Planning Practicum (G)</td>
</tr>
<tr>
<td></td>
<td>ALR675 Applied Ecosystem Science (G)</td>
<td>ALR675 Applied Ecosystem Science (G)</td>
</tr>
<tr>
<td></td>
<td>ALR370 Intro to Watershed Management*</td>
<td>ALR370 Intro to Watershed Management*</td>
</tr>
<tr>
<td></td>
<td>ALR460 Principles of Outdoor Recreation Mgmt*</td>
<td></td>
</tr>
</tbody>
</table>

* Signifies only a very minor treatment as part of a larger course.

(G)=Graduate level course

For example, Memorial University has six departments offering twelve courses; two of these are second year courses offered through earth sciences, and the others are upper level or graduate courses. The University of Tasmania has five departments offering ten courses, three of which are second year level. The University of Alaska has nine departments offering twenty-six
Table 6.8. Courses relating to general natural resource/environmental management offered by institution and faculty.

<table>
<thead>
<tr>
<th>University</th>
<th>Courses Relating to General Natural Resource/Environmental Management</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Memorial University</strong></td>
<td></td>
</tr>
<tr>
<td>Geography</td>
<td>3325 Natural Resources; 6250 Conservation of Natural Resources (G)</td>
</tr>
<tr>
<td>Political Science</td>
<td>4730 Public Policy in Newfoundland</td>
</tr>
<tr>
<td>Education</td>
<td>3277 Teaching of Environmental Science</td>
</tr>
<tr>
<td>Business</td>
<td>B913 Natural Resource Management (G)</td>
</tr>
<tr>
<td>Earth Science</td>
<td>2914 Natural Resources and the Past; 2915 Natural Resources and the Future</td>
</tr>
<tr>
<td>Engineering</td>
<td>4611 Engineering and Environmental Geology</td>
</tr>
<tr>
<td></td>
<td>3132 Man and the Biosphere; 5132 Environmental Conservation and Management</td>
</tr>
<tr>
<td></td>
<td>8715 Environmental Engineering; 8951 Water and Air Pollution Control</td>
</tr>
<tr>
<td><strong>University of Tasmania</strong></td>
<td></td>
</tr>
<tr>
<td>Political Science</td>
<td>RPC218B.7 The Politics of Development</td>
</tr>
<tr>
<td>Education</td>
<td>EED233 Science in Education; EED237 Living with Technology: Resources</td>
</tr>
<tr>
<td>Geography</td>
<td>EED238 Environmental Studies</td>
</tr>
<tr>
<td>Envr. Studies</td>
<td>SGG345 Rural Systems; SGG381 Env. Impact Assess and Decision-Making</td>
</tr>
<tr>
<td></td>
<td>BES811 Environmental Planning (G); BES813 Ecosystems (G)</td>
</tr>
<tr>
<td></td>
<td>BES821 Environmental Values (G)</td>
</tr>
<tr>
<td>Zoology</td>
<td>SBL320 Animal Ecology</td>
</tr>
<tr>
<td><strong>Univ of Alaska-Fairbanks</strong></td>
<td></td>
</tr>
<tr>
<td>Geography</td>
<td>Geog302 Geography of Alaska; Geog402 Man and Nature</td>
</tr>
<tr>
<td>History</td>
<td>Hist115 Alaska, Land and its People</td>
</tr>
<tr>
<td>Political Science</td>
<td>PS481 Geopolitics and the International Environment</td>
</tr>
<tr>
<td>Economics</td>
<td>Econ235 Intro to Natural Resource Economics; Econ635, 636 Resource</td>
</tr>
<tr>
<td></td>
<td>Economics (G)</td>
</tr>
<tr>
<td>Rural College</td>
<td>Soc406 Environmental Sociology</td>
</tr>
<tr>
<td>Education</td>
<td>Ed462 Alaska Environmental Education</td>
</tr>
<tr>
<td>Biology &amp; Wildlife</td>
<td>WF301 Animal Pop Dynamics and Management</td>
</tr>
<tr>
<td></td>
<td>WF302 Fish and Wildlife Ecology and Management; WF304 Wildlife Internships</td>
</tr>
<tr>
<td></td>
<td>WF402 Ad Wildlife Biology and Management</td>
</tr>
<tr>
<td></td>
<td>WF615 Ad Topics in Wildlife Management (G); WF692 Graduate Seminar (G)</td>
</tr>
<tr>
<td>Engineering</td>
<td>CE441 Environmental Engineering; CE442 Environmental Engineering</td>
</tr>
<tr>
<td></td>
<td>EQS201 Environmental Protection; EQS604 Environmental Quality Evaluation</td>
</tr>
<tr>
<td><strong>School of Agriculture and Land Resource Management</strong></td>
<td>ALR101 Conservation of Natural Resources</td>
</tr>
<tr>
<td></td>
<td>ALR102 Processes of Natural Resources Management</td>
</tr>
<tr>
<td></td>
<td>ALR300 Internship in Nat Resource Mgmt</td>
</tr>
<tr>
<td></td>
<td>ALR360 Outdoor Recreation Planning</td>
</tr>
<tr>
<td></td>
<td>ALR462 Alaska Environ Education</td>
</tr>
<tr>
<td></td>
<td>ALR640 Simulation and Modeling in Resource Mgmt (G)</td>
</tr>
<tr>
<td></td>
<td>ALR680 Environmental Decision Making (G)</td>
</tr>
</tbody>
</table>

(G)=Graduate level course
courses. Three first year courses are offered, including one in history, and two in the School of Agriculture and Land Resource Management. Two related second year courses are offered, one in economics and one in engineering. The remaining twenty-one courses are upper level undergraduate or graduate level.

Interestingly, all three institutions offer at least one environmental education course through their education department. In Newfoundland, it is a third-year course, Alaska has a fourth-year course, and Tasmania has two second-year and one fourth-year course.

In summary, the analysis of the teaching function as it relates to integrated forest land-use policy formulation suggests three basic points. First, the average student seeking a first degree at any of the institutions analyzed would, in all probability, not be exposed to direct concepts or subject matter relating to natural resource policy formulation in general, much less integrated forest land-use policy formulation. The number of related faculties, degrees, and individual courses is greater at the University of Alaska-Fairbanks than at the University of Tasmania or Memorial University, therefore, a student is more likely to encounter the subject matter by chance at U.A.F. than the other two institutions.

Second, an undergraduate student seeking to major in some aspect of land-based renewable resource management could do so at the University of Alaska in several options. However, at the University of Tasmania or Memorial University, a student could take some preliminary courses but then have to transfer to another university to get a specialized undergraduate degree in natural resources. In the case of a professional forestry degree, a student can do one to two years at the home university and then transfer to another province/state to complete the degree.
Third, at the graduate level, a student at U.A.F. or U. of Tas. has several options to pursue an advanced degree in some aspect of natural resource or environmental policy. At M.U.N. there are no specific graduate degrees awarded in these fields but an interested student could piece together a related program by finding a sympathetic faculty advisor.

Overall, on a comparative basis, Memorial University has the least number of related offerings on all aspects analyzed. The University of Alaska at Fairbanks offers the greatest variety of possibilities and the University of Tasmania falls in the middle with few undergraduate possibilities but a strong interdisciplinary graduate program in environmental studies.

6.5. RESEARCH IN RELATION TO FOREST LAND-USE POLICY

Research can be, and often is, a complex process encompassing a variety of activities that are expressed in several forms. For the purpose of this comparative analysis, I have organized research activities into three broad groups: specialized centres performing research, research by individual academics, and student thesis research. None of these activities are mutually exclusive. For example, individual academics and students are often associated with a particular research centre. As well, students often conduct research as part of their supervisors larger research project.

Furthermore, in some cases, it is difficult to decide where research activities end and service activities begin. For example, consulting activity can be considered as both research and service in some cases. In this analysis, if consulting work results in a centre publication or journal article, it is treated as research. If the consulting process
results in a publication by the outside funding agency, or it is not published at all, then it is treated as a service function.

Within the higher education systems of Newfoundland, Tasmania, and Alaska, research related to integrated forest land-use policy formulation is conducted primarily at Memorial University of Newfoundland, the University of Tasmania, and the University of Alaska at Fairbanks. The one significant exception is that the Institute of Social and Economic Research, formerly at U.A.F., was transferred to the Anchorage campus in 1977. Therefore, in the case of Alaska, research activity from both U.A.F. and U.A.A. campuses will be discussed together.

6.5.1. Research Centres

The role of research centres, or institutes specializing in certain topic areas can be important. These centres often bring together a variety of academics, that combine their expertise, to work on specific problems or topics. They are especially important in facilitating interdisciplinary research on problems that do not lend themselves easily to fruitful study by any single academic discipline. The realm of policy research often requires this interdisciplinary approach.

Table 6.9 presents the historical establishment of research and service centres or institutes at their respective universities. Memorial University has established a large variety of research centres, however, few are actively engaged in research relating to integrated forest land-use policy. The University of Tasmania has fewer centres, but those that are present are active in related research. The University of Alaska has numerous institutes that are active in related research. Appendix H provides a detailed inventory of related contributions by centres. In this section I will highlight the most
<table>
<thead>
<tr>
<th>Newfoundland M.U.N.</th>
<th>Tasmania U. of Tas.</th>
<th>Alaska U.A.F.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1930</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1945</td>
<td></td>
<td>1931 Agriculture Experiment Station transferred from federal ownership to U of A</td>
</tr>
<tr>
<td>1950</td>
<td></td>
<td>1946 Geophysical Institute</td>
</tr>
<tr>
<td>1955</td>
<td>1959 Extension Service</td>
<td>1950 Alaska Cooperative Wildlife Research Unit</td>
</tr>
<tr>
<td>1970</td>
<td></td>
<td>1972 Arctic Environmental Information and Data Center 1972 Alaska Cooperative Park Studies Unit 1978 Alaska Cooperative Fishery Research Unit</td>
</tr>
<tr>
<td>1980</td>
<td>1980 Centre for Management Development 1983 Centre for Earth Resources and Research</td>
<td>1980 Centre for Regional Economic Analysis</td>
</tr>
</tbody>
</table>
| 1985                | 1986 Maritime Studies Research Unit 1980’s at least a dozen other centres and institutes established | 1984 Ag Experiment Station renamed to Agricultural and Forestry Experiment Station  
*Moved main offices to U of Anchorage in 1977 |
| M.U.N. Circle of Excellence | University of Tasmania | University of Alaska-Fairbanks, 1988 |
relevant contributors: the Institute of Social and Economic Research in Newfoundland; the Centre for Environmental Studies and the Centre for Regional Economic Analysis in Tasmania; and the Agriculture and Forestry Experiment Station, the Cooperative Wildlife Research Unit, and the Institute of Social and Economic Research in Alaska.

Memorial Universities' Institute of Social and Economic Research (ISER) was formed in 1961. The early years were dominated by anthropologists interested in studying Newfoundland as a distinct society (House, personal communication). A review of ISER annual reports from 1971-1984 reveal only a few projects related to integrated forest land-use policy (Appendix H.1.Nfld.). ISER funded two masters theses related to forest harvesting and one masters thesis on provincial parks. It also provided funds for a study on Gros Morne National Park. In addition, there are several other studies on agriculture and a 1969 survey on rural land-use. A review of ISER's formal publication series of books, research and policy papers, reports, and conference papers reveals that none of these are significantly related to integrated forest land-use policy.

In contrast, the University of Tasmania's Centre for Environmental Studies, formed in 1975, has produced a number of directly relevant research documents (Appendix H.1.Tas.). For example, among the Occasional Papers series are such titles as:

- Perspectives on Forest Policy in Tasmania.
- Wilderness in Tasmania; Huon Pine - Endangered?
- Exploited and Endangered Wildlife.
- Approaching Deep Ecology.

The Project Reports series includes several closely related titles:

- The Content and Historical Development of Forestry Legislation in Tasmania.
- The Law and the Environment.
- The Effect of Forestry Practices on Bird Breeding in Open Forests.
- The Roots of the Woodchip Industry in Tasmania.

In addition, the Working Papers and Special Publications series include several forest utilization documents.

A second related centre at the University of Tasmania, the Centre for Regional Economic Analysis (CREA) was formed in 1980. It has produced a number of general economic models related to natural resources. Two specific reports are:

- Export Woodchip Industry: Significance for Tasmania's Economy
- The Effects on the Tasmanian Economy of the Resources Boom.

The University of Alaska has several institutes directly related to forest resources (Table 6.9). I will highlight three of these: The Agriculture and Forestry Experiment Station, the Cooperative Wildlife Research Unit, and the Institute of Social and Economic Research.

The Agriculture and Forestry Experiment Station has roots dating prior to the University of Alaska establishment in 1917. An analysis of its 1984-1987 annual reports yields a large variety of publications relating to forest lands (Appendix H.1.AK.). Table 6.10 provides a summary of the number of related publications under five general headings. Of the 95 related publications listed, 50 were on forestry, 19 on recreation, 10 on land-use, and 8 each for wildlife and recreation. Almost one quarter of these were journal articles.

A closer analysis reveals that only a few publications relate specifically to forest land-use policy:

- Forest Management Agreements: The Canadian Experience Applied to Alaska.
- Current Utilization of Alaska Boreal Forest Resources.
- Forest Product Marketing Realities.
- Forest Management for Interior Alaska.
- Outdoor Recreation Management.
- Integration of Recreation Management and Tourism.
- Environmental Issues.
Table 6.10. Related research by the Agriculture and Forestry Experiment Station School of Agriculture and Land Resources management, 1984-1987.

<table>
<thead>
<tr>
<th></th>
<th>Land-Use</th>
<th>Forestry</th>
<th>Wildlife</th>
<th>Recreation</th>
<th>Environment</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Journal articles</td>
<td>2</td>
<td>9</td>
<td>3</td>
<td>4</td>
<td>3</td>
<td>21</td>
</tr>
<tr>
<td>Bulletins and Technical Reports</td>
<td>0</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>Circulars and Extension Publications</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Agroborealis</td>
<td>1</td>
<td>4</td>
<td>1</td>
<td>4</td>
<td>1</td>
<td>11</td>
</tr>
<tr>
<td>Books and Chapters of Books</td>
<td>0</td>
<td>5</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Proceedings</td>
<td>3</td>
<td>7</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>13</td>
</tr>
<tr>
<td>Popular Publications</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>Abstracts</td>
<td>1</td>
<td>10</td>
<td>0</td>
<td>3</td>
<td>2</td>
<td>16</td>
</tr>
<tr>
<td>Theses and Dissertations</td>
<td>1</td>
<td>7</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>Total</td>
<td>10</td>
<td>50</td>
<td>8</td>
<td>19</td>
<td>8</td>
<td>95</td>
</tr>
</tbody>
</table>

Excludes Agriculture


Publications by Agriculture and Forestry Experiment Station, 1984-1987.

There are many more general natural resource related publications and a large number are on biophysical aspects, particularly forest soils.

The Alaska Cooperative Wildlife Research Unit, formed in 1950, is a second University of Alaska institute conducting related research. An analysis of its complete list of 147 publications reveals that the majority are on specific biophysical aspects of wildlife species (Appendix
However, a smaller number of publications are of a general nature and relate to forest land-use policy. Some of these are:

- Cultural Influences on Landscape Aesthetics; Wilderness Parts I and II.
- Value of Wildlife and Related Recreation.

In addition, the Unit has supported the production of many student theses; these will be discussed in section 6.5.3.

Similar to Newfoundland, Alaska also has an Institute of Social and Economic Research coincidentally formed in the same year, 1961. However, unlike its Newfoundland namesake, ISER in Alaska has perhaps been the most directly relevant institute in Alaska to produce public policy research, in general, with a number of publications related to integrated forest land-use. Appendix H.1.AK.d. provides a selected listing of ISER publications from its comprehensive publications list to 1988 (ISER, 1988). Several titles are particularly relevant:

- Alaska Resources Development: The Limits of Policy.
- Opportunities for Cooperative Resource Management in Alaska.
- Analysis of State Land Disposal Programs.
- Comprehensive Regional Planning for Alaska's Lands and Resources.
- Case Studies and Interviews. Tongas Land Management Plan.
- Economic Implications of Native, State and P-2 Land Selections: Changing Ownership and Management of Alaska Lands.
- The National Park System in Alaska: An Economic Impact Study.
- A Survey of the Alaskan Forest Products Industry.

In summary, the research centres of the three study areas have produced a variety of policy related publications. The Newfoundland centres have produced the least. The University of Tasmania centres have produced the most directly related publications to forest policy. Finally, the University of Alaska research institutes have produced by far the largest variety of publications, but with the exception of the ISER
publications, the majority are on biophysical aspects of forest land management.

6.5.2. Individual Research

In addition to the research conducted and sponsored by special centres or institutes, individual academics also carry on research through departments or faculties such as biology or geography. Again, I must stress that this research category is not mutually exclusive from the research already listed for the centres, but rather it serves as a supplement to that list.

An analysis of Memorial Universities Annual Research Inventory for the time series 1974-75 through to 1987-88 (Appendix H.2.Nfld.) reveals several interesting facts. Of the total external and internal awards received by departments at M.U.N. for research related to forest land-use, 92 percent was in the biology department (Table 6.11). A further analysis provided in table 6.12 reveals that 98 percent of the funds awarded to the biology department were for insect related research. Of this amount, roughly 50 percent was for environmental impact and monitoring of forest spraying for spruce budworm. Another 30 percent of the funds went towards investigation of nematodes as a possible biological control of forest insect pests - primarily spruce budworm. And 15 percent was allocated for other biological control agents of spruce budworm.

Of the non-insect related research the only noteworthy items are a $30 thousand grant for a study on land-use conflicts and alienation on productive forest lands done through the geography department. And a small $750 grant to study the history of the Newfoundland forest industry up to 1939.
Other individual research publications found outside of the research inventories (Appendix H.2.Nfld.b and c) revealed more biophysical research publications but no directly related policy research on land-based resources.

Table 6.11. External and internal awards by department at M.U.N. for research related to forest land use for period 1974-1988.

<table>
<thead>
<tr>
<th>Department</th>
<th>External $</th>
<th>Internal $</th>
<th>Total $</th>
<th>% Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biology</td>
<td>1,454,132</td>
<td>-</td>
<td>1,454,132</td>
<td>92.1</td>
</tr>
<tr>
<td>Economics</td>
<td>29,958</td>
<td>-</td>
<td>29,958</td>
<td>1.9</td>
</tr>
<tr>
<td>Extension Service</td>
<td>24,829</td>
<td>-</td>
<td>24,829</td>
<td>1.6</td>
</tr>
<tr>
<td>Geography</td>
<td>44,167</td>
<td>240</td>
<td>44,407</td>
<td>2.8</td>
</tr>
<tr>
<td>History</td>
<td>2,336</td>
<td>750</td>
<td>3,086</td>
<td>0.2</td>
</tr>
<tr>
<td>Psychology</td>
<td>2,300</td>
<td>-</td>
<td>2,300</td>
<td>0.1</td>
</tr>
<tr>
<td>Professional Schools</td>
<td>20,460</td>
<td>-</td>
<td>20,460</td>
<td>1.3</td>
</tr>
<tr>
<td>TOTAL</td>
<td>1,576,182</td>
<td>990</td>
<td>1,579,172</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Source: Memorial University of Newfoundland Office of Research, Research Inventories for 1974-75, 1987-88. (Note: Report for 1975-76 unavailable.)

Table 6.12. External awards to M.U.N. department of biology for 1974-88 by general subject area related to forest land use.

<table>
<thead>
<tr>
<th>Award</th>
<th>$</th>
<th>% of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental impact and monitoring of forest spraying for spruce budworm</td>
<td>707,471</td>
<td>48.7</td>
</tr>
<tr>
<td>Nematodes as biological control of forest insect pests - primarily spruce budworm</td>
<td>420,421</td>
<td>28.9</td>
</tr>
<tr>
<td>Other Biological</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control agents - primarily spruce budworm</td>
<td>216,864</td>
<td>14.9</td>
</tr>
<tr>
<td>Spruce Budworm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>General</td>
<td>74,772</td>
<td>5.1</td>
</tr>
<tr>
<td>Kalmia</td>
<td>19,441</td>
<td>1.3</td>
</tr>
<tr>
<td>National Parks - vegetation - overuse</td>
<td>9,963</td>
<td>0.7</td>
</tr>
<tr>
<td>Caribou and insect interactions</td>
<td>5,200</td>
<td>0.4</td>
</tr>
<tr>
<td>TOTAL</td>
<td>1,454,132</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Source: Memorial University of Newfoundland Office of Research, Research Inventories for 1974-75, 1987-88. (Note: Report for 1975-76 unavailable.)
In contrast, individuals within a number of departments of the University of Tasmania have produced an impressive array of directly related policy research. Table 6.13 presents a summary of the number of related publications listed in the University of Tasmania Research Reports for the years 1981-1988.

Table 6.13. Number of research publications at the University of Tasmania related to formulation of integrated forest land-use policy by department for period 1981-1988.

<table>
<thead>
<tr>
<th>General Subject</th>
<th>Forest Policy</th>
<th>Natural Resource/Environment Policy</th>
<th>Forest Research Bio/Physical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faculty/Department</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agriculture</td>
<td>-</td>
<td>-</td>
<td>11</td>
</tr>
<tr>
<td>Botany</td>
<td>9</td>
<td>1</td>
<td>57</td>
</tr>
<tr>
<td>Environmental Studies</td>
<td>4</td>
<td>38</td>
<td>4</td>
</tr>
<tr>
<td>Geography</td>
<td>11</td>
<td>13</td>
<td>32</td>
</tr>
<tr>
<td>Economics and Commerce</td>
<td>4</td>
<td>5</td>
<td>-</td>
</tr>
<tr>
<td>Law</td>
<td>2</td>
<td>10</td>
<td>-</td>
</tr>
<tr>
<td>Political Science</td>
<td>2</td>
<td>17</td>
<td>-</td>
</tr>
<tr>
<td>Sociology</td>
<td>-</td>
<td>4</td>
<td>-</td>
</tr>
<tr>
<td>TOTAL</td>
<td>32</td>
<td>88</td>
<td>104</td>
</tr>
</tbody>
</table>


Appendix E (Table E.2.Tas.b) lists all of these publications. A few of the forest policy related titles by department are:

Botany: - Conservation of Endangered Species of Eucalypts in Tasmania

Environmental Studies: - Management of Non-Wood Values in State Forests: Should the User Pay?
- Perspectives on Forest Policy in Tasmania - The Tasmania Rainforest Estate

Geography: - Ecology and Conservation of Wet Eucalypt Forests
- Forest Reservation in Tasmania
- The Allocation of Rights to Public Forests in Tasmania
- Clearfelling versus Selective Logging
- Incentive Schemes for Private Forestry in Tasmania
| Economics and Commerce: | - Assistance to Pulp, Paper and Printing Industries and the Tasmanian Economy  
| | - The Significance of APPM for the Regional Economics of Tasmania and Illawarr  
| | - Tightening of Woodchips Export Licensing  
| | - The World Heritage Convention in the High Court: The Tasmanian Forests Case  
| Political Science: | - Non-Wood Values and State Forestry Policy  

In addition, some of the more general publications on natural resource or environmental policy are particularly noteworthy.

| Environmental Studies: | - Tasmania's Greening: Eco-Politics and the Electorate  
| | - Will the Tasmania Disease Spread to the Mainland? The Politics of Land-Use Conflict  
| | - The South-West Tasmania Wilderness Crisis  
| Geography: | - Redefining the Environmental Problem  
| | - Heritage and Development in Tasmania  
| | - Conservation of Native Ecosystems of Tasmania  
| Economics and Commerce: | - The Contribution of the National Parks and Wildlife Service to the Tasmanian Economy in 1986-87  
| | - The Economics of Resources and the Resource Rent Tax  
| Law: | - Protecting Tasmania's Wilderness: Can the Law Help?  
| | - Standing in Environmental Litigation  
| Political Science: | - Comparative Green Politics  
| | - Federalism and Environmental Politics  
| | - Conservation and Sustainable Development: Aspects of Australian Ecological Politics  
| | - Policy, Law, and Administration for Protected Areas  
| | - Eco-Action: Does it Educate or Divide?  
| Sociology: | - Wilderness Protection and Peace Movement  
| | - The Wilderness Society: The Transformation of a Social Movement Organization  

Individuals of the University of Alaska have produced a large number of forest related publications. Most of these publications were produced in association with a specific research institute, and these were discussed in the previous section. A few other related publications are listed in
Appendix H.2.AK.  For example:

Weeden:  
- An Exchange of Sacred Gifts: Thoughts towards Sustainable Northern Development.

Gallagher:

- The Planned Frontier: The History of Land Planning in Alaska; Who's Planning Alaska?
- The Alaska Planning Directory
- Land Ownership and Land Management in Alaska: A Review Eight Years after ANILCA.

Johnson and Jorgenson:

- The Land Resources of Alaska.

In summary, the University of Tasmania again rates first in this category of individual research for producing the most directly related research to integrated forest land-use policy. However, individuals at the University of Alaska have also produced a number of relevant pieces. The majority of related research at Memorial University has been done by a few academics who have concentrated on insect control, but there has been very little in the way of directly related policy research on integrated forest land-use.

6.5.3. Student Theses

Appendix E.3 lists all of the related student theses I could access in Newfoundland, Tasmania, and Alaska.

In Newfoundland, very few theses produced at Memorial University touch on subjects closely related to integrated forest land-use policy. However, if one extends the boundary to include the University of New Brunswick - M.U.N. pre-forestry linkage then several of the B.Sc.F. theses are relevant. Of the 90 known U.N.B. theses produced by Newfoundlanders associated with M.U.N.'s two-year pre-forestry program, 34 or nearly 40
percent were on Newfoundland forest related topics. Of these, only a few are directly policy related such as:

- Newfoundland Provincial Parks Policy and Zoning of Areas for Recreation.
- Forest Management on Crown Lands in Newfoundland.

In addition since U.N.B.'s formation in 1908, there have been three M.F. theses on Newfoundland forest topics, two were directly policy oriented:

- The Development and Present Status of Forest Policy in Newfoundland.
- Policy for Newfoundland and Labrador Regional Parks.

The University of Tasmania Research Reports 1981-88 list twenty-seven theses related to formulation of integrated forest land-use policy (Appendix H.3.Tas). For this period, the botany department has awarded nine Ph.D. and one masters degrees related to bio/physical aspects of forests.

Environmental Studies has awarded four Ph.D.'s and nine masters degrees. Of these, eleven theses were relating directly to the forest or environment policy:

- A Survey of Eastern Australian and some other Approaches to Legislative Control of Off-Road Recreation Vehicles: Lessons and Proposals for Tasmania.

- Sustained Yield in Tasmanian Forest Management: An Examination of the Conflicts between Sustained Yield Management and the Provision of Non-Wood Values.

- Towards an Australian Concept of Cultural Landscape Conservation: A Model-Approach based on a Case Study of Tasman Peninsula.

- Combating the Notion of Environment as Additionality: A Study of the Integration of Environment and Development and a Case for Environmental Development as Investment.

- Ideology and Representation in Environmental Politics: Political Views of Conservation Activists.

- Socio-Economic Aspects of the Export Woodchip Industry in Tasmania.
- Native Conservation on Rural Land: Attitudes of Tasmanian Farmers to Native Vegetation Retention Practice and Policy.

- A Case for the Construction of Curriculum Framework for Environmental Education in Australian Schools, Based on Teacher Perceptions in Tasmania.

- Some Implications for Tasmania Due to the Resources Boom.


Geography has awarded three Ph.D.'s and two masters on some aspect of integrated land management, but only one of these was directly policy related.


Political science has awarded two related Ph.D.'s.


- Characteristics and Influence of the Australian Conservation Movement: An Examination of Selected Conservation Controversies.

Several other theses projects of direct relevance are in progress in Environmental Studies (Appendix H.3.Tas). These include:

- National Parks Management in Tasmania.
- Land Degradation in South-East Australia, Policy History.
- Industrial Policy and Environmental Conflict in Tasmania using Power Analysis as a Conceptual Framework.

The Centre for Environmental Studies of the University of Tasmania has graduated sixty masters students and four doctoral students during the period 1976-1987 (Todd, 1987).

The University of Alaska has produced mostly biophysical related theses. For example, the Alaska Cooperative Wildlife Research Unit has
helped produce 102 masters theses and five doctoral theses (Appendix H.3.AK.a). Of these, only a few are directly policy related:

- A Comparison of Management Practices and Economic Importance of Moose, Muskrat, Hare and Ptarmigan in Alaska and Finland.

An analysis of the theses titles produced through the School of Agriculture and Land Resource Management for the period 1984-1987 reveals nine masters and four Ph.D. theses somewhat related to forest lands (Appendix H.3.AK.b). Of these, three of the masters theses are directly related to forest land-use policy:

- An Economic Evolution of Stumpage Appraised Methods used in the Interior of Alaska, British Columbia and the Yukon Territory

The remainder are biophysical related or not on an Alaskan topic.

A further analysis of titles of all masters degrees by field of study from 1952-1985 reveals that of the 3,969 theses, 115 are on wildlife management, 5 on land resources, 26 on natural resources, 28 on environmental quality engineering, and 2 on resource economics (Appendix H.3.AK.c).

In summary, the University of Tasmania has produced student theses that are most directly policy related to integrated forest land-use policy. Alaska has produced many theses related to forest land, but most are of a bio-physical nature. Newfoundland has produced the least number but if the U.N.B. relation is considered, there are a few on forest policy topics.

To summarize this section on the research function, Table 6.14 presents a nominal means of rating each institution research contribution. In all criteria, the University of Tasmania rated first, the University of
Alaska second, and Memorial University of Newfoundland last. Although the volume of land-based research was by far the greatest in Alaska, research activities in Tasmania were more directly related to forest policy formulation and evaluation. It is interesting to note that I had greater access to Memorial University of Newfoundland research and for a longer time series, but with the exception of studies on forest insect control, there were far less examples of related research on all aspects of land management.

Table 6.14. Relative rating of research contributions to integrated forest policy formulation by Centre, Individuals, and Student Thesis in Newfoundland, Tasmania, and Alaska.

<table>
<thead>
<tr>
<th>Institution</th>
<th>M.U.N.</th>
<th>U. of Tasmania</th>
<th>U. of Alaska (Fairbanks, Anchorage)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Centre</td>
<td>3</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Individual</td>
<td>3</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Thesis</td>
<td>3A</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

*This does not count the 34 U.N.B. B.Sc.F. theses done by Newfoundland Students on Newfoundland topics.*

6.6. SERVICE IN RELATION TO FOREST LAND-USE POLICY

Of the three primary criteria being analyzed in this chapter (teaching, research, and service), the service criteria is by far the most difficult to bound. For instance, certain aspects of service can also be considered as either teaching or research. Furthermore, the service function is sometimes interpreted as an internal service to the university community, for example, serving on various internal committees. In this thesis, service is considered primarily as an external contribution to the wider community. Particularly, I have looked for examples of how it might relate to formulation of integrated forest land-use policy.
For the purpose of this section, service is clustered into three broad categories: policy advice and consulting; conferences, symposiums, short courses; and participation in public associations. What follows is a narrative account, under these three broad headings, for Newfoundland, Tasmania, and Alaska. A more detailed itemization can be found in Appendix I for the first two categories and Appendix J for participation in public associations.

6.6.1. Policy Advice and Consulting

Members of the academic community are often called upon, by governments and other public or private interests, to provide independent opinions on matters of policy. In the most simple form, this could be a brief telephone call; in more complex cases, it could mean a hefty retainer or official appointment to public office. Sometimes, academics take it upon themselves to submit unsolicited briefs or pass opinions in public or private without specific request, but simply as a matter of conscience. Much of this policy advice and consultation process is not documented or is buried in footnotes or acknowledgement sections of publications. Occasionally the contributions are high profile and available to the public. I have attempted to document a wide range of activities.

In Newfoundland, several Memorial University academics have chaired Royal Commissions. The role of the Royal Commission process and subsequent report and recommendations is often of paramount importance to policy formulation in Newfoundland. Two cases are of particular importance to the present study. The first arose from the perceived crisis caused by the massive spruce budworm infestations during the late 1970's. This crisis led to formation of the Royal Commission on Forest Protection and Management. The appointed chair was Dr. C. Poole, Principal of Memorial
University's Grenfell College located in Corner Brook - a small city dependent primarily on the pulp and paper industry. The selection of a chair neutral to the forest industry was seen as important, especially in the consideration of aerial spraying of insecticides. After an extensive hearing process, the Commission made the case for a comprehensive forest protection policy using pesticides (Poole et al., 1981). This recommendation was subsequently accepted as public policy.

A second Royal Commission of significance to all resource sectors was the 1986 Royal Commission on employment and unemployment (House et al., 1986). The chair was Dr. D. House, Research Director of Memorial University's Institute for Social and Economic Research. The impact of the Commission has weighed heavily on government policy making in regard to many Newfoundland sectors. As evidence of this significance, Dr. House was appointed by the Premier in 1989 to head a newly established Economic Recovery Commission. The new team is in a position to affect implementation of the recommendations of House's own 1986 Royal Commission.

Other members of M.U.N. have submitted briefs to Royal Commissions or sat as members on important public review committees. Dr. D.J. Larson of the biology department has sat on the Forest Spray Review Committee of the Newfoundland Department of Environment. Dr. J. Lien, Head of Memorial's Whale Research Group has chaired several public committees such as the ad hoc World Conservation Strategy Review Board for Newfoundland and Labrador. He also has been a member of several government advisory committees on development of resource and wilderness curricula and education materials (Appendix I.NF).

Dr. D. Draper and Dr. K. Storey, members of M.U.N.'s geography department authored an unsolicited consultants report to the Canadian

Academics from the University of Tasmania have made a fair number of direct contributions to the public policy formulation process. For example, Dr. J. Kirkpatrick, head of the recently amalgamated Department of Geography and Environmental Studies served as a consultant to the Commission of Inquiry into the Lemonthyme and Southern Forests 1988 (Helsham et al., 1988). He has also served as a member of the Tasmanian National Parks and Wildlife Advisory Council, Australian Heritage Commission, State Review Panel, and the World Wildlife Fund Scientific Advisory Committee (University of Tasmania, 1989).

At least two academics from the University, both from the Centre for Environmental Studies, participated more directly in the political process. Dr. R. Jones is credited for establishing Tasmania’s Green Party; he ran for parliament in 1972 but was defeated (Walker, 1988). Several years later, in 1980, Dr. N. Sanders was elected to the State Parliament. He has been a leading advocate for Tasmania’s wilderness (Sanders, 1980).

Dr. B.W. Davis, a former senior lecturer in the department of political science has chaired several important committees and commissions such as the South West Tasmania Committee. In addition, he has advised State Cabinet on land-use matters in the South-West Conservation Area, he was a Commissioner of the Australian Heritage Commission, he participated in authoring the National Conservation Strategy, and he has given testimony to the Senate Standing Committee on Science Technology and the Environment regarding land-use policy (Senate Standing Committee, 1984).
Dr. A.J. Kellow of the Centre for Environmental Studies also gave testimony to the same Senate Standing Committee on land-use policy.

Another example from the University of Tasmania is an interdisciplinary body known as the Environmental Law Reform Group. It consists of professors and senior lecturers from administration, botany, environmental studies, zoology, and law. Among its directly relevant reports are:

- Environmental Protection Legislation: A Proposed Bill for Tasmania.
- The Vanishing Forest?
- Woodchip Production and the Public Interest in Tasmania.

In Alaska a small number of academics have held very important public policy positions. For example, Dr. G.W. Rodgers, founder of ISER, was a commissioner of the Joint Federal-State Land-Use Planning Commission for Alaska during the period 1976-1979. In addition, he was an economic advisor to two Alaska Governors (Joint Federal-State Land-Use Planning Commission, 1979).

Dr. R.B. Weeden, professor of wildlife management was appointed as the Director of Division of Policy Development and Planning, Office of the Governor, for the period 1975-1976 (Weeden, 1978).

Several academics have served as land-use advisors to the Federal-State Alaska Land-Use Council. Among these were Dr. J.V. Drew, Dean, School of Agriculture and Land Resource Management who sat as a member of the Land-Use Council from 1981-1983 and was chairman in 1984. More recently, Drs. J. Choon Kim and L.L. Selkregg have also served on this council (Alaska Land Use Council, 1985).

Professor L. Selkregg produced several consultant reports for the Federal-State Land Use Planning Commission (Selkregg and Whiteman, 1979).
In addition, V. Fischer, a former Professor of political science and regional planning and former Director of ISER, was elected to several terms in the Alaska Senate (Foster, 1985).

In summary, these examples illustrate that academics in Newfoundland, Tasmania, and Alaska have contributed directly or indirectly to the land policy formulation process. The several Green Party members from the University of Tasmania provide the most direct examples, but academics in Newfoundland and Alaska have also made important contributions.

6.6.2. Conferences, Symposia, and Short Courses

Universities often provide the setting for a wide array of conferences, symposia, and short courses. These forums serve many functions and they often focus interest and increase public understanding of important policy issues.

Over the years, the Extension Service of Memorial University has organized a number of directly relevant activities. Among these are such conferences as the 1978 Sawmillers Conference, the 1980 Public Participation in Resource Development Assessment Conference, a 1980 Forum on Resource Education for Educators and Leaders of Youth Groups, and the 1987 Design for Development seminar.

M.U.N. Extension has also organized resource education summer camps for high school students. For example, a forestry resource camp was offered from 1978-1981. In addition, M.U.N. Extension sponsored several studies: in 1974 A Study of the Image of Wood Harvesting Sector of Newfoundland's Forest Industry and in 1979 A Forest Resource Inventory for Fogo Island. And as well, two issues of Decks Awash, a M.U.N. Extension magazine of wide circulation in Newfoundland, were devoted primarily to
resource topics. The February 1979 issue was on sawmilling and the February 1984 issue was on conservation and the environment (Appendix I).

Several other departments at Memorial University have organized related events. In 1984-85 the Geography Department co-sponsored a seminar series in Forestry in Newfoundland. The Biology Department has organized and delivered biology summer camps in 1987-1989; these have an environmental component. In 1971 a short course in environmental education was organized by members of the Biology Department (Appendix I).

One of the most directly relevant contributions was when M.U.N. helped organize a symposium on land-use held in 1959 (Newfoundland Research Committee, 1959).

The University of Tasmania has also hosted or had representation at a number of important conferences. One example is a 1982 Symposium on Tasmanian Rainforests in which several University of Tasmania academics presented papers on bio/physical aspects of forests (Forest Ecology Research Fund, 1983). Another example is the 1987 Tall Eucalypt Workshop represented by the four departments of botany, agriculture, geography, and zoology (Brown et al., 1987). Still a further illustration was a 1987 Ecopolitics Conference organized by Dr. Peter Hay of Environmental Studies in which "some 300 people attended including leading politicians and academics" (University of Tasmania, 1988).

Dr. B. Davis of political science and Dr. R. Jones of environmental studies were delegates at the 1983 Natural Conservation Strategy Conference held in Canberra (Dept. of Home Affairs and Environment, 1983).

The Cooperative Extension Service of the University of Alaska has produced or participated in a variety of relevant activities related to land-use. It produces two newsletters: Alaska Forest Products Newsletter
(1968-Present) and Alaska Branching Out (1981-present). It also has sponsored and published proceedings of several conferences including: Alaska’s National Interest Lands (d-2): A Summary of Current Congressional Proposals; and Twelve Views on d-2: Proceedings of the Alaska Rural Development Council Meeting. In addition, it produces a variety of public circulars on land-use planning and forestry.

The Institute of Social and Economic Research (ISER) has also been active in sponsoring conferences. In 1974 it sponsored a conference called Alaska Growth Policy - A Discussion of Issues. Dr. G. Rodgers, while Director of ISER, participated at the 1976 Alaska Lands Symposium held at the Yale School of Forestry and Environmental Studies. In 1980 it co-sponsored the Thirty-First Alaska Science Conference.

Several other University of Alaska co-sponsored conferences include: 1977 North American Forest Lands and latitudes of 60 Degrees; 1986 Alaska Soil Survey and Land-Use Workshop; and several others on forest inventory and forest soils (Appendix I).

6.6.3. Involvement in Public Associations

Individual academics are not isolated in their ivory towers, separate from society. Instead they are functioning members of the broader community and they possess a diversity of interests and obligations. Their position, especially that of tenured professors, often allows them to pursue ideas with an unparalleled degree of freedom.

These factors, among others, enable academics to voice critical opinions on public policy issues with less fear of personal reprisal than most other professions. In their professional worlds, their opinions and procedures are policed through intense peer review and professional associations that legitimize their authority on a subject. In their
personal lives, their relatively secure positions and flexible work arrangements allow them to participate prominently in public associations. It is not surprising, therefore, that academics are often leaders or spokespeople for a wide variety of public policy issues.

Among public associations it is probable that the environmental or conservation groups serve as the primary vehicles through which controversial opinions on integrated forest land-use policy issues are expressed. Therefore, I have tried to gauge the degree to which academics participate in this genre of public association. Appendix J provides some information on the major environmental groups in Newfoundland, Tasmania, and Alaska. This includes information on membership (particularly academic membership), staff, main objectives, and the major issues they are concerned with.

In Newfoundland there are three public groups that have been active in public debate on forest policy issues. Of these the Natural History Society (NHS) is the oldest, largest, and best established. Although its primary interests are natural history, it has voiced critical opinions through letters to federal and provincial politicians on issues such as insecticide and herbicide aerial spraying, the Main River logging plans, and the Pine Marten-Little Grand Lake issue. These letters are published in their journal The Osprey. Traditionally, nearly 50 percent of membership of this group has consisted of academics and staff from Memorial University. The executive committee has usually included several professors.

The Wilderness Society formed in 1980 is more issue oriented than the NHS and publicly expresses opinions through regular public meetings and newspaper articles on all of the same issues noted above. The first
president of this association is a professor from Memorial University and academics comprise approximately half of the membership.

The Tuckamore Club of Corner Brook is the smallest and most regional of the three groups. Several of its presidents have been faculty members of M.U.N.'s Sir Wilfred Grenfell College. Meetings are generally held on campus. This group occasionally get involved in public comment on controversial issues. For the most part, however, it has been an outdoor recreation group.

Several other environmental groups are in their formative stages in Newfoundland, but it is too early to say what role academics will play.

Tasmania's environmental groups are aggressively political. In one case, an environmental group actually grew into a political party. The Lake Pedder Action Committee, formed in 1971 by Dr. R. Jones of the University of Tasmania Centre for Environmental Studies, renamed the United Tasmanian Group in 1972, claims to be the first "Green Party" in the world (Walker, 1988). As mentioned, Dr. N. Sanders, supported by this group, was elected to parliament in 1980. The Greens presently hold the balance of power in the Tasmanian parliament.

There are at least three other important environmental groups in Tasmania. All of these have direct, if not prominent, participation from University of Tasmania faculty. The Tasmanian Conservation Trust was formed in 1968 and its first president was Dr. J.L. Davis of the University of Tasmania Geography Department. It has published newsletters since 1968 and several forest policy related publications such as Forest Industry Strategy for Tasmania (Tarlo and Miller, 1985). The Trust publicly opposed the amalgamation of the Centre for Environmental Studies with the Department of Geography stating "the perception of independence of the
Centre by the community is essential if it is to effectively contribute to debates on environmental issues" (Tasmanian Conservation Trust, 1987).

The Wilderness Society's (TWS) second director was Dr. N. Sanders who has taught in the Centre for Environmental Studies. TWS publishes several newsletters and has been very militant on wilderness, world heritage, and forestry issues. It operates three bookstores in Tasmania.

A third environmental group active in Tasmania is the Australia Conservation Foundation. It has an Australia wide membership of almost 3,800. Dr. R. Jones, Director of the Centre for Environmental Studies, was active in a 1973 struggle that changed the group from a conservation club to a lobby group. The Foundation has published a newsletter, Conservation News, since 1968.

These three environmental groups combined efforts to prepare a nomination to include the South West Tasmania forests as a World Heritage Area (Australian Conservation Foundation et al., 1987).

Alaska has 61 different environmental groups. Five of these groups are Alaskan based with full-time paid staff. Another six groups are national groups with staffed offices in Alaska. In addition, there are two environmental law firms (Alaska Conservation Foundation, 1988). Of all of these, the Southeast Alaska Conservation Council based in Juneau has been the most directly involved in forest land-use issues. This council is a coalition of 12 southeast Alaska groups and has been very critical of the Tongass National Forest Planning process (Southeast Alaska Conservation Council, 1986).

Partly because of the large number of groups, I could not determine the degree of academic involvement in these organizations. One indicator is that Dr. R.B. Weeden, Professor of wildlife management, was hired in
1969-70 by a coalition of local and national conservation groups to lobby in the Alaska legislature. In general, it seems that this direct, high profile role of the academic may be becoming less important in Alaska as many of the groups hire full-time staff who are highly educated.

In summary, the service function is harder to bound than teaching or research functions, yet it appears to contribute most directly to policy formulation. In terms of policy advice and consulting, academics in Newfoundland, Tasmania, and Alaska have served in important capacities. As well, the universities in all three have organized relevant conferences, symposiums, and short courses. Involvement in public associations has also been important. In Newfoundland academics are involved through environmental group leadership and membership. In Tasmania several academics have taken a very direct stance by actually forming a green political party. The role of academics in environmental groups in Alaska is no doubt pervasive, but their presence is diluted by a prominent professional staff that take on front line public communication. Comparatively, Newfoundland is again less dynamic and effective in the service category than Tasmania or Alaska. But compared with the teaching and research criteria, the margin of difference is narrowed substantially. Service activities at the University of Tasmania are the most directly related of the three.

6.7. OTHER FACTORS

During the course of this study, my primary focus was on the explicit criteria of teaching, research, and service functions as they relate to formulation of integrated forest land-use policy. Nevertheless, as the study evolved several other pertinent observations surfaced repeatedly. In this section I will highlight two apparent phenomena: the role of idea
champions and the come-from-away (CFA) - return-from-away (RFA) syndrome. These observations have some empirical basis but they are still in their formative stages and would require more study before any sound conclusions could be drawn.

6.7.1. Idea Champions

In their book, *In Search of Excellence*, Peters and Waterman (1982) popularized the notion of the champion. Adjectives they used to describe such a person included the following: potential innovator, creative fanatic, obnoxious, impatient, egotistic, a bit irrational. Further, they stated that the person had the know-how, energy, daring, and staying power to implement ideas. In other words, they were emotionally committed to finding a way.

I had completed interviewing in Tasmania and was partly finished in Alaska when it struck me that the names of certain individuals surfaced repeatedly in interviews and the literature. Therefore, by the time I returned to Newfoundland I was sensitized to the possible occurrence of champions within the higher education system and their effect on public policy. In any event, it appeared that the concept of an individual making a dramatic and lasting impact on a major policy sector might be more visible in jurisdictions with relatively small populations - Newfoundland, Tasmania, and Alaska. The proverbial "big fish in a small pond."

Given this context, it is appropriate to identify champions within the higher education system that have apparently influenced integrated forest land-use policy either generally or specifically. The selection criteria I used are relatively simple and in keeping within the bounds of the explicit criteria of teaching, research, and service. In order for a person to qualify as a champion, they had to have made outstanding
contributions to teaching undergraduate and graduate students; they had to be respected by their professions and peers as recognized by published research and speaking invitations; and they had to have made significant lasting contributions to public service.

As might be expected there were many academics in Newfoundland, Tasmania, and Alaska who excelled in one of the criteria; there were less that excelled in two of three criteria and there were only a few that were outstanding in all three criteria. Interestingly, even though I was aware of the champion phenomenon by the time I returned to Newfoundland, and paid particular attention to it, I did not find any individual outstanding in all three in relation to land-based policy. If I were to broaden this selection process to include marine policy or more general public policy, then several individuals easily fill all three criteria.

Table 6.15 outlines the characteristics of two idea champions in each of Tasmania and Alaska. These are: Drs. J.B. Kirkpatrick and R. Jones of the University of Tasmania and Drs. G.W. Rodgers and R.B. Weeden of the University of Alaska. I make no claim to having exhausted all the possible candidates and I may have excluded individuals who others feel should be included. Conversely, I may have included controversial individuals who many would exclude.

All four of the individuals outlined have made outstanding contributions to land-use policy formulation. The Tasmanians, in particular, have influenced forest policy substantially through a combination of scholarly and political commitment.

The fact that the higher education system, in general, and multi-universities, in particular, often provide a home for controversial ideas and people that might otherwise not gain credibility in a less tolerant and
forgiving environment may, in itself, be of paramount importance to policy formulation. In other words, the system may provide a home for individuals to explore controversial ideas in sufficient depth and to credibly voice unpopular opinions that may indeed lead to improvements to the society as a whole. This is an interesting subject area that could bear more investigation and, perhaps, yield fruitful insights into policy formulation.

Table 6.15. Idea champions within the higher education systems of Tasmania and Alaska having had pervasive influence on land-use policy.

<table>
<thead>
<tr>
<th></th>
<th>Tasmania</th>
<th>Alaska</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Dr. J.B. Kirkpatrick</td>
<td>Dr. G.W. Rodgers</td>
</tr>
<tr>
<td>Education</td>
<td>B.A.</td>
<td>B.A. U. Cal., Berkeley, 1942</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ph.D. Harvard, 1950 Economics</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Visiting Fellow - Cambridge U.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Littaner Fellow - Harvard</td>
</tr>
<tr>
<td>Teaching</td>
<td>Professor and head Department of Geography and Environmental Studies</td>
<td>Adjunct Professor of Economics.</td>
</tr>
<tr>
<td>Research</td>
<td>Numerous journal articles, book chapters, and books on Tasmanian forests and conservation, (see Appendix E)</td>
<td>1961 Founding Member and Director Institute of Social and Economic Research (ISER)</td>
</tr>
<tr>
<td>Service and Honors</td>
<td>Supervised numerous post-graduate states on forest conservation related research</td>
<td>1976-1979 appointed by governor as commission Joint Federal-State Land Use Planning Commission.</td>
</tr>
<tr>
<td></td>
<td>Consultant 1987-88 to Helsham Inquiry</td>
<td>Economic advisor to two governors.</td>
</tr>
<tr>
<td></td>
<td>Frequent invited speaker to large spectrum of conferences and meetings.</td>
<td>National Academy of Sciences committees, Juneau City Council, Juneau Bureau Assembly.</td>
</tr>
<tr>
<td></td>
<td>Produced vegetation map of Tasmania</td>
<td>&quot;1979 Humanist of the Year&quot;</td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>Name</th>
<th>Tasmania</th>
<th>Alaska</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dr. R. Jones (Deceased 1986 at age of 50)</td>
<td>Dr. R.B. Weeden</td>
<td></td>
</tr>
<tr>
<td>Teaching</td>
<td>Botany Department U. of Tas. 1970-75 Centre for Environmental Studies 1975-1986</td>
<td>Professor of Resource Management 1976-present Professor of Wildlife Management 1970-75 Courses link biological and public policy interests</td>
</tr>
<tr>
<td>Research</td>
<td>Founding Director - Centre for Environmental Studies, 1975 Produced numerous publications and drew postgraduate students from around Australia and the world.</td>
<td>Writing book on Role of Natural Environment in Public Policy in Alaska. Alaska - Promises to Keep, 1978 Over 70 refereed publications.</td>
</tr>
</tbody>
</table>

6.7.2. The CFA-RFA Syndrome

A second phenomenon relevant to Newfoundland, Tasmania, and Alaska is that many, if not most, forest resource professionals have received the majority of their higher education elsewhere.

Almost all people working in forest related professions in these jurisdictions fall within one of two categories: CFA or RFA.

The CFA represents Come from Away. This is local parlance in Newfoundland for people who were not born in the province, were educated elsewhere and came to work in Newfoundland, often with the intention of using the experience as a springboard to better opportunities elsewhere.
Some of the foresters in Newfoundland, and many of the foresters in Tasmania and Alaska, fit into this category. However, a large number remain because they genuinely like the unique lifestyle these areas provide.

The RFA denotes Return from Away, that is, people who are born in Newfoundland, leave for an extended period of time to gain experience or education, and then return to Newfoundland to work. Most of the foresters in Newfoundland, and only a few in Tasmania and Alaska, fit into this category. In Newfoundland, many foresters took two years of pre-forestry at Memorial University then finished their degree at the University of New Brunswick.

Both the CFA and RFA are misfits of sorts because they possess knowledge and skills that are frequently foreign to the mainstream way of thinking in the province/state. This may be a less important factor in well established and prestigious professions such as medicine and law than it is with professions such as forestry.

The implications of this phenomenon to formulating integrated forest land-use policy may be substantial. For example, many of the future politicians, educators, business leaders are being socialized into a dominant paradigm at a local university that is quite different, if not alien, to the resource professionals conceptual framework. This may result in the resource professional being left on the periphery of the decision-making network with little chance of penetrating the core. This point raises several questions.

If most of the public decision makers and general citizenry are educated at a university which does not expose them to renewable resource concepts and issues, then are decisions regarding these resources likely to
be optimum? Conversely, if most of the resource professionals are educated elsewhere, are they likely to understand the social and political context in which they work? These questions are interesting, and this whole concept of CFA-RFA warrants more study.2

Another implication is that resource professionals do not have an intellectual home within their province/state. If they want to discuss ideas freely, update or otherwise refresh their professional education, they must often go outside again. To put this in concrete terms, if a professional wants to go back to graduate school he/she must usually pack up and leave the province/state for an extended period of time. At this stage of their career, mortgages, children, and other complications often come to bear, and are exacerbated by the peripheral location of Newfoundland, Tasmania, and Alaska which means long travel distances and major cultural shifts. At the graduate level, Tasmanians and Alaskans do have options to remain in-state. For example, they can take environmental studies at U. of Tas., Tasmania or natural resource management at U.A.F., Alaska. For a similar education, Newfoundlanders must leave the province.

6.8. THE RELATIONSHIP IN SUMMARY

Table 6.16 provides a matrix that rates the relative importance of teaching, research and service functions as they relate to formulating integrated forest land-use policy in Newfoundland, Tasmania, and Alaska. The comparison is of Memorial University of Newfoundland, the University of Tasmania, and the University of Alaska at Fairbanks and Anchorage.

The rating is based on a scale of 1, 2, or 3. A rating of 1 means that the institution has made a greater and more direct contribution to the integrated forest land-use policy formulation process than the other

2MacLeod (1983a and b, 1985), McCorquado (1988), and Storey et al. (1986) provide relevant background for a study of this kind.
institutions. For example, for the teaching function, the University of Alaska rates first above the University of Tasmania, which rates second, and Memorial University falls in third place.

The rating system is subjective, but the bias favours Newfoundland since my knowledge, experience, and access to materials is far greater in Newfoundland than in Tasmania or Alaska. Therefore, the probability of missing a critical piece of information was less in Newfoundland than in Tasmania or Alaska.

Even with this built in bias, Memorial University rates last in most criteria. The exceptions are in the service function where relevant conferences and individual participation in public associations are significant and earn it a second spot behind the University of Tasmania.

For the teaching function, the University of Alaska rates first in all three criteria for its diversity of related faculties, degrees, and individual courses.

On the other hand, the University of Tasmania rates first in all the research and service criteria.

Taking into account all functions of teaching, research, and service, the University of Tasmania has had the most direct and profound influence in relation to formulating integrated forest land-use policy.

In all three places, the service function was the criteria with the most direct contributions to the policy formulation process.
Table 6.16. Matrix of relative contributions Memorial University, University of Tasmania, and University of Alaska (Fairbanks and Anchorage) to the process of formulating integrated forest land-use policy in Newfoundland, Tasmania, and Alaska.

<table>
<thead>
<tr>
<th>Institution</th>
<th>Memorial University of Newfoundland</th>
<th>University of Tasmania</th>
<th>University of Alaska (Fairbanks and Anchorage)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Related Functions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teaching</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faculties</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Degrees</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Individual Courses</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Research</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Centres</td>
<td>3</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Individual Thesis</td>
<td>3</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Thesis</td>
<td>3</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Service</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Policy Advice and consulting</td>
<td>3</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Conferences, etc.</td>
<td>2</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Participation</td>
<td>2</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Public Asso’s.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall</td>
<td>3</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

6.9. EPILOGUE TO CHAPTER 6 - IMPLICATIONS FOR NEWFOUNDLAND

Having compared the contribution to forest land-use policy made by Memorial University with that made by the University of Tasmania and the University of Alaska (Fairbanks and Anchorage), what are the implications for Newfoundland's higher education system as a whole?

At this point, it is appropriate to bring in results of my interview with Dr. Harris, president of Memorial University. I was nearing completion of my preliminary comparative analysis when I met with Dr. Harris and shared with him my initial conclusions and possible recommendations.
As a preface to this discussion, it is worth highlighting several statements made by Dr. Harris in a keynote address to the 1980 Forum on Resource Education organized by M.U.N. Extension Service.

"...The ownership of resources is one thing. Their effective utilization, their proper management, their conservation are different propositions. We must, therefore, not only have the technological capacity to exploit, we must also possess the scientific capacity to understand, the managerial skills to direct and control, the human wisdom and sensitivity to see and appreciate the fact that we do not live by bread alone, the political and economic skills to conceive and plan the kind of society we want and to use our resources wisely to that end...

...We must believe that our fisheries, our forests, and our soil are, in the long run, the only stable foundations upon which we can build a viable life. To a lesser extent, we can include our mines and our oil wells. I say to a lesser extent because they are ephemeral. A century from now they will be memories or historical records. The continuing, renewable resources are those that must be infinitely cherished...

...What I am saying is that resource education properly comprehended must be set in a much wider context.

...Being aware, we will turn our minds to the tasks of conserving and renewing... We must recall the forests we have irretrievably destroyed, the lakes we have polluted, the animal species we have brought to the point of extinction. We must, in short, realize the horror of what enormous harm man can do when caught in the toils of ignorance or when prompted by the forces of greed. ...All of those things we must be able to do for ourselves. We cannot rely on imported experts, on imported managers, on imported concepts. Heretofore, we have failed to realize our potential because we have not been ready to assume responsibility for setting our own targets, for controlling our own destinies, for managing our own resources...Heretofore, we have been content to be led rather than be leaders.

Enormous changes have occurred within the past fifty years. We have in that time succeeded, perhaps, in establishing an educational foundation
upon which we can now build. The signs of that remarkable achievement are all about us. But now is no time to rest on our laurels. We still have a long, long way to go.

Thus, when I talk about resource education, I am not merely talking about jobs derivative from the basic exploitative function. I am talking about the broad spectrum of opportunity that exists in the areas of advanced science and technology; of the mathematicians and statisticians and computer scientists we will need; of the biologists and geologists and geophysicists and oceanographers and foresters and engineers; of the managers; of the political scientists and sociologists and of the humanists who alone are capable of providing that kind of vertical integration that holds the whole together in a structure commensurate with the values of our culture and our civilization. I am also, of course, talking about the technologists, the tradesmen, the craftsmen. I am talking about the private entrepreneur.

The field is indeed limitless. The opportunities are enormous. If we are to be masters in our own house, if we are to create a society molded to our heart’s desire, if we are to transmit to our descendants a world better than we inherited, we must act and act now to equip ourselves for those tasks..." (Harris, 1980)

Almost ten years after making these comments, Dr. Harris was not surprised by my initial findings and noted that his own casual observations had led to much the same conclusions. He outlined the agreements made between Atlantic Canada institutions whereby the University of New Brunswick would offer forestry, Nova Scotia would offer agricultural science through the Nova Scotia Agriculture College, and veterinarian science would be delivered at the University of Prince Edward Island. He indicated that he was not entirely pleased with the results of the arrangements and pointed to the example of medical education. At one time Delhousie University offered the only medical program in Atlantic Canada, but in Dr. Harris’ view, the level of medical practice in Newfoundland has improved considerably since Memorial University established its own medical
school. He wondered if a similar improvement in land-based resource management would result from a modification of the higher education system.

He was open to the concept of establishing an interdisciplinary program, such as environmental science, for undergraduates and graduates wishing to focus on aspects of land-based renewable resource management.

He felt it was a particularly appropriate time for these discussions since the Grenfell campus in Corner Brook was in the process of seeking degree granting status. The Presidential Committee (1989) Report had recommended that Grenfell offer degrees that were unique from those offered in St. John’s. It seemed obvious to Dr. Harris that an expanded program in land-based renewable resource education might find a receptive and relevant home in Corner Brook more so than it would in St. John’s which is very much oriented to marine and offshore resources.

In light of other occurrences, such as Fisher Institute’s mandate for technology education and applied research in land-based resources, the provincial forestry headquarter’s 1984 relocation to Corner Brook, several attempts to move the federal government’s forest research centre from St. John’s to Corner Brook, and Memorial’s own pre-forestry program being in the shadow of a much larger engineering department in St. John’s; Dr. Harris felt it might be appropriate to pool resources and construct a certain critical mass of expertise rather than fragment it into several locations. In this regard he concurred that one approach would be to establish a multi-agency task force or similar body to address the question of improving land-based resource management through coordinated education and research efforts at the higher education level.
CHAPTER SEVEN. DISCUSSION TOWARDS A THEORY

7.1. INTRODUCTION

The foregoing analysis has demonstrated that Newfoundland's higher education system has contributed less to the integrated forest land-use policy formulation process than the higher education systems of either Tasmania or Alaska. Overall, the teaching, research, and service functions were most direct at the University of Tasmania - to the point of actual political involvement. The contributions made by the University of Alaska are more subtle but they are pervasive throughout the land-grant system.

While the specific example used in this study has been formulation of integrated forest land-use policy, I suspect that the results would be similar for other natural resource and environmental policy questions. That is to say, Newfoundland's higher education system would generally have a weaker relationship to formulating these types of policy than either Tasmania or Alaska.

However, I would be hard pressed to say that the higher education systems in any of the three study areas are doing a superb job of providing present and future public policy leaders and general citizens with an appropriate conceptual framework for making wise public decisions relating to natural resource management. I also have to wonder whether this might be a microcosmic reflection of the contributions made by the higher education systems in each respective federation; and indeed whether there is any global relevance to the observations made in this study. To address these questions definitively would require further comparative study of higher education systems in jurisdictions where forests are a dominant part of the socioeconomic structure; such as Sweden (Bergqvist et al., 1989), British Columbia, or Oregon.
Nevertheless, having completed a comparative examination of the higher education systems of Newfoundland, Tasmania, and Alaska, it is appropriate to attempt to draw from this analysis some plausible interpretations that may have more universal application. To do this, I will begin to assemble a conceptual framework that places higher education and public policy formulation in a broader context.

Throughout this study one observation became sharper and more focused. It is that the intellectual and physical ground upon which we depend is shifting and changing at an unprecedented pace and to a degree previously unwitnessed. It appears that a paradigm shift, of global proportions, is in process and is cutting across many sectors of society, including a number of academic disciplines. The search for a model that can effectively address these apparent transformations would seem to be an urgent matter to which a wide cross section of the planet's intellectual community should be focused.

What follows is an attempt to construct such a model by linking a set of propositions into a conceptual framework that encompasses the cerebral and functional perspectives while cutting across different temporal and spatial dimensions. In other words, the proposed model links knowledge with action at various points in time and space.

An overview of the proposed model is presented in section 7.2. This is followed by a general elaboration, in section 7.3, of the higher education component of the model in a historical and global context. In section 7.4 I re-examine the relationship of higher education and formulation of integrated forest land-use policy in Newfoundland, Tasmania, and Alaska through the lens of this model.
7.2. THE E/P MODEL

In this section, I begin the construction of a conceptual framework or model that links together, not only higher education and public policy, but places them in perspective with other important concepts and propositions. This attempt to tie up loose ends is incomplete and may, in fact, unravel many more questions than it answers. However, I have found the process of model construction has clarified my thinking on forest land-use policy formulation and natural resource/environmental policy in general.

This model can be summarized in eight words: four begin with E, four begin with P. Thus, I have labeled it the E/P model. For simplification purposes, I have taken some liberty with the complexity of these terms and summarize their meanings as follows:

- **Ethics** - Codes of behaviour
- **Philosophy** - The search for truth
- **Education** - Meaning out of chaos
- **Principles** - Truth as understood
- **Economy** - Meeting human needs
- **Policy** - Statement of intent
- **Ecology** - Interrelated dependence
- **Projects** - Human actions

The E/P model is symbolized by two adjacent triangles: one upright (the E's), the other inverted (the P's) interfaced by people at the center(Figure 7.1). The "E's" build in hierarchical fashion from the foundation of life - ecology - to the means of production and distribution - economy - followed by a progressive learning called education which enables informed choices between right and wrong actions - ethics. The "P's" have their base in the search for truth - philosophy - which leads to clarification of principles that are used in setting a common course of action - policy - which are then implemented through human actions - projects.

The symbolism is extended by the juxtaposition of the two triangles. The "E" triangle is based firmly on earth, representing the functional or
Figure 7.1. The E/P Model.

Cerebral
ETHICS
Theoretical
EDUCATION
PRINCIPLE
ECONOMY
Institutional
ECOLOGY
Functional

PEOPLE

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material reality of life. It points to the sky representing the cerebral
dimension or use of the intellect. On the other side, the "P" triangle is
based in the heavens of pure reason. It, in turn, points to the earth,
where it is firmly implanted in the practical functioning of day to day
life. In short, knowledge, as represented by the upper sections of the
triangles, is linked to action, represented by the lower sections of the
triangles.

Although the E/P model is depicted as a layer cake of sorts, with
neat boundaries between each successive concept; it should be visualized
instead as a marble cake in which the concepts are inextricably interwoven.

Furthermore, the same pair of triangles can be used to represent the
temporal and spatial dimensions. In figure 7.2, time is represented by the
left triangle whose base symbolizes the broad history on which the present
sits, ultimately pointing to the infinite and unanticipated future of
surprises. As T.S. Eliot put it: "The present is but a thin film on the
deep well of the past." The inverted spatial triangle graphically portrays
the current slogan "Think global and act local," with broad global
conceptions at the top and specific local actions rooted below.

With a bit of artistic wizardry or difficult mental visualization,
figures 7.1 and 7.2 could be combined into a single three dimensional
model.

Given this introduction, I will now briefly describe each component
of the E/P model in the general context of land-use.

People

At the centre of the model are People with all of their complex needs
and behaviours. The basic need for clean air, water, food, shelter, and
space provides the motivation for much of human behaviour. The harsh
reality is that many of the earth's five billion or so people are struggling to attain several of these basic needs, and they can only dream about their higher needs and desires as described by Maslow. At the same time, a more limited number of people have achieved all basic and most higher needs, to an extent where greed becomes a chief motivating factor.

This model is ultimately based on the assumption that we do not manage natural resources per se, but rather, as stewards of our heritage, we are managing the actions of people in such a way that their actions and the manner in which they use natural resources benefit society and the planet as a whole, both today and in the future.
Projects

Therefore, human actions, labeled here as projects, are the obvious start and end point of the model. They are the practical outcome and the effects of meeting our needs and desires and, as such, are symbolized in Figure 7.1 as planted firmly in the earth. These actions can range from an individual picking fruit off a tree to large scale deforestation. The challenge is to recognize the potential and real consequences of our actions and ensure that they are consistent with the renewability and ultimate survival of the human species and the planet. Ethics, the exact inverse of projects in this model, aims for the highest reaches of consciousness; ethics help guide human actions towards appropriate directions.

Ecology

Ecology is represented by the base of the left triangle, symbolizing the foundation of life; it is submerged partially in the earth and reaches into the atmosphere. Hardin (1985) states the first law of ecology in simple terms: "We can never do merely one thing."

In effect, this underlines the interconnected relationships between all living organisms and their non-living environment. It also emphasizes that all actions have side effects - many are predictable, more are not.

Closed forests comprise almost one fifth of the earth's land area. These forests help provide clean air, water, food, and shelter. Projects which cause irreversible damage to life support systems such as these are ultimately a threat to life itself and, therefore, require a careful assessment of competing values before proceeding. Notice how an erosion of this ecological base symbolically causes the entire model to topple over,
Figure 7.3. Erosion of base essentials of ecology and economy topples the whole system and destroys projects (squeezing people).
tearing the projects in half (Figure 7.3) and threatening the ultimate fate of people metaphorically crushed at the centre.

Economy

The economic system is the institutional mode of producing and distributing the goods and services that fulfill human needs and desires. Evidently, the dominant economic models of the past have not properly valued the non-market benefits of raw natural resources, and perhaps this has led to circumscribed public policies that are somewhat one-dimensional in scope.

The Bruntland Commission demonstrated, at a high political level, the need to consider the inextricable relationship between a healthy ecological base and a vibrant and lasting economy. Unfortunately, while many people now recognize this, there are still a significant number of nations that undervalue ecological processes. Stated in different terms - action has not yet caught up to knowledge.

Education

Any economic system must provide adequately for investment in education. The education system, either formal or informal, is the obvious link between knowledge and action. The volume of knowledge, and rapid advances to knowledge, necessitates that education be a lifelong pursuit.

The higher education component of the system is often at the cutting edge of new knowledge and, therefore, it shoulders a significant part of the responsibility to ensure that new knowledge is translated into appropriate action. The higher education system also serves as the gatekeeper to almost all of the major professions. The professions, in turn, are the most direct link between new knowledge and its proper application. However, natural resource professions form only a small component and,
therefore, need widespread societal understanding and support if their knowledge is to be effectively applied.

Ethics

An education can provide the intellectual tools to examine and differentiate between application of knowledge that is ethically right from wrong. In general, actions could be considered wrong if they cause an erosion of life support systems. However, the ethical trade-offs between one action over another are not always clear cut. Questions regarding natural resource management issues often come down to choices among values. In a democratic society, conflicts between values are usually settled through the political process. Therefore, a well-educated citizenry that is able to distinguish ethical from unethical actions would help ensure good political decisions and public policies.

The ethical responsibility for proper use of land and the environment in general, falls upon all of us. This point was made eloquently in the forward to a conference on business ethics:

" 'Ethics,' Albert Schweitzer reminds us, 'is the maintaining of life at the highest point of development.' Let me add that ethical behavior safeguards not only the highest points of development in life; today especially, ethical behavior may be required to safeguard life itself. This burden of ethical responsibility must be borne by all, for no person, no society, is immune from the contagion in which widespread ethical irresponsibility can potentially destroy us. It is especially important that corporate leaders have farsighted moral vision because they marshal so much of the nation's welfare and deploy so many of its citizens every day." (Hoffman et al., 1984)

Philosophy

The study and application of ethics, while critically important, is only one part of a larger search for truth known as philosophy. Philosophy seeks to unify knowledge. Traditionally, philosophy included such fields
as axiology, metaphysics, theology, political-economy, and history. Until recently, philosophy did not explore in any depth the relationship of man and the environment. During the past twenty years, environmental ethics has emerged as an important sub-discipline with a growing literature, including several scholarly journals (Roy, 1988).

**Principle**

From these philosophical discourses and explorations come general principles. These principles represent the truth as it is understood, and they remain intact until proven incorrect.

In forestry, the principle of sustained yield has been in place for centuries. The actual application of the principle has been a long hard struggle that has been achieved by relatively few nations. Sustainable development, made popular by the World Conservation Strategy and the Bruntland Commission, could be seen as an expanded version of the sustained yield principle.

**Policy**

These principles, in turn, help guide the formulation of public policy. In a democracy, these policies, or accepted courses of action, are determined through the political process through a series of negotiations and compromises. A policy could be deemed good if in accord with identified principle and bad if it runs contrary to principle.

Policies are more dynamic than principles and change according to prevailing public opinion. In addition, policies often have the power of law as expressed through legislation or regulation.

In recent decades, forestry has generally been guided by a multiple-use policy. The implementation of this policy has met with mixed success.
Projects

Having come full circle, we are back where we started. Human actions are nominally guided by accepted policy. Sanctions for inappropriate action can range from ostracism to jail sentences. In the case of destroying ecological systems, it could mean whole communities must relocate or that other more extreme penalties might apply.

7.3. HIGHER EDUCATION AND THE E/P MODEL

A basic assumption of this thesis is that many of the opinion leaders, policy advisors, and public policy makers, today, and in the future, have or will receive some amount of formal higher education. If, for argument's sake, a knowledge of the concepts presented in the E/P model is an important component to being considered an educated person, then how well does the higher education system fulfill this mission?

To answer this question, I will recall the historical origins of higher education and how these early beginnings manifest themselves on campus today.

In medieval times the seven so-called liberal arts were grouped into two divisions known as the trivium and quadrivium. The trivium consisted of grammar, rhetoric, and logic - the humanistic subjects. The quadrivium consisted of more scientific or numeric subjects such as geometry, arithmetic, astronomy, and music (Haskins, 1957).

Initially all scholars were educated in the seven subjects. As the centuries passed, there was a gradual division and those interested in questions of value resorted to the trivium while those interested in facts concentrated on the quadrivium. Eventually "divisive scholarly judgments manifested themselves in the ranking of the quadrivium as the higher and
the trivium as the lower branch of learning" (Cude, 1987). This is reflected in the present use of the word trivial.

On modern campuses the division and relative status between the humanities and sciences is readily apparent. For discussion purposes these two basic groups can be labeled as literate or numerate. The literate are interested primarily in words and values. The numerate rely more on numbers and scientific method to arrive at facts. To complicate matters further, there is really a third major hybrid group on campus - the professions; their primary interest is to apply knowledge, the same knowledge that is often generated by the first two groups. Some professions such as medicine, law, engineering are well known and generally accepted on campus while other less prominent professions such as forestry and planning occupy a less prestigious niche. For convenience I will refer to these three major categories as liberal, professional, and scientific education.

As a tentative generalization, table 7.1 presents the basic type of education in relation to the E/P model. It should not be interpreted literally. As can be seen the educational aims are quite different. While the liberal arts tend to promote knowledge for its own sake and science endeavours to discover knowledge, the professional attempts to apply knowledge. The point of noting these different orientations is that there appears to be no such thing as a general higher education. Upon entering the higher education system an individual chooses among streams. Based on this initial choice an individual will be exposed to radically different sets of philosophies and principles. The content of their programmes will also be radically different. Using ecology as an example, those in the
liberal arts stream have not traditionally been exposed to ecology in any depth.

Table 7.1. Liberal, professional, and scientific education in relation to the E/P model.

<table>
<thead>
<tr>
<th>Type of Education</th>
<th>Liberal</th>
<th>Professional</th>
<th>Scientific</th>
</tr>
</thead>
<tbody>
<tr>
<td>E/P Character</td>
<td>Knowledge for its own sake</td>
<td>Knowledge into action</td>
<td>To discover knowledge</td>
</tr>
<tr>
<td>Ethics</td>
<td>Responsibility to individual spirit</td>
<td>Responsible to client</td>
<td>Responsible to reproducible results</td>
</tr>
<tr>
<td>Philosophy</td>
<td>Oriented to past</td>
<td>Oriented to present</td>
<td>Oriented to future</td>
</tr>
<tr>
<td>Principle</td>
<td>Various</td>
<td>Various</td>
<td>Various</td>
</tr>
<tr>
<td>Policy</td>
<td>Free involvement</td>
<td>Formal influence</td>
<td>Aloof from process</td>
</tr>
<tr>
<td>Projects</td>
<td>Human oriented</td>
<td>Pragmatically oriented</td>
<td>Analytically oriented</td>
</tr>
<tr>
<td>Ecology</td>
<td>Historically not treated</td>
<td>Seen as limiting factor</td>
<td>Not fully accepted as science</td>
</tr>
<tr>
<td>Economics</td>
<td>Left wing</td>
<td>Moderate</td>
<td>Right wing</td>
</tr>
</tbody>
</table>

Many scientific disciplines discount ecology as a discipline and some professional schools (especially engineering) often view ecological factors as constraints or obstacles to be overcome.

Figure 7.4 provides another way of visualizing the possible relation of each type of education to the E/P model. In this caricatured form it becomes apparent that the liberal education emphasizes the knowledge aspects; the professional stream emphasizes the applied nature; and the scientific focus is a partial combination of both. In temporal terms, the liberal orientation is towards the past, the professional stream is oriented to the present, and the scientific orientation is towards future
Figure 7.4. The general emphasis of liberal, professional, and scientific education as they relate to the E/P Model.

- Aspects Emphasized by Type of Education
possibilities and discoveries. The spatial dimensions vary significantly within each stream depending on the specific subject matter.

In summary, to the question posed earlier in this section, none of the three educational streams, by themselves, would seem to provide a holistic appreciation for the conceptual framework outlined in the E/P Model.

At the first degree level, it may be more by chance than design that an individual student will be exposed to, and become reasonably well versed in, the underlying concepts deemed important by the liberal, scientific, and professional streams of education.

Perhaps a first degree that combines aspects of these three general streams would be useful in providing a balanced foundation from which to build. A schematic of this is presented in figure 7.5. This type of a general degree might help ensure that future public policy makers have a common conceptual basis on which to draw from when making important decisions. This approach does not preclude a student from specializing by taking second and third degrees, but it does start all streams from a more generic base. In effect, this is simply an updated version of the ancient seven liberal arts approach with some concepts of the professional orientation added to help ensure that knowledge is applied.

7.4. HIGHER EDUCATION AND FOREST LAND-USE POLICY IN THE E/P MODEL

Drawing on the discussion of the E/P Model thus far, I will re-examine the relationship of the higher education system to formulating integrated forest land-use policy in Newfoundland, Tasmania, and Alaska.

Table 7.2 presents an oversimplified breakdown of three prominent philosophies of natural resource use and their related principles and policies. To a large
Figure 7.5. Combining concepts from the three educational streams into a first higher education degree.

![Diagram showing a spectrum from Liberal to Scientific and Professional, indicating the combination of concepts]

Table 7.2. Natural resource philosophy in the E/P model.

<table>
<thead>
<tr>
<th>Philosophy</th>
<th>Exploitation</th>
<th>Conservation</th>
<th>Preservation</th>
</tr>
</thead>
<tbody>
<tr>
<td>E/P Character</td>
<td>&quot;Selfish use&quot;</td>
<td>&quot;Wise use&quot;</td>
<td>&quot;No use&quot;</td>
</tr>
<tr>
<td>Principle</td>
<td>Maximum yield</td>
<td>Sustained yield</td>
<td>No yield</td>
</tr>
<tr>
<td>Policy</td>
<td>Use now</td>
<td>Multiple use</td>
<td>Use in future</td>
</tr>
<tr>
<td>Project</td>
<td>First come, first served</td>
<td>Coordinated to minimize conflict</td>
<td>Ecological Reserves National Parks</td>
</tr>
<tr>
<td>Ecology</td>
<td>Raw material source, waste receptacle</td>
<td>All components interrelated</td>
<td>Man outside the system</td>
</tr>
<tr>
<td>Economy</td>
<td>Free market- Laissez faire</td>
<td>Free market- Regulated</td>
<td>State control</td>
</tr>
<tr>
<td>Education</td>
<td>Scientific</td>
<td>Professional</td>
<td>Liberal</td>
</tr>
<tr>
<td>Ethics</td>
<td>Rational self interest</td>
<td>Maximum benefit to maximum number</td>
<td>Future generations most important</td>
</tr>
</tbody>
</table>
extent Newfoundland, Tasmania, and Alaska are still in the exploitation mode of natural resource use. Ironically, Newfoundland with its longer history is perhaps the most exploitative of the three. Compared to Tasmania and Alaska, Newfoundland has considerably less forest land managed for multiple-use purposes or for preservation purposes.

The natural resource philosophies and the policies guided by them, are perhaps more a reflection of the peripheral nature of the socio-political economies of Newfoundland, Tasmania, and Alaska and their subordinate position in their respective federations than they are a reflection of the higher education system’s influence over policy formulation. Nevertheless, it is clear from the comparative analysis that the higher education systems in Tasmania and Alaska have influenced forest land-use policy to a greater extent than is the case in Newfoundland.

The higher education systems in all three jurisdictions provide a full range of options in terms of liberal or scientific education. However, it is at the professional level of education that Newfoundland, Tasmania, and Alaska vary the most. For example, the universities in each province/state provide professional education for business, engineering, and geology but for land-based renewable resources only Tasmania and Alaska have professional level options.

Therefore, it is plausible that one reason Newfoundland’s higher education system has been less active in integrated forest land-use policy formulation is because of this void in the professional level of education. This is particularly significant since the professions are a major link between knowledge and action. It is also important because land-based resource professions tend to promote a conservation or wise-use philosophy that in turn supports multiple-use or integrated land-use policies. At the
same time, professions are in need of an intellectual home to help shape their personal philosophies which are based on accepted principles.

Figure 7.6 provides a typology of professions relating to natural resources and their general orientation to liberal or scientific education. These professions range from law which is oriented primarily to the liberal arts on one end of the spectrum to geology which is oriented almost entirely to science on the other. Environmental studies and science fall somewhere in-between, drawing almost equally on the liberal arts and the sciences.

Using this typology, Memorial University offers professional degrees on either end of the spectrum while the universities in Tasmania and Alaska offer a broader range of professional degrees.

In Newfoundland, the lack of a bridge between the liberal and scientific orientations, coupled with the absence of degree level professional education for land-based renewable resources, would seem to be two important gaps in need of attention. The University of Tasmania and the University of Alaska are clear examples on which Memorial University could draw. In particular, the interdisciplinary approach encouraged by the University of Tasmania's Centre for Environmental Studies seems to be a workable model for Newfoundland. Memorial University has most of the necessary components lying in relative isolation. Perhaps all that is needed is for a champion or two to serve as a catalyst and accelerate the process of combining the isolated parts.
Figure 7.6. Typology of relative education orientation of professions having interest in natural resource policy.

| LIBERAL | | SCIENTIFIC | | Province/State |
|---------|-----------|------------|-----------|
|         | | | N | T | A |
| Law     | X          | | | | |
| Business| X          | X          | X         | |
| Planning|            |            | x         | |
| Public Administration | | | | X |
| Parks and Recreation | | | | X |
| Environmental Studies | | | | X |
| Environmental Science | | | | |
| Agriculture | | | X | X | |
| Natural Resources | | | | X |
| Forestry | | | | |
| Wildlife Biology | | | X |
| Engineering | | | X | X | X |
| Geology | | | X | X | X |

Note: X signifies that a professional degree/s is offered in Newfoundland, Tasmania, or Alaska.
PART IV.

CONCLUSIONS AND RECOMMENDATIONS

CHAPTER EIGHT. CONCLUSIONS

CHAPTER NINE. RECOMMENDATIONS
8.1. OPENING REMARKS

This study originated from a deep personal concern and uneasiness that Newfoundland's forest lands were not being managed to their optimum. In particular, I was concerned with the apparent lack of integration between complementary uses and the ad hoc mitigation among competing uses. Over the past three decades similar concerns have been expressed by several royal commissions on forestry, a federal-provincial task-force on forestry, and through a variety of other documents and conferences. The results of a 1989 Integrated Resource Planning Workshop held in St. John's indicate that integrated land-use problems in Newfoundland are far from settled and that there is still an active search for solutions. This is both discouraging and heartening.

It is discouraging because, while the problems have been identified for many years, the solutions remain elusive. It is heartening because it endorses the ongoing need for a thesis of this type which takes on a long-term and somewhat lateral approach to addressing the constraints to formulating integrated land-use policy.

My thesis is that one of the weak links, if not the weakest link, in the integrated forest land-use policy formulation process in Newfoundland is the higher education system. I have attempted to clarify and elaborate on this position by comparing Newfoundland with Tasmania and Alaska. The comparison is fair because all three jurisdictions share many common characteristics. For example, they are all peripheral in their respective federations, their population sizes are similar, and the maritime influence has been a pervasive element to their development. In addition, they each have a similar amount of forest land that generates a comparable contribution to the local economy. Their higher education systems have
each made arrangements with universities in other provinces/states for providing a professional forestry degree. While Newfoundland was last to establish a degree-granting institution; in terms of student numbers, it was quick to catch up and surpass the student numbers in Tasmania and Alaska. Also, as a percent of the general population, Newfoundland has the largest number of students attending a degree-granting institution.

From this comparative analysis, it is clear that Newfoundland's higher education system has contributed less to the integrated forest land-use policy formulation process than the systems in Tasmania or Alaska. Therefore, based on this finding, I can conclude with confidence that Newfoundland's higher education system has indeed been a weak link in the integrated forest land-use policy formulation process. More detailed conclusions fall into three levels: empirical, theoretical, and impressionistic.

8.2. EMPIRICAL CONCLUSIONS

The conclusions that follow were drawn from an explicit research design that generated empirical observations of teaching, research, and service functions as they relate to the integrated forest land-use policy formulation process.

8.2.1. Teaching

The relationship of the teaching function to formulating public policies is often indirect, but at the same time it is pervasive. Through teaching, students are equipped with conceptual frameworks that influence their decision-making process. To provide an index of the relative teaching contribution that higher education systems in Newfoundland, Tasmania, and Alaska have made towards formulating integrated forest land-
use policy, three aspects of the system were analyzed: related faculties and departments, related degrees, and individual courses.

Since the University of Alaska is a land-grant institution, it was not surprising that it rated first, ahead of the University of Tasmania and Memorial University of Newfoundland, on all three aspects. That is, the University of Alaska had, by far, the largest number of related faculties, related degrees, and individually related courses.

It follows from this that the University of Alaska provided the greatest number of possible teaching contacts for this type of conceptual matter at the general, professional, and graduate levels of education. The University of Tasmania has a strong inter-disciplinary professional/graduate level program that relates directly to integrated land-use policy. In contrast, Memorial University of Newfoundland has negligible related faculties, no specifically related degrees at bachelors, masters, or Ph.D. levels, and fewer individual related courses than either the University of Alaska or the University of Tasmania.

Therefore, it is concluded that the average student attending Memorial University will be less exposed to conceptual frameworks relating to integrated forest land-use policy formulation than a similar student at the University of Alaska or the University of Tasmania. This is also true for a student wishing to pursue professional or graduate level education in a related field. Furthermore, these observations would hold true for most policy fields related to land-based renewable resources or the environment in general.

8.2.2. Research

The research function of the higher education system can be more direct than teaching in its relationship to formulating public policy. For
example, research is sometimes undertaken on specific policy issues and the very process of conducting this research may help clarify or focus the issue for decision makers and the interested public. For purposes of comparative analysis, research functions were organized into three distinct but not mutually exclusive categories: research centres and institutes, individual research, and student thesis research.

In all categories, the University of Tasmania rated first, the University of Alaska second, and Memorial University of Newfoundland last. Without question, the University of Tasmania has produced the most directly related research to integrated forest land-use policy. While a good portion of this research is through the Centre for Environmental Studies, a number of other departments such as law, political science, geography, botany, and economics and commerce have produced directly related publications.

The University of Alaska had, by far, the largest number of related research institutes, individual publications, and student theses. However, the overall content was bio/physically oriented and less directly related to integrated forest land-use policy formulation than the University of Tasmania. Related research at Memorial University of Newfoundland was dominated by aspects of forest insect biology and control. In comparison with Tasmania and Alaska, the related land-use policy research is negligible.

The Institute of Social and Economic Research (ISER) in Anchorage and Centre of Environmental Studies in Hobart appear to be good models that Newfoundland could examine. The individual talent appears to exist at Memorial University, but perhaps what is needed is an interdisciplinary centre or institute to focus the effort.
8.2.3. Service

The service function is more difficult to bound than teaching or research functions, yet it appears to contribute most directly to the public policy formulation process. Service was analyzed using three broad categories: policy advice and consulting; conferences, short courses, and seminars; and involvement in public associations.

The University of Tasmania rates ahead of the University of Alaska and Memorial University in all three categories. At the University of Tasmania, policy advice and consulting through centres and individuals is sought after by governments, private industry, and non-governmental organizations. The contributions made by groups such as the Environmental Law Reform Group and individuals from several departments have clearly influenced the policy formulation process. Most obvious and direct among the involvement in public associations is the formation and active participation by several faculty members in Tasmania's "Green" party.

Memorial University and the University of Alaska fall behind Tasmania on all counts, but in comparison with the teaching and research functions, the margin of difference is narrowed considerably.

In terms of policy advice and consulting, academics from all three institutions have served in important capacities. As well, they have all organized relevant conferences, symposiums, and short courses. And academics have been active in related environmental groups at both leadership and general membership levels.

8.2.4. Combination of Teaching, Research, Service

On the whole, the service functions make the most direct contributions to the public policy formulation process. Research activities also contribute directly, and teaching contributions are more
indirect but no less pervasive in the long term analysis. The interplay of all three functions serve to complement and strengthen each other.

From the comparative analysis, it is clear that the University of Tasmania has, from an overall perspective, contributed more to the integrated forest land-use policy formulation process than either the University of Alaska or Memorial University. It is also clear that the land-grant university status of the University of Alaska has insured that the structure of the institution will enable land-use education, research, and service.

Memorial University of Newfoundland has made far less of a contribution to the integrated forest land-use policy formulation process than U of Tasmania or U of Alaska have made in their respective states. This is particularly interesting since Memorial University is considerably larger than the other institutions. In comparison, the lack of professional and graduate level education and research for land-based renewable resources appears to be obviously lacking at Memorial University. This gap is often reasoned away by Memorial officials because of the pre-forestry arrangement with the University of New Brunswick. However, the University of Tasmania and the University of Alaska have made similar transfer arrangements but it does not diminish their overall contribution to land-based renewable resource teaching, research, or service.

8.3. CONCLUSIONS ON THEORY

A unified theory linking higher education and public policy formulation does not exist. To work towards building such a theory, I have put forward a conceptual framework called the E/P Model. The model is relatively simple yet it represents an infinitely complex juxtaposition of important concepts, summarized by two sets of four terms related in a pair
of logical systems: ecology, economy, education, ethics, philosophy, principle, policy, and projects.

By dividing higher education along conventional lines into three basic approaches, it is suggested that none of these by themselves contribute to a balanced understanding of the concepts in the E/P Model. The three educational approaches are termed liberal, scientific, and professional. The way each views knowledge and its subsequent application to policy formulation and implementation is important.

The liberal thrust views knowledge for its own sake which may or may not be used towards practical policy ends. The scientific focus sees its mission as discovering new knowledge and is generally aloof from the policy process. On the other hand, the professional thrust attempts to translate knowledge into real applications of importance to people. Thus, the professional thrust acknowledges the importance of the policy process and is commonly active in attempting to influence it.

It would seem appropriate to a well rounded higher education that individuals receive a conceptual understanding of each thrust. Further, it would seem appropriate that this balancing take place at the first degree level since many individuals do not proceed beyond this level, yet they may end up later in positions of significant public policy influence.

It is also suggested that an average general education in any one of these three approaches does not equip students with an appropriate conceptual framework for considering environmental/natural resource policies, much less integrated forest land-use policy implications. This apparent gap may be partially responsible for the short term exploitation philosophies that have dominated Newfoundland, Tasmania, and Alaska. This may also be a microcosmic reflection of the general attitudes towards
renewable resources in their respective federations and perhaps even the world.

In the context of the E/P Model, the higher education systems in Newfoundland, Tasmania, and Alaska do not balance the liberal, scientific, and professional thrusts. All three have well developed tracks towards the liberal and scientific approaches. The professional level, particularly as it relates to land-based renewable resources, is highly varied. The University of Alaska and the University of Tasmania provide a number of directly related professional options. However, Memorial University offerings are conspicuously devoid of options at the professional level for land-based renewable resources. Because the professional approach is the most concerned with putting knowledge to work towards relevant ends, it is suggested that this may be one reason why Newfoundland's integrated forest land-use policy is less advanced than Tasmania's or Alaska's.

The conceptual framework as outlined by the E/P Model may be thought of as a lens through which the relationship of higher education to public policy formulation can be seen in perspective with other equally important concepts. However tentative this lens, it would seem to merit some additional thought by a wider segment of the academic community. The fact that the E/P Model recognizes higher education as a critical component towards achieving the globally espoused goal of sustainable development is a substantial step beyond the simpler linear concept of economy/environment integration.

8.4. IMPRESSIONISTIC CONCLUSIONS

By definition, the impressions that follow are not conclusive, but nevertheless, they are important observations which merit follow-up study.
I have lumped these observations into two groups: factors within and factors outside the higher education system.

8.4.1. Other Factors within the Higher Education System

The higher education system, in general, and universities, in particular, allow for a relatively free exploration and discussion of ideas, some of which are controversial. Occasionally, an idea champion may emerge who would not have easily gained credibility in a less tolerant and forgiving environment. At the University of Tasmania and the University of Alaska several idea champions were obvious in the area of integrated natural resource/environmental policy. These and other champions may be the critical trigger to changing and influencing the higher education system from within. They also appear to have significant influence in the public policy arena. The fact that I could not identify a similar idea champion at Memorial University may be an important reason why M.U.N. falls short on teaching, research, and service functions as they relate to integrated forest land-use policy.

The concept of the come-from-away (CFA), return-from-away (RFA) may also be important, particularly as it relates to education of foresters.

In Newfoundland there is roughly a 50/50 CFA-RFA ratio. All foresters are in one or the other category. In Tasmania and Alaska, well over 90 percent of foresters fall in the CFA category. This may be a factor in what level of influence they have over land-use policy making.

Another interesting observation is that Memorial University, the University of Tasmania, and the University of Alaska each have internationally recognized geology and mining faculties, and yet the economic contribution of the mining sector in each Province/State does not appear to be significantly higher than that of the forest sector. There
are several possible explanations that require further study. One is that
geology is more academically acceptable on campus. Another more plausible
reason is the level of industrial support. It could be argued that
geologists are seen as friends of the mining industry - i.e., they help
find and process minerals faster and cheaper. On the other hand, foresters
could be seen by the forest industry as an enemy of sorts - costing the
industry more in the short term through implementation of basic
professional principles such as sustained yield and silviculture.
Therefore, in an exploitative economy, foresters could be seen as financial
burdens and, therefore, industry may not finance the higher education of
foresters to the same degree that the mining industry finances the
education of geologists.

Still, another observation is that foresters appear to be losing
ground, or forests, to other disciplines and professions such as planners,
geographers, and environmental studies graduates. The fact that the number
of environmental studies programs have blossomed on university campuses
while forestry programs have shown little growth or even declined in
relative position would seem to be an important indicator of this loss of
traditional territory. Considering that there are only about 100 thousand
foresters in the world and that closed forests comprise approximately one
fifth of the planet's land-base would seem to indicate that more foresters
are needed, not less. Perhaps the apparently poor image of foresters is
partially because of a narrow training that does not adequately balance
liberal, scientific, and professional points of view. All of these
observations seem to merit further study.
8.4.2. Factors Outside the Higher Education System

I have not made any claim in this study that higher education is the only or even most important factor in the integrated forest land-use policy formulation process. Instead, I have attempted to argue that the higher education system is a weak link in the policy process in Newfoundland. There are many other factors that influence the kind of policies that are, or are not, formulated.

It is clear from this study that one of the single, biggest factors influencing land-use policy formulation and implementation in all three study areas is the peripheral position in their respective Federation. For example, Newfoundland is influenced by Canada through large federal government transfer payments and cost-sharing regional development schemes. Tasmania’s land-use policy is under the close scrutiny of Commonwealth legislation over World Heritage Areas and International Export legislation. Alaska’s lands were almost entirely federally owned, and the disposal of lands has been controlled primarily by a federal agenda.

Other factors influencing forest policy include the existence of high profile issues which can detract from a long-term comprehensive approach. In Newfoundland the spruce budworm infestation of the 1970’s, hemlock looper of the 1980’s, and the Corner Brook pulp mill ownership transfer in the early 1980’s are examples of such dominant issues. In Tasmania, Lake Pedder, woodchip export licensing, and the National Estate issues have dominated land-use policy. In Alaska, the discovery of oil in Prudhoe Bay dominated all aspects of the State land-use policy. As well, the wilderness movement in the U.S. and native claims settlement have weighed heavily on policy-making.
8.5. VALUE OF THIS STUDY

This thesis began as a problem solving study that quickly moved into a more exploratory process to help understand the broader context within which the Newfoundland public policy formulation process sits. The ultimate value and merit of the study must be left for others to judge. However, I will attempt to outline at least three levels of value stemming from this study: personal, professional, and theoretical.

At a personal level, the comparative study of Newfoundland, Tasmania, and Alaska was instrumental to shaking my own deep biases concerning the apparent neglectful natural resource development in Newfoundland. By dispassionately observing Alaska and Tasmania, I was better able to understand processes occurring in Newfoundland. I feel Newfoundland can benefit from this study - even if it only sparks debate and discussion on better use of our human and natural resources. At the very least, it places Newfoundland in a broader context with other peripheral areas.

At a professional level, this study may help spark discussions within and between related land-use professions such as forestry, wildlife, outdoor recreation, environmental studies, rural planners, landscape architects, and others. In particular, it may help focus discussion on how professional education in these fields of study ought to fit within the broader university community.

The theoretical gaps are wide when it comes to the relationship of higher education to land-use policy formulation. Perhaps the conceptual framework put forward through the E/P model will help narrow this gap. This conceptual framework could help focus other studies. It is possible that this study has only begun to unearth the tip of the conceptual mountain. Perhaps this study could help spawn a series of forest policy studies that focus less on economics and more on the process of policy
formulation and implementation through the use of core-periphery theory and comparative analysis.

It is my hope that the ultimate benefit of this study could assist in translating existing knowledge into appropriate policies and actions.
CHAPTER NINE. RECOMMENDATIONS

Based on the findings of this study, I will make three levels of recommendations. The first level relates specifically to Newfoundland. The second level of recommendations pertains to further comparisons of Newfoundland, Tasmania, and Alaska in their respective national context. Finally, a few global suggestions are offered.

9.1. NEWFOUNDLAND

I have two recommendations in relation to Newfoundland: one for policy action and one for further academic studies.

9.1.1. Task Force to Establish a Centre for Land-Based Renewable Resources

I recommend that the provincial and federal governments strike a task force to investigate the possible establishment of a Centre of Excellence for Land-Based Renewable Resources. Membership of the task force should include provincial and federal representatives from forestry, wildlife, agriculture, parks, environment, and lands. In addition, there should be one representative from each level of the higher education system; i.e., one from Memorial University, one from Fisher Institute of Applied Arts and Technology, and one from the Community College system. Also, one member should represent the secondary education system. Several recognized and well respected members from out-of-province should also be invited to participate.

The task force would investigate and report on the goals of such a centre, programs, the proper location, the required facilities, and budget. It should focus on education, management, and research activities. For education and research, the task force should pay particular attention to graduate level programs for existing professionals in the Province, with a focus on integrated land-use.
The issue of fragmentation of resources, i.e. provincial forestry and technical education in Corner Brook, federal forestry and two year pre-forestry in St. John’s should be addressed. As well, it should investigate implications of Grenfell’s degree granting status and Fisher Institute’s Centre for Forestry and Environmental Studies.

9.1.2. Academic Studies

Memorial University of Newfoundland presently has the capabilities to conduct a number of needed studies. Funding grants and scholarships should be established to encourage these studies. Several interdisciplinary studies would also be useful.

Some ideas are:

<table>
<thead>
<tr>
<th>Subject</th>
<th>Ideas</th>
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<tbody>
<tr>
<td>History</td>
<td>- The pre-forestry programme at M.U.N. and status of graduates.</td>
</tr>
<tr>
<td>Political Science</td>
<td>- Influence of Newfoundland U.N.B. forestry graduates on forest policy.</td>
</tr>
<tr>
<td></td>
<td>- Investigate constraints to integrated land-use policy formulation.</td>
</tr>
<tr>
<td></td>
<td>- Idea champions</td>
</tr>
<tr>
<td></td>
<td>- Why have Royal Commission and Task Force recommendations not been followed up?</td>
</tr>
<tr>
<td>Economics</td>
<td>- Economics of forest land-use for: wildlife, recreation, timber, watershed.</td>
</tr>
<tr>
<td>Education</td>
<td>- Reasons why an interdisciplinary degree in natural resources or environmental studies has not been established at M.U.N.</td>
</tr>
<tr>
<td></td>
<td>- Suitability of the Newfoundland primary and secondary curriculum to environmental education and integrated land-use.</td>
</tr>
<tr>
<td>Sociology</td>
<td>- The brain drain</td>
</tr>
<tr>
<td></td>
<td>- Membership in N.G.O.’s participation.</td>
</tr>
<tr>
<td></td>
<td>- The land-based renewable resource profession in Newfoundland.</td>
</tr>
<tr>
<td>ISER</td>
<td>- Team investigation of E/P Model in relation to Newfoundland.</td>
</tr>
</tbody>
</table>
9.2. NEWFOUNDLAND, TASMANIA, AND ALASKA

I believe that Newfoundland, Tasmania, and Alaska can learn from each other. Therefore, a network of scholars should be established in the three areas to continue comparative studies on such topics as:

- the "brain drain."
- the CFA - RFA syndrome.
- a comparison with important forestry areas: B.C., Oregon, Sweden.
- a comparison of timber allocation rights.
- the sister city rivalries of St. John's-Corner Brook, Hobart-Launceston, and Fairbanks-Anchorage.

It would also be productive to establish a cross disciplinary team to investigate the effects of various professions and disciplines on forest management in Canada, Australia, and the United States. These should include: forestry, environmental studies, regional planning, geography, public policy, landscape architecture, and others.

9.3. GLOBAL

The FAO and UNESCO should convene a World Conference for Education for Forest Land-use. This would build on the first World Conference on Forestry Education, but would be much broader to include representatives from forestry schools, environmental studies, planning, geography, wildlife, natural resources, recreation and parks, and other disciplines. The events leading to the 1992 Conference on Environment and Development in Brazil would be good preparation for a more specialized conference focusing on forests and education.

Some of the following questions could be addressed:

- What is the state of the art in the world in relation to educating technicians, technologists, professionals, and scientists for integrated forest land-use policy and management?

- Is the education of land-based resource professionals sufficient to translate existing knowledge into appropriate action?
What kind of conceptual framework is critical for all educated people to possess in order to ensure best use of the planet's resources?

In preparation for this conference, a network of scholars should be established from around the world to research and write a history of forest-related education.
LITERATURE CITED


Alaska Department of Natural Resources. 1988. Briefing paper - Susitna Valley forestry. Alaska Dept. of Natural Resources, Juneau, AK.


Australian National University. 1988b. Graduate courses in forestry. Australian National University, Canberra. 16 pp.


Bramble, W.C. 1963. The development of forestry. In: The development of the land-grant colleges and universities and their influence on the economic and social life of the people. Addresses given at a series of ten seminars sponsored by the College of Agriculture, Forestry, and Home Economics of West Virginia University during the year 1962 commemorating the centennial of the First Morrill Act authorizing the establishment of the land-grant colleges and universities. West Virginia University Bulletin, Morgantown, WV. p. 75-81.


Eddy, E.D., Jr. 1963. The first hundred years, in retrospect and prospect. In: The development of the land-grant colleges and universities and their influence on the economic and social life of the people. Addresses given at a series of ten seminars sponsored by the College of Agriculture, Forestry, and Home Economics of West Virginia University during the year 1962 commemorating the centennial of the First Morrill Act authorizing the establishment of the land-grant colleges and universities. West Virginia University Bulletin, Morgantown, WV. p. 3-13.


Harris, R.S. 1969. On higher education in Australia and Canada. The Australian University. 7(3): 190-203.


Institute of Foresters of Australia. 1986. Forest policy for Tasmania - Papers presented to a seminar organised by the Institute of Foresters of Australia on Saturday 12 July, 1986 at the University Centre, Hobart.


Institute of Foresters of Australia. 1949. Report and recommendations of the sub-committee appointed by the Institute of Foresters to consider certain aspects of higher forestry education in Australia. IFA, Canberra. 11 p. mimeo.


Memorial University of Newfoundland. Undated. Circle of excellence. M.U.N., St. John’s, Nfld. Fact sheets on University Centres, Institutes, and Departments.


Memorial University of Newfoundland. 1957, 1956. Senate Minutes. M.U.N., St. John’s, Nfld.


Reidel, C. 1987. Leadership land. Where all the leaders are good looking and all the led are above average. J of For. 85(7): 17-21.


APPENDICES

A. Related conferences and field trips during period of thesis research.

B. Personal interviews and correspondence with non-replaceable respondents (June 1987 - July 1989).

C. Some natural resource comparisons in Newfoundland, Tasmania, and Alaska.

D. Legislation and policies impacting on land use.

E. Generic and specific land use issues in Newfoundland, Tasmania, and Alaska.

F. Enrolment and graduation statistics for Newfoundland, Tasmania, and Alaska.

G. Teaching: Course descriptions for Newfoundland, Tasmania, and Alaska.

H. Research by centres, individual academics, and student thesis for Newfoundland, Tasmania, and Alaska.

I. Service functions by universities in Newfoundland, Tasmania, and Alaska.

J. Environmental Groups in Newfoundland, Tasmania, and Alaska.
### APPENDIX A. RELATED CONFERENCES AND FIELD TRIPS ATTENDED DURING PERIOD OF THESIS RESEARCH.

<table>
<thead>
<tr>
<th>Conference or Field Trip and Sponsor</th>
<th>Location</th>
<th>Date</th>
</tr>
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<tbody>
<tr>
<td>Canadian Institute of Forestry Annual meeting</td>
<td>Hotel Newfoundland</td>
<td>August 2-6, 1987</td>
</tr>
<tr>
<td>&quot;Forestry Communications, The Essential Link&quot; (P)</td>
<td>St. John's, Newfoundland</td>
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<tr>
<td><strong>Field Trip (P)</strong></td>
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<tr>
<td>The Future Forest: A Vision for Tomorrow (F.L.C.)</td>
<td>University of Victoria Victoria, B.C.</td>
<td>March 4-6, 1988</td>
</tr>
<tr>
<td>Our Common Future in B.C.: Prospects for a Sustainable Economy (P)</td>
<td>Robson Centre Vancouver, B.C.</td>
<td>April 15-16, 1988</td>
</tr>
<tr>
<td>Australian Bicentennial International Forestry Conference (F.L.C.)</td>
<td>Albury-Wodonga, Australia</td>
<td>April 25-May 1, 1988</td>
</tr>
<tr>
<td>Research Field Trip, Australia (H.H., B.C.)</td>
<td>Victoria, Tasmania, Australia</td>
<td>April-May 1988</td>
</tr>
<tr>
<td>Research Field Trip, Alaska (F.L.C.)</td>
<td>Alaska, United States</td>
<td>July 1988</td>
</tr>
<tr>
<td>The State of Education in B.C.: Rebuilding Education Activism for the 1990's (P)</td>
<td>Univ. of B.C. Vancouver, B.C.</td>
<td>August 27, 1988</td>
</tr>
<tr>
<td>Personal Field trip Oregon-California (P)</td>
<td>Oregon State University, University of California-Berkeley, Redwoods National Park, Yosemite National Park, California; Crater Lake National Park, Oregon; World Forestry Centre, Portland, Oregon</td>
<td>October 4-12, 1988</td>
</tr>
<tr>
<td>Advanced Silviculture Field Trip with Dr. G. Weetman (F.L.C.)</td>
<td>Vancouver Island</td>
<td>January 13-14, 1989</td>
</tr>
<tr>
<td>Research Field Trip, British Columbia (F.L.C.)</td>
<td>Simon Fraser Univ., British Columbia Institute of Technology, Selkirk College, Malaspina College</td>
<td>February 1989</td>
</tr>
<tr>
<td>Personal Field Trip United States (P)</td>
<td>Sequoia National Park, California; Petrified National Forest, Arizona; Great Smokey Mountains National Park, North Carolina</td>
<td>March 1-7, 1989</td>
</tr>
<tr>
<td>Research Field Trip, New Brunswick (F.L.C.)</td>
<td>Univ. of New Brunswick Fredericton, N.B.</td>
<td>March 12-13, 1989</td>
</tr>
<tr>
<td>Conference or Field Trip and Sponsor</td>
<td>Location</td>
<td>Date</td>
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<tr>
<td>Research Field Trips, Newfoundland (F.I.C.)</td>
<td>St. John's, Newfoundland</td>
<td>April 9-14, 1989</td>
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<td></td>
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<td>May 29-30, 1989</td>
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<tr>
<td>Symposium on the Environment (P)</td>
<td>Sir Wilfred Grenfell College, Corner Brook, Newfoundland</td>
<td>June 9, 11, 1989</td>
</tr>
<tr>
<td>Fifty-Third Federal/Provincial Territorial Wildlife Conference - Theme: Integrated Land Management for Wildlife - Fact or Fiction (F.L.C.)</td>
<td>Radisson Plaza Hotel, St. John's, Newfoundland</td>
<td>June 19-21, 1989</td>
</tr>
<tr>
<td>Newfoundland Section Canadian Institute of Forestry Field Trip - Theme: Integrating Forestry-Wildlife Activities (F.L.C.)</td>
<td>Northwest Gander River, Newfoundland</td>
<td>June 22, 1989</td>
</tr>
<tr>
<td>Sixth World Conference on Co-operative Education (F.I.)</td>
<td>Hamilton Convention Centre, Hamilton, Ontario</td>
<td>August 28 - September 1, 1989</td>
</tr>
<tr>
<td>Research Field Trip Atlantic Canada (F.I.)</td>
<td>Nova Scotia Agriculture College; School of Resource and Environmental Studies, Dalhousie Univ.; Nova Scotia College of Art and Design; Holland College, P.E.I.; Maritime Forest Ranger School, N.B.; Univ. College of Cape Breton, N.S.</td>
<td>October 1-6, 1989</td>
</tr>
<tr>
<td>Research Field Trip, Quebec (F.I.)</td>
<td>College de Ste. Foy-CERFO, University of Laval</td>
<td>October 23-24, 1989</td>
</tr>
<tr>
<td>Annual Meeting Newfoundland Section of the Canadian Institute of Forestry - Theme: Forest Utilization (F.I.)</td>
<td>Mount Peyton Hotel, Grand Falls, Newfoundland</td>
<td>November 9-11, 1989</td>
</tr>
</tbody>
</table>

*S Sponsor Key

F.L.C. - F.L.C. Reed/NSERC Chair - University of British Columbia.

F.I. - Fisher Institute of Applied Arts and Technology, Corner Brook, Newfoundland
Research for Fisher Institute, but context helpful for thesis research.

H.H. - Vancouver and Melbourne Branches of the International Order of Hoo-Hoo

B.C. - British Columbia Festival of Forestry

P. - Personally Funded
APPENDIX B: PERSONAL INTERVIEWS AND CORRESPONDENCE WITH NON-REPLACEABLE RESPONDENTS (June 1987 - July 1989)

NEWFOUNDLAND

June 26, 1987
- Dr. J.A. Munro, Director General, Forestry Canada, Newfoundland Forest Research Centre.

August 3, 1987
- Dr. M. Nazir, Asst. Deputy Minister (Forestry), Dept. Forest Resources and Lands, Govn't of Newfoundland and Labrador.

August 4, 1987
- Mr. K.J.S. Beanlands, Asst. Deputy Minister (Lands), Dept. Forest Resources and Lands, Govn't of Newfoundland and Labrador.
- Mr. R.A. Warren, Director of Land Management, Department of Forest Resources and Lands, Government of Newfoundland and Labrador.

August 6, 1987
- Mr. G. Savage, Executive Council, Government of Newfoundland and Labrador.
- Ms. N.J. Richards, Legislative Librarian, Government of Newfoundland and Labrador.

August 7, 1987
- Ms. A. Hart, Head, Centre for Newfoundland Studies, Memorial University of Newfoundland.

August 13, 1987
- Mr. R.D. Mercer, Director, Forest Management Division, Dept. Forest Resources and Lands, Govn't of Newfoundland and Labrador.

CANADA

August 24, 1987
- Dr. E.W. Manning, Chief Land Use Analysis Division, Environment Canada, Ottawa.
- Mr. A.R. Petch, Research Officer, Lands Director, Environment Canada, Ottawa.

August 25, 1987
- Dr. F.C. Pollett, Director General, Petawawa National Forest Institute.

August 28, 1987
- Dr. P.J. Murphy, Associate Dean (Forestry) Faculty of Agriculture and Forestry, University of Alberta.
- Mr. M.C. Taylor, Manager, Regional Planning Alberta Energy and Natural Resources.

August 31, 1987
- Prof. F.L.C. Reed, NSERC/Industrial Chair in Forest Policy Research, Faculty of Forestry, University of British Columbia (Thesis Supervisor).

August 1987-1989
- Meetings with many University of British Columbia Professors.

AUSTRALIA - Victoria - Tasmania

April 26, 1988
- Dr. R.C. Ellis, President, Institute of Foresters of Australia

April 28, 1988
- Mr. B. LaFontaine, Executive Director, The Pulp and Paper Manufacturers Federation of Australia.
- Mr. A. Skuja, Chief Commissioner, Forestry Commission, Tasmania.

April 29-30, 1988
- Mr. D. Howlck, Forest Products Industries Liaison Officer, Commonwealth Scientific and Industrial Research Organization (CSIRO).

May 3, 1988
- Dr. I. Ferguson, Dean, Faculty of Agriculture and Forestry, University of Melbourne.
- Mr. I. Miles, Director Land-Use Planning, Victoria Land Conservation Council.

May 4, 1988
- Dr. D. Evans, Environmental Planning, Faculty of Architecture and Planning, University of Melbourne.

TASMANIA

May 9, 1988
- Mr. P. Nichols, Forest Planning Supervisor, Associated Forest Holdings, Tasmania.
May 10, 1988
- Mr. A. Warner, Forest Management Superintendent, Associated Forest Holdings, Tasmania.
- Mr. D. Gould, Head Teacher, School of Forest Industries, Devonport Technical College, Tasmania.

May 11, 1988
- Mr. B. Harris, Forestry Consultant, Launceston, Tasmania.
- Mr. M. Buck, Executive Officer, Tasmanian Forest Industries Training Council Inc.
- Mr. R. Dixon, Information and Service Manager, Forest Industries Association of Tasmania Ltd.

May 11, 1988
- Mr. K. Felton, Commissioner, Forestry Commission, Tasmania.
- Mr. R. Keenan, Planning Section Supervisor, Forestry Commission, Tasmania.
- Ms. A. McCuasig, Park Planning, Dept. of Lands, Parks, and Wildlife.
- Mr. J. Burgess, Planning Office, Park Planning, Dept. of Lands, Parks and Wildlife.
- Mr. D. Peters, Research Office, Wildlife Section, Dept. of Lands, Parks, and Wildlife.
- Mr. P. Hoysted, Director, Tasmanian Conservation Trust Incorporated.

May 12, 1988
- Mr. A. Graham, Director, The Wilderness Society.
- Dr. J.B. Kirkpatrick, Head, Department of Geography, University of Tasmania.
- Dr. J. Todd, Director, Centre for Environmental Studies, University of Tasmania.
- Dr. M. Walsh, Centre for Education, University of Tasmania.
- Mr. J. Hickey, Interdepartmental Working Group for Forestry Conservation, Forestry Commission, Tasmania.
- Mr. R. Nolan, Chief Planning Officer, Town and Country Planning Commission, Tasmania.

May 13, 1988
- Dr. M. Higgs, Director, Division of Forest Management Forestry Commission, Tasmania.

YUKON

July 4, 1988
- Mr. B. Chambers, Director, Northern Land Use Planning Directorate Yukon Region, Whitehorse.
- Ms. Y.D. Harris, Chief of Regional Planning, Yukon Renewable Resources.

ALASKA

FAIRBANKS

July 6, 1988
- Dr. T. Frank, Assistant Director, Institutional Research, University of Alaska, Fairbanks.
- Dr. T. Gallagher, Assistant Professor Land Use Planning, School of Agriculture and Land Resources Management.

July 7, 1988
- Ms. A. Tremarollo, Director, Admissions and Records, University of Alaska, Fairbanks.
- Dr. B. Weedan, Head, Department of Biology and Wildlife, Univ. of Alaska, Fairbanks.
- Ms. D. Myers, Personal Secretary to Dr. D.D. O'Dowd, President, Univ. of Alaska.
- Mr. T. Gasbarro, Extension Forester, Cooperative Extension Service, Univ. of Alaska.
- Dr. W. Workman, Associate Professor, Resource Economics, School of Agriculture and Land Resources Management.

July 8, 1988
- Mr. P. Heki, Assistant Regional Forester, Division of Forestry, Department of Natural Resources.
- Mr. M.M. Robus, Habitat Biologist, Alaskan Department of Fish and Game.
- Mr. D. Runberg, District Manager, Bureau of Land Management.
- Dr. D.R. Klein, Director, Alaska Cooperative Wildlife Research Unit, and Professor of Wildlife Management.

ANCHORAGE

July 11, 1988
- Dr. L.E. Gorsuch, Director, Institute of Social and Economic Research and Dean, School of Public Affairs, Univ. of Alaska, Anchorage.
- Dr. T. Morehouse, Professor, Institute of Social and Economic Research, Univ. of Alaska, Anchorage.
- Mr. S. Colt, Visiting Assistant Professor, School of Public Affairs, Univ. of Alaska, Anchorage.
- Dr. M.D. Berman, Associate Professor, Institute of Social and Economic Research, Univ. of Alaska, Anchorage.
- Dr. J. M. Brown, Associate Professor of Natural Resources, Alaska Pacific University.
July 12, 1988
-Mr. A. Phipps, State Lands Staff, Alaska Center for the Environment, Anchorage.
-Mr. W.A. Boden, Deputy State Director, Land and Renewable Resources, Bureau of Land Management.
-Mr. J. Stratton, Alaska Conservation Foundation.
-Mr. B. Wilhelm, Planning Team Leader, United States Forest Service.

July 13, 1988
-Ms. D. Oylear, State Staff Coordinator, Alaska Land Use Council, Office of the Governor
-Mr. P.M. Tweten, Timber Division Manager, Chugach Alaska Corporation.
-Dr. G.S. Baker, U.S. Fish and Wildlife Service.
-Ms. J. McCabe, Special Assistant to the Regional Director, National Park Service.

July 14, 1988
-Mr. K. A. Sundberg, Habitat Biologist, Alaska Department of Fish and Game.
-Mr. D. Hickok, Former Director, Arctic Environment Information and Data Center (Retired).
-Ms. E.C. Wunnicka, Former Commissioner, Department of Natural Resources and Former Federal co-Chairman Joint Federal-State Land Use Planning Commission for Alaska (Retired).
-Mr. C. McVie, Chairman, Land Use Advisors Committee, Alaska Land Use Council.

JUNEAU
July 18, 1988
-Mr. B. Rae, State Data Center Coordinator, Department of Labor.
-Mr. R. Behnert, Regional Planning Specialist, U.S. Forest Service.
-Mr. P. Janis, Director of Wildlife and Fisheries, U.S. Forest Service.
-Mr. B. Loescher, Senior, Vice President Resource Management, SEALASKA Corporation.

July 19, 1988
-Dr. R. Phibbs, Director, Post-Secondary Education Commission.
-Mr. F. Seymour, Senior Marketing Specialist, Alaska Department of Commerce and Economic Development.
-Mr. B. Koehler, Executive Director, Southeast Alaska Conservation Council.
-Mr. M. Kirchoff, Deer Research Biologist, Alaska Department of Fish and Game.

July 21, 1988
-Dr. G. Rodgers, Former Director and Founder of Institute of Social and Economic Research, University of Alaska (Telephone interview while in Juneau - Retired).

NEW YORK
August 17, 1988
-Mr. H.A. Hilmi, Chief Forestry Education, Forestry Department, Food and Agriculture Organization of the United Nations, Rome (while at conference on Forestry Education at Paul Smith’s College, New York).

BRITISH COLUMBIA
February 8, 1989
-Dr. J.A. Dunster, Consultant for Simon Fraser University, Natural Resources Management Program.

February 13, 1989
-Dr. R.M. Strang, Associate Dean, Renewable Resources, British Columbia Institute of Technology.

February 15, 1989
-Mr. J.L. Adams, Department Head, Environmental Sciences and Technologies, Selkirk College.

February 22, 1989
-Mr. J.A. Blickert, Assistant Chief Forester, Integrated Resources Branch, B.C. Ministry of Forests.

February 23, 1989
-Mr. G. Squire, Department Head, Forest Resources Technology, Malaspina College.
-Dr. C.W. Chestnut, Coordinator, Resource Management Officer Technology, Malaspina College.

NEW BRUNSWICK
March 13, 1989
-Dr. A.T. Easley, Chairman, Department of Forest Resources, Faculty of Forestry, University of New Brunswick.
NEWFOUNDLAND

April 12, 1989
-Dr. K. Storey, Department of Geography, Memorial University of Newfoundland.
-Dr. D. Bajzak, Department of Forestry, Memorial University of Newfoundland.
-Mr. D. Curran, Acting Director, Extension Service, Memorial University of Newfoundland.
-Dr. W.H. Spain, Director, Institute for Educational Research and Development, Memorial Univ.
-Dr. R.K. Crocker, Institute for Educational Research and Development, Memorial Univ.

April 13, 1989
-Mr. H. Press, Asst. Director, Evaluation and Research, Department of Education, Govn't Newfoundland and Labrador.
-Mr. R.C. Thomson, Director, Planning and Research Division, Department of Career Development and Advanced Studies, Government of Newfoundland and Labrador.
-Dr. B.A. Roberts, Research Scientist, Forestry Canada. Newfoundland Forest Research Centre.

April 14, 1989
-Dr. M.A.J. Collins, Director, Division of General Studies, Memorial University of Newfoundland.
-Dr. A. Sullivan, Professor of Psychology, Former Director M.U.N. Extension Service, Former Principal Sir Wilfred Grenfell College, Former Director Division of General Studies.

May 16, 1989
-Dr. C.M. Wernerheim, Assistant Professor, Forest Economics, Dept. of Economics, Memorial Univ. of Newfoundland.
-Dr. G. Jenner, Department of Earth Sciences, Memorial University of Newfoundland (Ph.D. from University of Tasmania).

May 17, 1989
-Dr. M. MacLeod, Deputy Director, Office of Research, Memorial University of Newfoundland.
-Dr. A.F. King, Deputy Head, Department of Earth Sciences, Memorial University of Newfoundland.
-Dr. A.G. MacPherson, Department of Geography, Memorial University of Newfoundland.
-Dr. D. House, Director of Research, Institute of Social and Economic Research, Memorial University of Newfoundland.

May 18, 1989
-Dr. G. Milne, Senior Policy Analyst, Forestry Canada, Newfoundland Forest Research Centre.
-Mr. R.S. vanNostrand, Program Director, Forestry Canada, Newfoundland Forest Research Centre.
-Dr. M. Nazir, Assistant Deputy Minister, Department of Forestry and Agriculture, Govn't Newfoundland and Labrador.

May 19, 1989
-Mr. B.R. LeDrew, LeDrew Environmental Management Ltd.

May 29, 1989
-Mr. D.F. Ford, Training Officer, Department of Forestry and Agriculture, Government of Newfoundland and Labrador.
-Mr. D. Minty, Chief, Information and Education, Wildlife Division, Government of Newfoundland and Labrador.
-Dr. J.A. Munro, Director General, Forestry Canada, Newfoundland Forest Research Centre.

May 30, 1989
-Dr. D. Steele, Department of Biology, Memorial University of Newfoundland (Sabatical in Tasmania).
-Dr. L. Harris, President, Memorial University of Newfoundland.

May 31 and June 1, 1989
-Integrated Resource Planning Workshop, Included all Directors and Assistant Deputy Minister of Government of Newfoundland and Labrador that have land and resource related responsibilities.

June 2, 1989
-Dr. M. Staveley, Dean, Faculty of Arts, Memorial University of Newfoundland. Also Chairman of Presidential Committee on the Future Development of the Sir Wilfred Grenfell College.
OTHER CORRESPONDENCE

November 22, 1988 - Dr. O.M. Paton, Postgraduate Coordinator, Department of Forestry, The Australian National University, Canberra.
November 24, 1988 - C.R. Cleary, Registrar, Tasmanian State Institute of Technology, Launceston, Tasmania.
November 29, 1988 - Dr. P. Crabb, Senior Lecturer in Geography, School of Earth Sciences, Macquarie University, New South Wales, Australia.
December 14, 1988 - Prof. H. Nix, Director, Centre for Resources and Environment Studies, The Australian National University, Canberra.
April 10, 1989 - Mr. C. Chapman, Registrar, University of Tasmania.
June 7, 1989 - Dr. S. McCorquodale, Professor of Political Sciences, Memorial University of Newfoundland (Telephone).
June 7, 1989 - Dr. V.A. Summers, Assistant Professor Political Sciences, Memorial University of Newfoundland (Telephone).

APPENDIX C. SOME NATURAL RESOURCE COMPARISONS IN NEWFOUNDLAND, TASMANIA, AND ALASKA.

Table C.1. Some designated national or provincial/state forest in Newfoundland, Tasmania, and Alaska.

<table>
<thead>
<tr>
<th>National Forest</th>
<th>Newfoundland (Island) # ha.</th>
<th>Tasmania # ha.</th>
<th>Alaska # ha.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>26,761,280 (1,500,000 commercial)</td>
<td>2,402,299 (38,000 commercial)</td>
<td>6,761,280</td>
</tr>
<tr>
<td>Provincial/State Forest</td>
<td>-</td>
<td>1,583,139</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(158,000 commercial)</td>
<td>728,460</td>
</tr>
<tr>
<td>Total</td>
<td>-</td>
<td>1,583,139</td>
<td>2</td>
</tr>
<tr>
<td>% of Total Land Base</td>
<td>0%</td>
<td>25%</td>
<td>6.7%</td>
</tr>
<tr>
<td>Total Land Base</td>
<td>9,957,200</td>
<td>6,300,000</td>
<td>148,200,000</td>
</tr>
</tbody>
</table>

Source
Table C.2. Some designated conservation lands in Newfoundland, Tasmania, and Alaska.

<table>
<thead>
<tr>
<th>Parks</th>
<th>Newfoundland (Island)</th>
<th>Managed by</th>
<th>Tasmania</th>
<th>Managed by</th>
<th>Alaska</th>
<th>Managed by</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td># ha.</td>
<td>Managed by</td>
<td># ha.</td>
<td>Managed by</td>
<td># ha.</td>
<td>Managed by</td>
</tr>
<tr>
<td>National Parks</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>40,000 PC(F)</td>
<td>13</td>
<td>851,051 NPWS(S)</td>
<td>15</td>
<td>20,000,000 USPS(F)</td>
</tr>
<tr>
<td></td>
<td>(Terra Nova)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>180,500 PC(F)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Provincial/State Parks</td>
<td>34</td>
<td>22,141 PD(P)</td>
<td>54</td>
<td>19,316 NPWS(S)</td>
<td>107</td>
<td>1,260,758 DNR(S)</td>
</tr>
<tr>
<td>Historic Site</td>
<td>41</td>
<td>1,249 PD(P)</td>
<td>34</td>
<td>2,035 NPWS(S)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reserves</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wildlife</td>
<td>6</td>
<td>2,262 PD(P)</td>
<td>34</td>
<td>33,260 NPWS(S)</td>
<td>16</td>
<td>31,186,836 USFS(F)</td>
</tr>
<tr>
<td>Wilderness/Waters</td>
<td>1</td>
<td>107,000 PD(P)</td>
<td>38</td>
<td>29,426 NPWS(S)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forest</td>
<td>1</td>
<td>Humber Valley For(P)</td>
<td>38</td>
<td>15,961 F.Comm(S)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conservation</td>
<td>41</td>
<td>829,010 NPWS(S)</td>
<td>9</td>
<td>2,779 NPWS(S)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Game</td>
<td>1,583,139 F.Comm(S)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multiple Use</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>State Forest</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>National Forest</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Abbreviations</td>
<td>PC Parks Canada</td>
<td>F.Comm Forestry Commission</td>
<td>BLM Bureau of Land Management</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PD Parks Division</td>
<td>NPWS: National Parks &amp; Wildlife Service</td>
<td>DNR Dept. of Natural Resources</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>For Dept. of Forestry</td>
<td></td>
<td>USFS U.S. Forest Service</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>USFNS U.S. Fish &amp; Wildlife Service</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>USPS U.S. Park Service</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table C.3. Trees by genus in Newfoundland, Tasmania, and Alaska.

<table>
<thead>
<tr>
<th>Genus</th>
<th>Newfoundland</th>
<th>Tasmania</th>
<th>Alaska</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gynoperms</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Abies</em> (Fir)</td>
<td>1</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td><em>Athrotaxis</em> (King Billy)</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td><em>Callitris</em> (Oyster Bay)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Chamaecyparis</em> (Cedar)</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td><em>Decarydium</em> (Huon)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Larix</em> (Larch)</td>
<td>1</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td><em>Phyllocladus</em> (Celery Top)</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td><em>Picea</em> (Spruce)</td>
<td>2</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td><em>Pinus</em> (Pine)</td>
<td>2</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td><em>Pseudotsuga</em> (Tsuga)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Thuja</em> (Red cedar)</td>
<td>1</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td><em>Tsuga</em> (Hemlock)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td><strong>Sub-Total</strong></td>
<td>6</td>
<td>6</td>
<td>12</td>
</tr>
<tr>
<td><strong>Angiosperms</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Acer</em> (Maple)</td>
<td>1</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td><em>Acacia</em> (Wattle)</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td><em>Alnus</em> (Alder)</td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td><em>Amelanchier</em> (Serviceberry)</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td><em>Betula</em> (Birch)</td>
<td>2</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td><em>Eucalyptus</em> (Gum)</td>
<td></td>
<td>29</td>
<td></td>
</tr>
<tr>
<td><em>Fraxinus</em> (Ash)</td>
<td>1</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td><em>Malus</em> (Apple)</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td><em>Nothofagus</em> (Myrtle)</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td><em>Populus</em> (Aspen)</td>
<td>2</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td><em>Prunus</em> (Cherry)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Salix</em> (Willow)</td>
<td>(33)</td>
<td></td>
<td>(12)</td>
</tr>
<tr>
<td><em>Sambucus</em> (Elderberry)</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td><em>Sorbus</em> (Mountain ash)</td>
<td>2</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Other Species (Tasmania)</td>
<td></td>
<td>20</td>
<td></td>
</tr>
<tr>
<td><strong>Sub-Total</strong></td>
<td>10</td>
<td>63</td>
<td>15</td>
</tr>
<tr>
<td><strong>TOTAL</strong> (Excludes Willows)</td>
<td>16</td>
<td>69</td>
<td>27</td>
</tr>
</tbody>
</table>

**Sources:**


Table C.4. Seven trees in common in Newfoundland and Alaska.

<table>
<thead>
<tr>
<th>Species</th>
<th>Common Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Betula papyrifera</td>
<td>paper birch</td>
</tr>
<tr>
<td>Larix laricina</td>
<td>tamarack, larch</td>
</tr>
<tr>
<td>Picea glauca</td>
<td>white spruce</td>
</tr>
<tr>
<td>Picea mariana</td>
<td>black spruce</td>
</tr>
<tr>
<td>Populus balsamifera</td>
<td>balsam poplar</td>
</tr>
<tr>
<td>Populus tremuloides</td>
<td>trembling aspen</td>
</tr>
<tr>
<td>Salix bebbiana</td>
<td>bebb willow</td>
</tr>
</tbody>
</table>

Table C.5. Newfoundland visitors by place of origin.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Canada</td>
<td></td>
<td>72.8</td>
<td>84.0</td>
</tr>
<tr>
<td>Ontario</td>
<td></td>
<td>(34.0)</td>
<td>(39.7)</td>
</tr>
<tr>
<td>Nova Scotia</td>
<td></td>
<td>(21.3)</td>
<td>(19.8)</td>
</tr>
<tr>
<td>Other Canada</td>
<td></td>
<td>(17.5)</td>
<td>(24.5)</td>
</tr>
<tr>
<td>United States</td>
<td></td>
<td>26.3</td>
<td>11.7</td>
</tr>
<tr>
<td>New England</td>
<td></td>
<td>(7.2)</td>
<td></td>
</tr>
<tr>
<td>South Atlantic</td>
<td></td>
<td>(6.2)</td>
<td></td>
</tr>
<tr>
<td>Other Countries</td>
<td></td>
<td>0.9</td>
<td>4.2</td>
</tr>
<tr>
<td>Total Percent</td>
<td></td>
<td>100.0</td>
<td>100.0</td>
</tr>
<tr>
<td>Total Estimated Number</td>
<td>81,382</td>
<td>57,749</td>
<td></td>
</tr>
</tbody>
</table>


Table C.6. Main purpose of visit to Newfoundland.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Sight seeing/Touring</td>
<td></td>
<td>47.0</td>
<td>9.6</td>
</tr>
<tr>
<td>Visiting friends/relatives</td>
<td></td>
<td>37.5</td>
<td>44.7</td>
</tr>
<tr>
<td>Conventions/conferences</td>
<td></td>
<td>1.7</td>
<td>8.0</td>
</tr>
<tr>
<td>Other business</td>
<td></td>
<td>2.6</td>
<td>31.7</td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td>11.2</td>
<td>6.0</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Attractions visited

<table>
<thead>
<tr>
<th>Attraction</th>
<th>Percent</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Gros Morne National Park</td>
<td></td>
<td>67.4</td>
<td></td>
</tr>
<tr>
<td>Terra Nova National Park</td>
<td></td>
<td>50.2</td>
<td></td>
</tr>
<tr>
<td>Signal Hill, St. John's</td>
<td></td>
<td>58.0</td>
<td></td>
</tr>
<tr>
<td>L'Anse Aux Meadows</td>
<td></td>
<td>35.0</td>
<td></td>
</tr>
</tbody>
</table>
Table C.7. 1981 Visitor Survey by the Department of Tourism of the relative popularity of selected activities.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Percent of visitors polled</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visiting Casino in Hobart</td>
<td>55.3</td>
</tr>
<tr>
<td>Bushwalking or climbing</td>
<td>22.4</td>
</tr>
<tr>
<td>Organised sport</td>
<td>5.3</td>
</tr>
<tr>
<td>Visiting historic sites</td>
<td>58.2</td>
</tr>
<tr>
<td>Sea fishing</td>
<td>6.6</td>
</tr>
<tr>
<td>Trout angling</td>
<td>3.8</td>
</tr>
<tr>
<td>Sightseeing and touring</td>
<td>66.5</td>
</tr>
<tr>
<td>Snow skiing</td>
<td>0.8</td>
</tr>
<tr>
<td>Canoeing or boating</td>
<td>5.1</td>
</tr>
<tr>
<td>Scenic flights</td>
<td>1.9</td>
</tr>
</tbody>
</table>

Tourism estimated at 90,000 per year to South West Tasmania (80,000 via Strahan and Gordon River worth $4,500,000 to local communities)


1981 Tourism Industry generated over 16,000 jobs or 9.3% of the State's workforce. Tarlo and Miller, 1985. p. 37.

Visitors to selected state reserves 1984-85.

<table>
<thead>
<tr>
<th>Area</th>
<th>Visitors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mt. Field</td>
<td>224,267</td>
</tr>
<tr>
<td>Freycinet</td>
<td>193,018</td>
</tr>
<tr>
<td>Port Arthur</td>
<td>91,404</td>
</tr>
<tr>
<td>Cradle Mountain</td>
<td>71,168</td>
</tr>
</tbody>
</table>

Table C.8a. Visitor arrivals to Alaska by place of origin.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>% of Total</td>
<td>Number</td>
<td>% of Total</td>
</tr>
<tr>
<td>United States</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>West</td>
<td>137,300</td>
<td>65.1</td>
<td>255,400</td>
<td>47.9</td>
</tr>
<tr>
<td>Midwest</td>
<td>23,400</td>
<td>11.1</td>
<td>96,000</td>
<td>18.0</td>
</tr>
<tr>
<td>South</td>
<td>24,700</td>
<td>11.7</td>
<td>92,000</td>
<td>17.3</td>
</tr>
<tr>
<td>East</td>
<td>9,700</td>
<td>4.6</td>
<td>48,200</td>
<td>9.1</td>
</tr>
<tr>
<td>U.S. TOTAL</td>
<td>195,500</td>
<td>92.7</td>
<td>492,100</td>
<td>92.3</td>
</tr>
<tr>
<td>Canada</td>
<td>6,100</td>
<td>2.9</td>
<td>21,300</td>
<td>4.0</td>
</tr>
<tr>
<td>Yukon</td>
<td>(2,500)</td>
<td>(1.2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ontario</td>
<td>(6,900)</td>
<td>(1.3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>British Columbia</td>
<td>(4,800)</td>
<td>(0.9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alberta</td>
<td>(4,800)</td>
<td>(0.9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Europe</td>
<td>4,900</td>
<td>2.3</td>
<td>11,000</td>
<td>2.1</td>
</tr>
<tr>
<td>Asia</td>
<td>2,100</td>
<td>1.0</td>
<td>3,900</td>
<td>0.7</td>
</tr>
<tr>
<td>Other Foreign</td>
<td>2,300</td>
<td>1.1</td>
<td>4,700</td>
<td>0.8</td>
</tr>
<tr>
<td>Total Foreign</td>
<td>15,400</td>
<td>7.3</td>
<td>41,000</td>
<td>7.7</td>
</tr>
<tr>
<td>TOTAL VISITOR ARRIVALS</td>
<td>210,900</td>
<td>100.0</td>
<td>533,100</td>
<td>100.0</td>
</tr>
</tbody>
</table>


Table C.8b. Trip purpose to Alaska.

<table>
<thead>
<tr>
<th></th>
<th>210,900</th>
<th></th>
<th>533,100</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Business only</td>
<td>34.4</td>
<td>9.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Business &amp; pleasure</td>
<td>11.4</td>
<td>6.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vacation/pleasure</td>
<td>24.4</td>
<td>69.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Visit friends/relatives</td>
<td>24.1</td>
<td>13.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seasonal worker</td>
<td>5.7</td>
<td>2.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


Of the overseas visitors in full year 1985-1986:

- 62% visited Portage Glacier
- 39% visited Anchorage Museum
- 33% visited Denali Park/McKinley.

Source: Data Decisions Group, Inc. 1987c.
Table C.9. Number of mammals by order in Newfoundland, Tasmania, and Alaska.

<table>
<thead>
<tr>
<th>Order</th>
<th>Newfoundland</th>
<th>Labrador</th>
<th>Tasmania</th>
<th>Alaska</th>
</tr>
</thead>
<tbody>
<tr>
<td>Artriodactyla</td>
<td>1 (21)</td>
<td>2</td>
<td>(11)</td>
<td>8</td>
</tr>
<tr>
<td>Carnivora</td>
<td>6 (11, 2A, 1E)</td>
<td>13 (1E)</td>
<td>(11)</td>
<td>17</td>
</tr>
<tr>
<td>Chiroptera</td>
<td>2</td>
<td>1</td>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td>Insectivora</td>
<td>(11)</td>
<td>4</td>
<td>-</td>
<td>8</td>
</tr>
<tr>
<td>Lagomorpha</td>
<td>1 (11)</td>
<td>2</td>
<td>(21)</td>
<td>4</td>
</tr>
<tr>
<td>Marsupials</td>
<td>-</td>
<td>-</td>
<td>20</td>
<td>-</td>
</tr>
<tr>
<td>Monotremata</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>Rodentia</td>
<td>3 (6I, 1A)</td>
<td>15 (2I, 1E)</td>
<td>5 (3I)</td>
<td>29</td>
</tr>
</tbody>
</table>

Source: Newfoundland & Labrador - Wildlife Division; Tasmania - Mammals of Tasmania; Alaska - Species List.
Table C.10. Land mammals occurring in both Newfoundland and Alaska.

<table>
<thead>
<tr>
<th>Order Artiodactyla</th>
<th>Newfoundland</th>
<th>Labrador</th>
<th>Alaska</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moose (Alces alces)</td>
<td>I</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Caribou (Rangifer tarandus)</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Bison (Bison bison)</td>
<td>I</td>
<td>-</td>
<td>X</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Order Carnivora</th>
<th>Newfoundland</th>
<th>Labrador</th>
<th>Alaska</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grey wolf (Canis lupus)</td>
<td>E</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Arctic fox (Alopex lagopus)</td>
<td>A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Red Fox (Vulpes vulpes)</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Black Bear (Ursus americanus)</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Grizzly (Ursus arctos)</td>
<td>-</td>
<td>E</td>
<td>X</td>
</tr>
<tr>
<td>Polar Bear (Ursus maritimus)</td>
<td>A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Marten (Martes americana)</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Ermine (Mustela erminea)</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Coast weasel (Mustela nivalis)</td>
<td>-</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Mink (Mustela vison)</td>
<td>I</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Wolverine (Gulo gulo)</td>
<td>-</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>River otter (Lutra canadensis)</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Lynx (Lynx canadensis)</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Order Chiroptera</th>
<th>Newfoundland</th>
<th>Labrador</th>
<th>Alaska</th>
</tr>
</thead>
<tbody>
<tr>
<td>Little brown bat (Myotis lucifugus)</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Keen's bat (Myotis keenii)</td>
<td>X</td>
<td>-</td>
<td>X</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Order Insectivora</th>
<th>Newfoundland</th>
<th>Labrador</th>
<th>Alaska</th>
</tr>
</thead>
<tbody>
<tr>
<td>Masked shrew (Sorex cinereus)</td>
<td>I</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Water shrew (Sorex palustris)</td>
<td>-</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Pygmy shrew (Microsorex hoyi)</td>
<td>-</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Order Lagomorpha</th>
<th>Newfoundland</th>
<th>Labrador</th>
<th>Alaska</th>
</tr>
</thead>
<tbody>
<tr>
<td>Snowshoe hare (Lepus americanus)</td>
<td>I</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Arctic hare (Lepus arcticus)</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Order Rodentia</th>
<th>Newfoundland</th>
<th>Labrador</th>
<th>Alaska</th>
</tr>
</thead>
<tbody>
<tr>
<td>Woodchuck (Marmota monax)</td>
<td>-</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Red squirrel (Tamiasciurus hudsonicus)</td>
<td>I</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Northern flying squirrel (Glaucomys sabrinus)</td>
<td>-</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Beaver (Castor canadensis)</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Deer mouse (Peromyscus maniculatus)</td>
<td>A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Red-backed vole (Clethrionomys gapperi)</td>
<td>I</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Meadow vole (Microtus pennsylvanicus)</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Muskrat (Ondatra zibethicus)</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Northern bog lemming (Synaptomys borealis)</td>
<td>-</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Norway rat (Tattus norvegicus)</td>
<td>I</td>
<td>I</td>
<td>X</td>
</tr>
<tr>
<td>House mouse (Mus musculus)</td>
<td>I</td>
<td>I</td>
<td>X</td>
</tr>
<tr>
<td>Meadow jumping mouse (Apus hudsonius)</td>
<td>-</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Porcupine (Erethizon dorsatum)</td>
<td>-</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Newfoundland</th>
<th>Labrador</th>
<th>Alaska</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>26</td>
<td>36</td>
<td>36</td>
</tr>
<tr>
<td></td>
<td>(91)</td>
<td>(21)</td>
<td>(1E)</td>
</tr>
<tr>
<td></td>
<td>(3A)</td>
<td>(1E)</td>
<td></td>
</tr>
<tr>
<td>------------------</td>
<td>--------------</td>
<td>------------------</td>
<td>--------------</td>
</tr>
<tr>
<td></td>
<td>Island</td>
<td>Labrador</td>
<td></td>
</tr>
<tr>
<td><strong>Mammals</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moose (NF, AK)</td>
<td>17,860*</td>
<td>108*</td>
<td>80,000 Residents</td>
</tr>
<tr>
<td>Caribou (NF, AK)</td>
<td>2,445*</td>
<td></td>
<td>8,000 Non-Resident</td>
</tr>
<tr>
<td>Bear (NF, AK)</td>
<td></td>
<td></td>
<td>1,500 Non-Resident</td>
</tr>
<tr>
<td>Follow Deer (Tas)</td>
<td></td>
<td>2,320</td>
<td>(Brown Bear &amp; Dall Sheep)</td>
</tr>
<tr>
<td>Wallaby (Tas)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Noncommercial</td>
<td></td>
<td>6,236</td>
<td></td>
</tr>
<tr>
<td>Commercial</td>
<td></td>
<td>(298)</td>
<td></td>
</tr>
<tr>
<td>Snowshoe</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Here (NF, AK)</td>
<td>41,369**</td>
<td>1,657 (1962)</td>
<td></td>
</tr>
<tr>
<td><strong>Birds</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Waterfowl (NF, Tas, AK)</td>
<td>32,788 (1977)</td>
<td>3,269 (1977)</td>
<td>3,336</td>
</tr>
<tr>
<td></td>
<td>18,769 (1977)</td>
<td>2,311 (1977)</td>
<td></td>
</tr>
<tr>
<td>Mutton Bird (Tas)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-commercial</td>
<td></td>
<td>3,039</td>
<td></td>
</tr>
<tr>
<td>Commercial</td>
<td></td>
<td>(80)</td>
<td></td>
</tr>
<tr>
<td>Brown Quail (Tas)</td>
<td></td>
<td>143</td>
<td></td>
</tr>
<tr>
<td><strong>Fish</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Popular Resident &amp; Non-Resident</td>
<td>Popular resident and Non-resident</td>
<td>87,000 (non-resident)</td>
</tr>
<tr>
<td></td>
<td>Atlantic salmon; brook, brown rainbow trout</td>
<td>Brook, brown, rainbow trout; Tasmanian blackfish</td>
<td>5 species of pacific salmon, 4 trout, and others.</td>
</tr>
</tbody>
</table>

* 1989-90 license quota. In 1987 there were 29,532 applications for big game licenses naming 51,490 individuals.

** Licenses issued vary with population abundance cycle of species.
Table C.12. Number of animals harvested in Newfoundland, Tasmania, and Alaska.

<table>
<thead>
<tr>
<th></th>
<th>Newfoundland</th>
<th>Tasmania 1984-85</th>
<th>Alaska</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Island</td>
<td>Labrador</td>
<td></td>
</tr>
<tr>
<td><strong>Mammals</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moose</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caribou</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deer</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bear</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sheep</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Snowshoe Hare</td>
<td>1,900,000(1983)</td>
<td>80,000</td>
<td></td>
</tr>
<tr>
<td>Wallaby</td>
<td>778,000(1987)</td>
<td>8,500</td>
<td></td>
</tr>
<tr>
<td><strong>Birds</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Waterfowl</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grouse</td>
<td>19,600</td>
<td>62,280(1986)</td>
<td></td>
</tr>
<tr>
<td>Ptarmigan</td>
<td>70,500</td>
<td>98,160(1986)</td>
<td></td>
</tr>
<tr>
<td>Mutton bird (commercial)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fish</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### APPENDIX D. LEGISLATION AND POLICIES IMPACTING ON LAND USE.

#### Table D.I.a. Some Canadian legislation and policies impacting on Newfoundland land use.

<table>
<thead>
<tr>
<th>Name/Date/Reference</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Confederation 1949</td>
<td>Newfoundland joins Canadian Confederation as the tenth province.</td>
</tr>
<tr>
<td>Agriculture Rehabilitation and Development Act 1961 (ARDA) Savoie, 1986</td>
<td>Canada's first regional development program name changed in 1966 to Agriculture and Rural Development Act expanded into non-agricultural programs in rural areas.</td>
</tr>
<tr>
<td>Department of Regional Economic Expansion 1969 (DREE) Savoie, 1986</td>
<td>In 1973 General Development Agreements (GDA's) negotiated between Canada and provinces. Subsidiary agreement for cost sharing up to 90% in Newfoundland. GDA's evolved into ERDA's (Economic and Regional Development Agreements) which enabled FRDA's (Forestry Regional Development Agreements).</td>
</tr>
<tr>
<td>Fisheries Act of Canada</td>
<td>Prevents people in logging, lumbering, land clearing other operations from disturbing fish habitat.</td>
</tr>
<tr>
<td>Environmental Assessment and Review Process (EARP) 1973; Couch, 1982</td>
<td>Environmental impact assessment (EIA) of federal projects, programs and activities.</td>
</tr>
<tr>
<td>Federal Policy on Land Use 1980 Government of Canada, 1982</td>
<td>To ensure that federal policies and programs and the managements of federal lands contribute to the wise use of Canada's land resources.</td>
</tr>
<tr>
<td>Atlantic Canada Opportunities Agency 1987</td>
<td>To stimulate opportunities for sustained economic growth in the Atlantic Region through action, cooperation, coordination and advocacy.</td>
</tr>
<tr>
<td>Canadian Environmental Protection Act 1988</td>
<td>Take both preventative and remedial measures in protecting the environment.</td>
</tr>
<tr>
<td>The Canada-U.S. Free Trade Agreement 1989</td>
<td>Agreement to establish an improved trading relationship based on more secure and open access to each other's markets.</td>
</tr>
<tr>
<td>National Round Table on Environment and Economy (NRTEE)</td>
<td>To act as a catalyst, consensus builder and leader in the pursuit of environmentally sustainable economic development.</td>
</tr>
<tr>
<td>Name/Date/Reference</td>
<td>Purpose</td>
</tr>
<tr>
<td>-----------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Newfoundland Royal Commission on Forestry 1955; Kennedy et al., 1955</td>
<td>Generally to examine into the forestry resources of the Province of Newfoundland with a view to their fullest development and utilization.</td>
</tr>
<tr>
<td>Crown Lands Act 1970</td>
<td>Principal piece of legislation directing allocation of lands to a variety of uses.</td>
</tr>
<tr>
<td>Royal Commission on Forestry 1970, Rousseau et al., 1970</td>
<td>To examine generally and enquire into the forestry resource of Newfoundland.</td>
</tr>
<tr>
<td>National Parks (Lands) Act 1973</td>
<td>Allow for the acquisition of lands for national parks.</td>
</tr>
<tr>
<td>Sheppard et al., 1973</td>
<td>To draw technical conclusions and evaluate alternative approaches which the Province may use in formulating forest policy.</td>
</tr>
<tr>
<td>Land Capability - Land Use committee of the Federal/Provincial Task Force on Forestry; Romaine et al., 1973</td>
<td>To provide an overview analysis of the Province's resources, with particular reference as to their capabilities and land use. To identify problem areas, priorities, and future study needs.</td>
</tr>
<tr>
<td>Maynard, 1974 in Appendix 1-4 DFRL, 1980</td>
<td>To encourage good husbandry of the forest resources of the Province by a tax arrangement that benefits persons who manage their forest lands.</td>
</tr>
<tr>
<td>Canada/Newfoundland Forestry Agreement 1974</td>
<td>To provide for the orderly development and use of designated areas in the Province and to prevent speculation of lands in those areas.</td>
</tr>
<tr>
<td>Urban and Rural Planning Act 1974</td>
<td>To review the status of the forest industry and the intensity of forest management within the Province and identify conditions necessary for the long term viability of the industry and the sustained flow of forest products and services for the economic and social well being of our people.</td>
</tr>
<tr>
<td>Development Areas (Lands) Act 1975-76</td>
<td>To facilitate the wise management of the natural resources of the province and to protect the environment and quality of life of the people of the province.</td>
</tr>
<tr>
<td>Royal Commission on Forest Protection and Management 1980, Poole et al., 1981</td>
<td>To provide for natural areas in the Province to be set aside for the benefit, education and enjoyment of present and future generations in the Province.</td>
</tr>
<tr>
<td>Environmental Assessment Act 1980</td>
<td></td>
</tr>
<tr>
<td>Wilderness and Ecological Reserves Act 1980</td>
<td></td>
</tr>
</tbody>
</table>
Evolved from the Crown Lands Committee. A Memorandum in Council stated ILUC would become the body which would coordinate government’s resource development activities by acting as a clearing house for development programs, policies, legislation and proposed administrative and/or planning boundaries, to integrate resource and land uses through the development of land use policies and regional Crown Land Plans.

The Government of Newfoundland and Labrador endorses the aim of the WCS. Throne speech of May 1989 announced government intent to formulating a Newfoundland Conservation Strategy.

Workshop of Provincial Government resource Directors and Assistant Deputy Ministers to propose a means by which IRP can be integrated into existing and proposed provincial processes and initiatives for ensuring sustainable development.

### Table D.2.a. Some Australian legislation and policies impacting on Tasmanian land use.

<table>
<thead>
<tr>
<th>Name/Date/Reference</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Australian Federation 1901</strong>&lt;br&gt; Bunker, 1986; Parkin et al., 1980; Powell, 1988</td>
<td>Commonwealth government signatory to international agreements, trade and commerce, taxation, external affairs. States controlled on rationalized initial processes of exploration, survey settlement, sale and lease of land.</td>
</tr>
<tr>
<td><strong>Environment Protection (Impact of Proposals) Act 1974</strong>&lt;br&gt; Australian Environment Council, 1986</td>
<td>To ensure, to the greatest extent practicable, that matters affecting the environment to a significant extent are taken fully into account in relation to the formulation of proposals, the carrying out of works and other projects.</td>
</tr>
<tr>
<td><strong>Australian Heritage Commission Act 1975</strong>&lt;br&gt; Aust. Env. Council, 1986</td>
<td>Provides for the identification and protection at a federal level of aspects of the natural environment of national significance or national estate.</td>
</tr>
<tr>
<td><strong>World Heritage Properties Conservation Act 1983</strong>&lt;br&gt; Aust. Env. Council, 1986</td>
<td>To provide for the protection of certain property that Australia has identified as “natural heritage” or “cultural heritage” within the meaning of the Convention for the Protection of the World Cultural and Natural Heritage.</td>
</tr>
<tr>
<td><strong>National Forest Strategy for Australia 1986</strong>&lt;br&gt; Australian Forestry Council, 1986</td>
<td>To indicate important basic principles and goals associated with the management of Australia’s forests. The Strategy includes statements on Land Use, Protection, Multiple-use, Economics and finance, Research, education and information, International aspects and implementation.</td>
</tr>
</tbody>
</table>
Memorandum of Understanding 1986
between Commonwealth of Australia and
State of Tasmania

Lemonthyme and Southern Forests
(Commission of Inquiry) Act 1987
Halahan et al., 1988

Under regulations made under the Export Control Act 1982 approval to export woodchips from Tasmania over a period of 15 years from January 1, 1989.

To enquire into and report upon various matters relating to two areas of Tasmania called the Lemonthyme area and the Southern Forests area, to report whether there are any qualifying areas found to be part of the world heritage as defined in the World Heritage Convention.

Table D.3.a. Some United States legislation and policies impacting on Alaska land use.

<table>
<thead>
<tr>
<th>Name/Date/Reference</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States Constitution 1787</td>
<td>Supreme law of the United States. The philosophy that lands west of the original States would be used for the benefit of all Americans.</td>
</tr>
<tr>
<td>Dept. of Agriculture 1862 Dana and Johnson, 1980</td>
<td></td>
</tr>
<tr>
<td>Homestead Act 1862 Dana and Johnson, 1980</td>
<td>Authorized U.S. citizens to enter upon not more than 160 acres of unappropriated land subject to preemption.</td>
</tr>
<tr>
<td>Morrill Act 1862 Dana and Johnson, 1980</td>
<td>Grant of public land to each state for establishment of colleges of agriculture and mechanic arts.</td>
</tr>
<tr>
<td>Alaska &quot;Organic Act&quot; 1884 Dana and Johnson, 1980</td>
<td>Established civil government, with schools and federal courts, for Alaska and provided that native land claims would be treated in subsequent legislation.</td>
</tr>
<tr>
<td>Hatch Act 1887 Dana and Johnson, 1980</td>
<td>Provided for financial assistance to states in the establishment of agricultural experiment stations</td>
</tr>
<tr>
<td>Creative Act of 1891 (Forest Reserve Act) U.S.D.A., 1978; Bubany et al., 1982</td>
<td>To set apart areas of public lands or government reservations as national forests.</td>
</tr>
<tr>
<td>Homestead laws extended to Alaska 1898 Dana and Johnson, 1980</td>
<td>No homestead to exceed 80 acres. Secretary of Interior authorized to sell timber on public lands in Alaska. Export of pulpwood and wood/pulp authorized in 1905.</td>
</tr>
<tr>
<td>National Park Organic Act 1916 U.S. Dept. Interior No P.S., 1988</td>
<td>To conserve the scenery and the natural and historic objects and the wildlife therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations.</td>
</tr>
<tr>
<td>Migratory Bird Treaty Act 1918 Dana and Johnson, 1980</td>
<td>Result of Convention of 1916 between U.S. and Great Britain (on behalf of Canada)</td>
</tr>
</tbody>
</table>
Alaska Game Law 1925
Dana and Johnson, 1980


Reorganization Plan No. 3 1946
Dana and Johnson, 1980; Dept. of Interior BLM, 1987

Fish and Wildlife Act 1956
Dana and Johnson, 1980

Alaskan Statehood Act 1958
Naske and Slotnick, 1987

Multiple-Use Sustained-Yield Act 1960
U.S.D.A., 1978; Bubany et al., 1982

McIntire-Stennis Act 1962
U.S.D.A. 1978; Bubany et al., 1982

Bureau of Outdoor Recreation Act 1963
Dana and Johnson, 1980

Wilderness Act of 1964
U.S.D.A., 1978; Bubany et al., 1982

National Wildlife Refuge System Administration Act 1966
Dana and Johnson, 1980

Wild and Scenic River Act 1968
U.S.D.A., 1978; Bubany et al., 1982


Alaska Native Claims Settlement Act 1971
U.S. Dept. Interior, 1986

Joint Federal-State Land Use Planning Commission 1972
Joint Federal-State LUPC, 1979

Trans-Alaska Pipeline (TAPS) 1973
Dane and Johnson, 1980

Created Alaska Game Commission authorized Secretary of Agriculture to adopt regulations governing the taking of animals and the issuance of hunting and trapping licenses.

To promote the continuous supply of timber and forest products and to secure forest benefits.

General Land Office merged with Grazing Service to form Bureau of Land Management (BLM). Exclusive jurisdiction for about 46 percent of federal lands, almost half of this area is in Alaska.

Admitted Alaska to Union and granted new state authority to select 102.9 million acres over twenty five years.

Declares supplemental purposes for which national forests are established and administered, including outdoor recreation, range, timber, watershed, and fish and wildlife. Declares multiple-use sustained-yield concept as a governing planning principle.

Provides the basic authority for forestry research grants with states, grants made to land-grant colleges or similar institutions.

Following Outdoor Recreation Resources Review Commission (ORRRC) established in 1958 final reports 1961. Bureau created to provide technical planning services in the recreation field.

Creates the National Wilderness Preservation System. Lands within system to be managed to protect and preserve their natural condition and to minimize man's impact upon the area.

National Wildlife Refuge System created consolidating wildlife refuges, ranges and management areas.

Creates National Wild and Scenic Rivers System preserving rivers in their basically freeflowing state.

Declaration of a national environmental policy calling for the creation and maintenance of conditions under which man and nature can exist in productive harmony.

Legislates the terms by which Alaska Natives could acquire title to their lands. Provided 44 million acres to 13 Native Corporations.

To create a framework for the use and protection of Alaska lands and resources in the years to come.

Exempted TAPS from further litigation of NEPA requirements.
APPENDIX E. GENERIC AND SPECIFIC LAND USE ISSUES IN NEWFOUNDLAND, TASMANIA, AND ALASKA.

Table E.NF.1. Some generic land use issues in Newfoundland.

<table>
<thead>
<tr>
<th>Document/Higher Education Involvement</th>
<th>Issue/s</th>
</tr>
</thead>
<tbody>
<tr>
<td>Report of the Land Capability-Land Use Committee to the Federal/Provincial Task Force on Forestry (Romaine et al., 1973)</td>
<td>Agriculture - No major conflict at present --Possible future conflicts Wildlife - Generally forestry wildlife compatible -Large clear cuts -Timber harvest impact on watersheds -Moose overpopulation - road maintenance -Suggestion of let burn policy in Labrador destroy caribou vegetation Forestry - No serious conflicts if Agriculture and Recreation have preference over forestry on land units with high category -Stream and shoreline reserves -Co-operative research required between Industry and Provincial Wildlife Service</td>
</tr>
<tr>
<td>Fish Habitat Protection Guidelines for Loggers (Rowe, L.W., 1975)</td>
<td>Effects of logging and road construction on fish life -Excessive sedimentation, obstruction of fish movement, depletion of oxygen supply, destruction of spawning and rearing areas. -Stressed importance of watershed vegetation and importance of small streams.</td>
</tr>
<tr>
<td>Environmental guidelines for resource road construction (Case and Rowe, 1978)</td>
<td>Includes a comprehensive list of the cause and effects of resource road construction on aquatic and terrestrial environments at various construction phases.</td>
</tr>
<tr>
<td>Type and extent of ground disturbance following skidder logging in Newfoundland and Labrador (Case and Donnelly, 1979)</td>
<td>Concluded &quot;The amount of Newfoundland's forest land area that is potentially lost to fibre production through bulldozing was calculated to be 1500-2000 ha./yr. Compaction affect 30% of unbulldozed portion of cutovers... up to 4000 ha./yr. may be affected in this manner.&quot;</td>
</tr>
</tbody>
</table>

- Provides for a comprehensive assessment of present and anticipated uses, demand for, and supply of renewable resources from the Nation's public and private forests and rangelands, through analysis of environmental and economic impacts, coordination of multiple-use and sustained yield opportunities.

- Comprehensive framework and primary source of direction to the Forest Service for fulfilling its mandate to manage the National Forest System. Institution of land and resource management planning.

- Comprehensive legislation for the management of lands by the Bureau of Land Management.

- Intended to be the last comprehensive treatment by Congress of the Alaskan land issues. Conservation System Units created.
Report of the Royal Commission on Forest Protection and Management Part I and II (Poole et al., 1981)

Dr. C.F. Poole, chairman of Commission, Principal Sir Wilfred Grenfell College, Memorial University.

One written submission from M.U.N. professors.

One written submission from Dean of Forestry, U.N.B.

Three research documents from U.N.B., U.B.C., Univ. of Maine in bibliography.

One symposium from Universite de Moncton in bibliography.

PART I

The spruce budworm outbreak of late 1970's and early 1980's. The effects of outbreak on nature, immature and future stands, fish and wildlife habitats and fire hazard. Human health aspects and environmental aspects of forest spraying using chemical insecticides and other control methods. Concludes "Unless there is a commitment by the Provincial Government to an effective forest pest protection policy, all silviculture activities such as precommercial thinning and reforestation should be terminated. The only effective way to help reduce further losses is by use of chemical insecticides." (p. 103)

PART II

A wide range of recommendations including comprehensive new forestry legislation, a new tenure system, a pilot community forests program, appointment of a Landscape Commission.

Strategic forest sector issues in Newfoundland and potential CFS program initiatives (Milne, 1988)

Survey population of 38 and workshop attendees of 28 included Dr. D. Bajzak and D.G. Bennett of M.U.N.

Thirteen strategic forest sector issues were identified and ranked in order of priority by questionnaire survey and workshop of selected individuals. The top six were: Effect of forestry practices on the environment; loss of forest from fire insects and diseases; forest land alienation due to poor comprehensive land-use planning and a reliance on single-use rather than multiple-use management; uncertain future wood supply; inadequate understanding of intensive forest management practices; improve and further develop legislation and policy relating to a number of issues such as land tenure, private woodlots, control over domestic cutting and government funding in forestry.

Number 12 was: Inadequate communication and education within the forestry sector, and between the forestry sector and the general public.


Convenor: Dr. G. Beanlands, School for Resource and Environmental Studies, Dalhousie University, Halifax; Session Chairperson, K. Storey, M.U.N., M. Roy, Fisher Institute.

High level workshop of Provincial Directors and Assistant Deputy Ministers reaching consensus that the Province needs a comprehensive land use policy.

Table E.NF.2. Some specific land use issues in Newfoundland.

<table>
<thead>
<tr>
<th>Issue/Reference/Significance</th>
<th>Problem in Brief</th>
<th>Higher Education Involvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spruce Budworm (Poole et al., 1981) Regional</td>
<td>Aerial spray application with chemicals become a widespread public issue.</td>
<td>Chairman of Royal Commission Principal of Sir Wilfred Grenfell College, M[U.N.</td>
</tr>
<tr>
<td>Herbicide Use (Roy, 1983) (Gov't Hfld. et al., 1986) Regional</td>
<td>Preparing use of herbicides in silviculture operations becomes a widespread public issue. Required to go through EIS process.</td>
<td>Environmental groups with large academic membership express concern.</td>
</tr>
<tr>
<td>Main River Road and Bridge (Dunster, 1987) Regional</td>
<td>Proposed road and bridge river area with potential World Heritage values</td>
<td>Environmental groups with large academic membership express concern.</td>
</tr>
<tr>
<td>Pine Marten (Tucker, 1988) Regional</td>
<td>The effects of forest harvesting on pine marten in western Newfoundland. Harvesting plans required to go through EIS process.</td>
<td>Environmental groups with large academic membership express concern.</td>
</tr>
</tbody>
</table>
Table E.Tas.1. Some generic land use issues in Tasmania.

<table>
<thead>
<tr>
<th>Document/Higher Education Involvement</th>
<th>Issue/s</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land reserved in Tasmania for nature conservation (Felton, 1978)</td>
<td>How much land should and can be set aside for nature conservation.</td>
</tr>
<tr>
<td>Animal damage to forest seedlings (National Parks and Wildlife Service of Tasmania, 1979)</td>
<td>Report to the Parliament of Tasmania. The committee highlighted several land use conflicts and recommended that small forest reserves be established by the Forestry Commission to protect and conserve unique forest systems and endemic species.</td>
</tr>
<tr>
<td>Forest Industry Strategy for Tasmania: Protecting Jobs and Forests (Tarlo and Miller, 1985)</td>
<td>Report by the Australian Conservation Foundation and Tasmanian Conservation Trust proposes solution “is the negotiation of a forest industry plan using the Federal Government's established industry planning mechanisms.” As a means to resolving the competing demands on Tasmania's forests.</td>
</tr>
<tr>
<td>References list six documents from the University of Tasmania, three from Centre of Environmental Studies, three from Centre for Regional Economic Analysis.</td>
<td></td>
</tr>
<tr>
<td>Timber Rights in Tasmania Problems and Opportunities (Pearse, 1987)</td>
<td>Outlines weaknesses with the present licensing system; statutory framework is fragmented and incoherent; structure of timber rights unbalanced, rights and responsibilities ill-defined, best use of timber impeded, regulations inhibit adaptation to changing circumstances.</td>
</tr>
</tbody>
</table>

Table E.Tas.2. Some specific land use issues in Tasmania.

<table>
<thead>
<tr>
<th>Issue/Reference/Significance</th>
<th>Problem in Brief</th>
<th>Higher Education Involvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Franklin Dam Case (Coper, 1983) (Green, 1981) National/International</td>
<td>Claimed to be perhaps the most important constitutional law decision since the creation of the federal system of government in Australia. Commonwealth of Australia (anti-dam) vs. State of Tasmania (pro-dam) under the World Heritage Properties Conservation Act 1983. Result: No dam was built.</td>
<td>Dr. R. Jones organized the United Tasmanian Group (UTG) over the Lake Pedder issue changed Australian Conservation Foundation to a lobby group. Dr. N. Saunders - Green Politician. No Dams.</td>
</tr>
<tr>
<td>Commission of Inquiry into the Lemonthyme and Southern Forests (Helsham et al., 1988) (Gee and Waterman, 1981) National</td>
<td>Commonwealth initiative to determine if there are qualifying areas under the World Heritage Properties Conservation Act 1983 in the Lemonthyme and Southern Forest. State refused to cooperate with inquiry initially but later did cooperate. Particularly Tall Eucalypt forests.</td>
<td>University of Tasmania Dr. J.B. Kirkpatrick, Geography Dr. A.M.H. Richardson, Zoology Dr. P.A. Tyler, Botany Engaged by Commission as consultants. Several others from Australian National University Forestry hired as consultants. Drrs. R.H. Green, W.D. Jackson, J.B. Kirkpatrick, A.R. Oliver, A.M.H. Richardson, and P.A. Tyler called as witnesses.</td>
</tr>
</tbody>
</table>
A failed joint venture between Canadian Noranda Forest Products Inc. and Australia’s North Broken Hill Holdings Ltd. due to environmental standards.

Dr. H. Bloom, professor emeritus chemistry, University of Tasmania, the developers "seemed to regard Tasmania as a bunch of ignorant islanders."

Table E.AK.1. Some generic land use issues in Alaska.

Document/Higher Education Involvement


Dr. G.W. Rogers, state co-chairman, March 1976; Commissioner April 1976-June 1979

Dr. L.L. Selkregg, member of the Advisory Committee

Alaska Resources Development Issues of the 1980's (Morehouse, 1984)

A policy analysis compendium by 5 academics, four with the University of Alaska, One with the University of California.

Environmental Issues (Weeden, 1984)

Dr. R.B. Weeden is professor of resource management at the University of Alaska-Fairbanks. (Chapter to book listed previously)

Statewide Natural Resources Plan Appendix 1 Detailed Issues and Policies (Alaska Dept. of Natural Resource, 1982)

In describing the roots of contemporary Alaska environmental issues, Weeden notes four persistent themes: 1. familiar polarity of conservation vs. economic growth 2. Colonialism belief of frontier people being exploited by outside interests 3. Rural vs. urban Alaska 4. Anti-government. He discusses air quality, water quality, care of landscapes, forest practices, off-road vehicle regulation, protection of wildlife and fisheries, wilderness management and others.

Statewide issues on agriculture, fish and wildlife habitat, forestry, recreation, etc. Two major issues in forestry: 1. Economic development and diminishing land base 2. Forest management, protection, coordination, and technical assistance.

Table E.AK.2. Some specific land use issues in Alaska.

Issue/Reference/Significance Problem in Brief Higher Education Involvement

State Lands (Alaska Dept. of Natural Resources, 1987) National The territorial and statehood land grants provided Alaska with a potential land entitlement of between 148 million and 162 million acres. The land selection process was critical. Unknown

Native Land Claims (Jull, 1986) National Pressed by the trans-Alaska pipeline project outstanding native land claims reached settlement through ANSCA in 1971. Unknown
<table>
<thead>
<tr>
<th>Conservation Lands (Cahn, 1982) National</th>
<th>Section 17(d)(2) of ANSCA set aside 80 million acres of public lands to be studied for possible establishment as national parks, wildlife refuge, national forests, or national wild and scenic rivers. Resulted in ANILCA 1980.</th>
<th>Academics participating in public debate through environmental lobby groups.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Susitna Valley Forestry (Alaska Dept. of Natural Resources, 1988; Phipps, 1988) Regional</td>
<td>Proposed timber sale in Susitna Valley generated widespread public comment. As a result an inter-agency planning team and a citizen’s advisory committee were formed.</td>
<td>Academics participating in public debate through environmental lobby groups.</td>
</tr>
</tbody>
</table>
Table F.1. Enrolment statistics for period 1896 to 1987.

<table>
<thead>
<tr>
<th>Year</th>
<th>Memorial University of Newfoundland</th>
<th>University of Tasmania</th>
<th>University of Alaska - Fairbanks</th>
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</thead>
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Land Grant Status

- 1922-23: 15
- 1923-24: 52
- 1924-25: 59
- 1925-26: 72
- 1926-27: 73
- 1927: 83
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- 1930: 131
- 1931: 144
- 1932: 121
- 1933: 152
- 1934: 164
- 1935: 193
- 1936: 200
- 1937: 220
- 1938: 291
- 1939: 268
- 1940: 310
- 1941: 244
- 1942: 157
- 1943: 80
- 1944-45: 77
- 1945-46: 149
- 1946-47: 338
- 1947-48: 323
- 1948-49: 330
- 1949-50: 330
<table>
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<tr>
<th>Year</th>
<th>Memorial University of Newfoundland</th>
<th>University of Tasmania</th>
<th>University of Alaska - Fairbanks</th>
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<td>34.6</td>
<td>49.3</td>
<td>1.4</td>
</tr>
<tr>
<td>1970</td>
<td>14.0</td>
<td>564</td>
<td>40.3</td>
<td>11.4</td>
<td>144</td>
<td>12.6</td>
</tr>
<tr>
<td>1980</td>
<td>8.8</td>
<td>16.0</td>
<td>1.8</td>
<td>7.4</td>
<td>43.4</td>
<td>5.9</td>
</tr>
<tr>
<td>1985</td>
<td>2.1</td>
<td>38.9</td>
<td>18.5</td>
<td>6.7</td>
<td>61.8</td>
<td>9.2</td>
</tr>
</tbody>
</table>

Example: Newfoundland 1940-50 General Population 1940 = 320, 1950 = 340; therefore population change is 340/320 - 1 = 6.3.
Relative rate of change = student pop increase/general pop increase = 60.0/6.3 = 9.5.

I.e. Student population grew 9.5 times the rate of general population for the same period.

Table F.5. Percent of the total general population enrolled at M.U.N., U of Tas., U.A.F. for selected years between 1940 and 1985.

<table>
<thead>
<tr>
<th></th>
<th>Newfoundland M.U.N.</th>
<th>Tanzania U. Tas.</th>
<th>Alaska U.A.F.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1940</td>
<td>250/320,000</td>
<td>0.08</td>
<td>310/73,000</td>
</tr>
<tr>
<td>1950</td>
<td>400/340,000</td>
<td>0.12</td>
<td>310/129,000</td>
</tr>
<tr>
<td>1960</td>
<td>1400/458000</td>
<td>0.31</td>
<td>920/226,000</td>
</tr>
<tr>
<td>1970</td>
<td>9,300/520,000</td>
<td>1.79</td>
<td>3,650/300,000</td>
</tr>
<tr>
<td>1980</td>
<td>10,800/508,000</td>
<td>1.90</td>
<td>3,760/402,000</td>
</tr>
<tr>
<td>1985</td>
<td>15,000/580,000</td>
<td>2.59</td>
<td>4,600/523,000</td>
</tr>
<tr>
<td></td>
<td>+ T.S.I.T.</td>
<td></td>
<td>+ U.A.A.</td>
</tr>
<tr>
<td></td>
<td>8,524/447,000</td>
<td>1.91</td>
<td>8,956/523,000</td>
</tr>
</tbody>
</table>

Doesn't subtract small foreign student's numbers.
APPENDIX G. TEACHING: COURSE DESCRIPTIONS FOR NEWFOUNDLAND, TASMANIA, AND ALASKA.

Table G.1.a. Course descriptions Memorial University of Newfoundland 1988-89.

ARTS
Economics (5 profs., 4 asso. profs., 2 assistant profs., 2 lecturers). B.A. (44 courses) No graduate courses.

2070, 3070 The Structure and Problems of the Newfoundland Economy An analysis of the structure of the economy of Newfoundland. Current economic issues and problems in Newfoundland will be studied.

4010 Economics of development in Less Developed Countries A problem and policy approach to the economics of development, with emphasis on the issues of poverty, inequality and unemployment. General economic principles, theories and models are examined in the context of less developed economies, and global, institutional and structural implications are drawn.

4011 Economic Planning and Development The examination of issues in the theory and practice of planning, principles of plan implementation, incentives in a planned economy and models of planning. Alternative approaches to planning are considered, e.g., Traditional Central Planning, Indirect Financial Planning, Indicative Planning, and Economic Development Planning.

4070 Forestry Economics An examination of the theoretical and empirical literature on the economics of forest use.

GEOGRAPHY (7 profs., 12 asso. profs., 5 assist profs.) B.A., B.Sc., M.A., M.Sc. (73 undergrad courses, 30 graduate courses)

2490 The Newfoundland Space Economy An examination of the economic geography of Newfoundland and Labrador designed to provide a spatially oriented view of the socio-economic structure of the province.

3140 Biogeography The application of ecological concepts to the study of the spatial variations in the distribution of plants and vegetation. Laboratory work emphasizes terrestrial flora of Newfoundland and plant domestication.

3225 Mapping for Field Scientists An examination of the principles and practices of modern ground and aerial surveying for solving problems likely to be encountered by field scientists.

3325 Natural Resources An introduction to the concepts of natural resources, environment and conservation; the nature and distribution of natural resources; methods of use, allocation and development of natural resources and the role of various physical, social, economic, political and technological factors influencing decision-making about resources.

3400 Lands and Seas of the Northern North Atlantic A comparative study of the marginal lands and seas of the Northern North Atlantic parts of Eastern Canada including Newfoundland and Labrador, Greenland, Iceland, parts of Scandinavia and the British Isles) with emphasis on the history and ecology of population, settlement and resource use.

4170 Advanced Biogeography Analytical and regional biogeography with emphasis on the terrestrial fauna. Laboratory work concerned with the distribution of land animals of Newfoundland.

4320 Regional Development Seminar Preparation of papers on various aspects of development, their presentation and discussion.

4400 Geographical Analysis of Resources The geographic study of contemporary North American problems and issues in resources and their management. Emphasis will be placed on one or more of: air and water quality issues; lands and forest resources; energy resources; coastal zone resources. A number of substantive areas in resource analysis will be considered, including resource appraisal, landscape evaluation, and environmental impact assessment.

4410 Research Seminar in Resources This course offers the opportunity to undertake advanced work in a number of resource sectors such as energy, fisheries, forests, lands, air and water. The emphasis will be on learning through experience. Students will be expected to initiate and complete suitable research projects in close consultation with faculty involved.

6203 Economic Geography IV: Land Use Pattern Analysis

6250 Conservation of Natural Resources
HISTORY (8 profs., 16 asso. profs., 9 assist. profs., 1 lecturer) B.A., M.A., Ph.D. (83 courses, 25 graduate)

3110 History of Newfoundland to 1815
3120 Modern Newfoundland since 1815 The establishment and development of political institutions, changes in economic structure and the growth of populations.

3660 The Scientific Revolution The change from the Aristotelian-Ptolemaic to the Newtonian world view with special emphasis on the work of Copernicus, Kepler, Galileo, Descartes and Newton.

NEWFOUNDLAND STUDIES (minor for B.A.) A multi-disciplinary Minor programme in Newfoundland Studies is offered to candidates for the Bachelor of Arts degree. The objective of the programme is the study of Newfoundland society and culture through a variety of disciplinary approaches rather than the concentration upon a single discipline.

PHILOSOPHY (5 profs., 7 assoc. profs., 1 assist. prof.) B.A., M.A. (52 courses, 12 graduate)

3400 Political Philosophy Leading philosophical ideas concerning the origin and justification of political institutions.

POLITICAL SCIENCE

3540 Principles of Public Administration An outline of major theoretical concepts in the field of public administration. The emphasis is on organization theory and practice, administrative decision-making, and organization development. Usually run as a seminar course. This course is relevant to any student contemplating a career in public employment.

3710 Intergovernmental Relations in Canada (I.) Federal constitutional structure: its development and current dynamics. Recent federal-provincial bargaining in the following issue areas: official languages; a charter of human rights; constitutional amendment; federal and provincial legislative power; and reform of the Senate and Supreme Court. (II*) The present and future status of Quebec.

3730 Introduction to Policy Analysis This course provides a broad survey of existing frameworks for the study of public policy. Theories purporting to explain policy outcomes in terms of ideas and institutions will also be examined, as well as operational processes of policy implementation and evaluation.

3741 Public Administration in Canada Introduction to public administration, history of the public service in Canada, an examination of the structure and functioning of contemporary federal and provincial governments. Topics covered include cabinet organization, financial and personnel management, collective bargaining, and bilingualism.

3780 Newfoundland Politics A study of the political process in Newfoundland. Topics may include electoral behaviour and attitudes, the party system, leadership styles, the consequences of federalism, and public administration.

4310 Comparative Federalism This course will examine theories of federalism along with the development and operation of federalism in selected nation states.

4401 Research Seminar in Newfoundland Political Development Students will participate in research projects on aspects of political change in Newfoundland: voting patterns, community participation, structural reform, etc.

4730 Public Policy in Newfoundland A study of public policy in Newfoundland. Examination of the formation, implementation and impact of policies in one or more of the following areas: fisheries, resources, industrial development, agriculture, social policy.

4790 Policy Analysis in Canada A study of the dynamics of policy-making in the social sector. Attention is directed to problems relating to health, welfare, criminal justice and corrections, native peoples, housing and immigration.

6610 Newfoundland Politics

SOCIOLOGY (4 profs, 9 asso. profs., 2 assist. profs., 1 lecturer) B.A., M.A., M. Phil. 69 undergraduate courses, 12 grad. courses
2110 Economy and Society Examines the role played by economic conditions in social life, reviews the historical evolution and present nature of socio-economic systems, and explores various theoretical issues such as materialist conceptions of society and the impact of technology.

3030 Political Sociology An introduction to the sociological foundations of political life. Topics to be examined include voting behaviour, comparative power systems, ideologies, mass movements, parties, voluntary associations, and bureaucracies. Attention is given to the concepts of class, status, command, power, authority, and legitimacy.

SOCIOLOGY-ANTHROPOLOGY INTERDEPARTMENTAL STUDIES

S/A 2230 Newfoundland Society and Culture The Sociology and Anthropology of the Island of Newfoundland.

S/A 3317 Oil and Society An examination of the sociology of the Western oil industry and of the social and cultural implications of oil activities for those regions in which they occur. Particular attention will be paid to North Atlantic societies: Scotland, Norway and Atlantic Canada.

S/A 4091 Oil and Development An advanced seminar which will consider some selected topics dealing with the petroleum industry and its implications for economic development and social change. A comparative approach will be taken, using material from developed, underdeveloped and intermediate regions of the world.


2360 School and Society An examination of the role of the school in society. An introduction to the historical and social forces which have influenced the structure and processes of schooling, with special reference to Newfoundland education. A consideration of themes relevant to the study of the school in society. A critical discussion of selected issues and trends in education.

3170 Foundations of Science Education A treatment of the philosophical, psychological, sociological and historical foundations of Science and Science education.

3171 An Introduction to the Teaching of Science An introduction to current trends in Science curriculum and instruction in the secondary school.

3277 The Teaching of Environmental Science A course designed to familiarize students with current methods and materials for teaching environmental science from K to 9. This course will include instruction and practice in strategies appropriate to teaching environmental science through classroom and field experiences. The focus is on strategies for developing students' awareness of and knowledge about living and nonliving resources of the environment. Regular outdoor field activities will be part of the course.

A6550 Organization and Administration of Further Education

F6108 Critical Thinking in Teaching

FACULTY OF BUSINESS ADMINISTRATION (5 profs., 9 assoc. profs., 14 assist. profs., 5 lecturers) B.Com., M.B.A. 59 under., 33 grad. courses

7301 Management of Not-for-Profit and Public Organizations The course is designed to examine the appropriateness of using business administration principles, concepts, and techniques in organizational settings other than business corporations. Students will be acquainted with the application of business administration approaches to managing such organizations as: voluntary associations, co-operatives, government-owned business enterprises, government agencies and commissions, regulatory agencies, and educational and health care institutions.

89313 Natural Resource Management Graduate course. This course takes a "strategic management" approach to topics of natural resources and policy. An integral part of the approach taken involves the application of economic methodology to renewable and nonrenewable resource management problems with a view of assessing existing and alternative management policies. (5 students in 1989)

SCHOOL OF PHYSICAL EDUCATION (3 profs., 6 asso. profs., 2 assist. profs.)
Outdoor Activity  Theory and practice of specific outdoor skills in canoeing, kayaking, kayak cohnstruct, orienteering, backpacking, lightweight camping, excursion camping and survival.

Camp Administration and Programming Organization of residence and mobile camps, camp ownership, site, property, buildings, health and safety, staff recruitment, equipment, budget, programming - operation and evaluation.

FACULTY OF SCIENCE
BIOLOGY (12 profs., 20 assoc. profs., 8 assist. profs.) B.Sc., A.Sc., Ph.D. 67 undergraduate courses, 34 graduate courses

Summer Course for High School Teachers An intensive summer course presenting high school teachers with a summary of current thinking in selected areas of the Biological Sciences. To be taken only in conjunction with Education 4272.

Boreal Flora The identification of the terrestrial plants (vascular plants and bryophytes) of Newfoundland and Labrador. Various aspects of reproduction or floral biology, and the use of dichotomous keys will be covered.

Boreal Ecology A study of the principal features of terrestrial ecosystems, with emphasis on the boreal region.

Applied Animal Biology The integration of the biological and other sciences in such complex fields as insect control, pollution and public health, wildlife resources, fisheries, and aquaculture.

Internship in Forestry or Agriculture The course is an external applied laboratory where a student works with professionals on a problem or problems in forestry or agricultural research. Co-operating agencies may include Environment Canada, Agriculture Canada, and Newfoundland and Labrador Department of Forestry. The student will have a supervisor within the department and one in the co-operating agency and will be expected to write a scientific account detailing the particulars of the work experience. The arrangements for the position must be agreed upon prior to registration for the course and have the permission of the Head. Enrolment will be dependent upon the availability of suitable positions and will be limited to the students in the Honours Program. This course can be done in any semester and carries one credit.

Topics in Wildlife Biology Graduate course.

Ecology of Newfoundland Graduate course.

Effect of Organic and Inorganic Pollutants on Biological Systems Graduate course.

Principles of Control Pest Organisms Graduate course.

EARTH SCIENCES (14 profs., 10 assoc. profs., 13 assist. profs., 18 others) B.Sc., M.Sc., Ph.D. 49 under., 39 grad. courses

Natural Resources and the Past The evolution of Homo sapiens, civilization, the industrial revolution, and contemporary technology is traced in terms of the use of, and the constraints provided by, the natural resources and environment of planet Earth.

Natural Resources and the Future Documentation of the effects of an increasing population of Homo sapiens on Earth's environment and finite resource stock of fossil and nuclear fuels, minerals, and topsoil will be reviewed together with recent strategies for survival in the coming increasingly post-industrial society.

Engineering and Environmental Geology Basic concepts in soil, rock and fracture mechanics; classification of soil, rock and rock masses; surface water and groundwater problems. Special topics include the engineering and environmental aspects and issues of (1) slope development and underground excavations in soils and rocks, (2) the development of hydroelectric and irrigation projects, (3) the nuclear fuel cycle, and (4) resource developments in sensitive terrains.

PSYCHOLOGY (12 profs., 29 assoc. profs., 10 assist. profs., 1 lect., 4 Hon. Instr.) B.Sc., M.Sc., Ph.D. 69 under., 39 grad. courses

Attitudes and Social Cognition

Social Psychology: Social Cognition

The Psychology of Thinking

Animal Behaviour II An examination of the behaviour of animals with particular emphasis on evolution and ecology. Topics include behavioural genetics and evolution, reproductive strategies, social behaviour, habitat selection, territoriality, foraging behaviour, and other topics in Biology and Psychology.
6351 Behavioural Ecology and Sociobiology Graduate course. (Same as Biology 6351)
6355 Field Course in Animal Behaviour Graduate course (Same as Biology 6355)
6400 Communication and Social Influence Graduate course

FACULTY OF ENGINEERING AND APPLIED SCIENCE (26 profs., 14 assoc. profs., 13 assist. profs, 12 others) B.Eng., M.Eng., Ph.D. 159 undergraduate courses, 89 graduate courses

1102 Knowledge, Values and Technology A study of various methods for achieving rational objectives, beginning with the most general appraisal of rational decision-making in an informal study of inductive and deductive reasoning, proceeding to a study of the principles involved in scientific methods and considering finally some ethical problems that are implicit in any human activity.

3132 Man and The Biosphere A study of current ideas on evolution, diversity of life forms, biological utilization of energy, reproduction and variation. The course will explore the interaction of organisms with the environment in the context of man and the biosphere.

5132 Environmental Conservation and Management An analysis of local ecosystems, with emphasis on the description, measurement and management of the abiotic and biotic factors critical to conservation, sustained use and enjoyment of our natural resources and environment.

5141 Economic and Social Impact of Major Projects The course will include general methods of assessing the impact of major projects and the problems associated with the identification and valuation of costs and benefits. While the emphasis will be on the economic costs and benefits, broader social implications will be considered. A number of specific projects will be studied in greater detail.

6101 Assessment of Technology Group seminars, each group evaluating the role of Engineering Technology in society, focusing on the sociological and environmental effects of major projects or developments in Newfoundland.

8715 Environmental Engineering Introduction to water and waste treatment; distribution and collection systems; management of solid wastes; engineering solutions to environmental problems; Relevant laboratory exercises.


DEPARTMENT OF FORESTRY (1 prof.) pre-forestry arrangement with U.N.B. 6 undergraduate courses

F2020 Introduction to Forestry I A study of trees as a basis for forestry and forest related disciplines. Involves identification features, use of keys, forest zones of world, forest regions of North America. Introduction to forest stand composition and sites, mechanisms of tree growth, principles of classification and nomenclature and the main silvical characteristics of the major tree species of Eastern Canada.

F2021 Introduction to Forestry II An introduction to forest and other vegetation measurements, forest surveying measurement of standing trees, tree volumes, cord measure, cubic volumes, scaling practices, cruising and vegetation sampling, growth measurements and predictions; use of aerial photographs; structure and functioning of forest ecosystems and manipulation of these for man's use; ownership, control and national importance of the forest resource.

F2040 Forest Measurements A first course in forest measurements. Topics include measurements of individual trees, calculation of tree volumes, forest inventory, measurement of forest products and of tree and stand growth.

F2041 Forest Biometry Lectures and problem assignments related to sampling and experimental designs for the collection of forest resource data, and to graphical and statistical analysis of such data.

F2220 Forestry Meteorology I An introduction to basic macro-physical principles of weather processes; world and regional climatic classifications; Instrumentation and measurement methods of weather elements; data processing, forecasting and services available in Canada.
F2221 Forest Meteorology II Application and relevance of the macro-physical principle of weather and climate to the micro-environment of the forest community; the interaction of both the forest and the environment; value of these interactions to man's use; the importance the water cycle plays in this system.


Geography 2302 Issues in Economic Geography Basic issues and ideas in economic geography. The development of a regional economy will be related to underlying economic, cultural and physical factors.

History 3120 Modern History Science 1815 The establishment and development of political institutions, changes in economic structure and the growth of populations.

Sociology 2120 Technology and Society An examination of the role of technology in society. The course also explores the ideological functions of science and technology in advanced industrial societies as well as the question of "the domination of nature".

Biology 2041 Modern Biology and Man II A course for students, in their second year and beyond, not intending to major in Biology. The course emphasizes basic modern biology and its relation to man. Topics will include energy, resources, plant growth, photosynthesis, genetics, heredity, genetic engineering, cloning, ecology, evolution, population, pollination, animal and plant diversity, pest control, food production and fisheries.

Table G.2.a. Course Descriptions, University of Tasmania, 1988-89.

ARTS

History (2 profs., 3 readers, 3 senior lecturers, 1 senior tutor, 6 hon. research assoc.)
Philosophy (1 prof., 1 reader, 3 senior lecturers, 1 lecturer, 3 hon. research assoc.)
Political Science (1 prof., 6 senior lecturers, 3 lecturers, 1 senior tutor, 1 tutor)

RPC214 B.3 Science, Technology and Politics An examination of the relationship between science, technology and education on the one hand and political and social choices and decision-making on the other.

RPC218 B.7 The Politics of Development An examination of major issues in relation to world poverty (or 'underdevelopment') in terms of their international dimensions and in a variety of local third-world contexts. Alternative theoretical frameworks for explaining 'underdevelopment' will be compared, linked to issues such as economic growth, industrialisation, rural development, foreign aid and investment, food, population and environment, cultural aspects of modernisation, health and education. Case studies will be offered relating to a variety of countries, particularly in the Asian-Pacific region, while consideration will be given to Australia's role in relation to third world countries.

RAD206 B. Public Policy Process 1 A course to provide understanding of the primary aim of all governmental activity: setting agendas, priorities and directions for the future. Since policy analysis involves the study of interaction between political and administrative actors, as well as community interest groups, a process orientation is adopted. The course involves a critical evaluation of several theories of policy process and serves as foundation unit for Public Policy Process 2.

RAD209 E. Public Policy Process 2 This course builds on concepts in policy analysis introduced in the prerequisite unit. Emphasis is placed on the dynamics of policy change, implementation problems and the evolution of policy performance.

Sociology (1 prof., 3 senior lecturers, 3 lecturers, 1 tutor)

RSY221 Unit 16 Knowledge, Science and Society A critical review of discussions of the social bases of rationality and its relationship to power. The unit examines two case studies: the relation between scientific knowledge and wider social processes; and everyday 'practical reasoning' as discussed in the work of interactionist sociologists.

RSY230 Unit 20 Occupations and Professions The unit locates occupations in organisational contexts and examines processes of occupational change, including professionalisation, bureaucratisation, and automation and deskilling. There will be concentrated study of specific occupations, for example, law, medicine, education, the military, printing, vehicle assembly, and mining.
CENTRE FOR EDUCATION

EED233  Science in Education 2  The emphasis of units given in Years 2 and 3 is mainly in the area of 'natural history and ecology' and 'humans and their environment.' For instance a series of half-year units is offered which is intended to familiarise students with local geology, fauna and flora. The second theme deals with the study of ancient and modern humans and their dependence on resources and environment. All the units contain experimental components and all are chosen with a consideration as to their appropriateness for providing an academic background suitable for infant and primary school teaching.

EED237  Living with Technology: Resources  This is an adaptation of the Open University's Foundation Course in Technology T101. The unit deals with the theme RESOURCES. Two examples are considered in depth, copper and oil. In order to explore the question 'Are resources running out and if so what can we do about it?' attention is directed towards anticipated demand, need for artefacts, recycling problems, legal and economic factors. This is an interdisciplinary unit and attention is paid to local problems.

EED833  Policy-Making and the Management of Change in Education  The subject begins with a comprehensive examination of a variety of models and other conceptual tools of value in policy analysis. Consideration is given initially to the broad range of policy activity by governments. Illustrations are then provided of policy-making in education in a variety of settings. Other topics include strategic planning and strategies for the management of change, with further illustration in the field of education.

EED452  Environmental Studies in Education  A series of lectures, seminars and practical work designed to assist teachers in the theory, skills and methods of environmental studies at early childhood, primary and secondary level. The subject will deal with: 1) Knowledge development in the sciences and other related areas. 2) Curriculum approaches including design, implementation and evaluation. 3) Practical aspects of field studies.

EED468  Rural Science in Education  Rural Science and Education is designed to help teachers interested in rural and general science to acquire a background of relevant knowledge and to develop skills and informed methods for teaching rural science in schools. Section 1 This section involves general principles of agriculture. It will be taught by a team of lecturers from the Faculty of Agricultural Science, Univ. of Tasmania. Section 2 Further background studies in this section will consider the management of natural resources. Personnel from the Department of Agriculture, Forestry Commission and Fisheries Development Authority will assist lecturers who will deal with the educational implications of the subject matter. Issues relating to the design and evaluation of curriculum materials for rural science in schools will be considered. Current practices and available resources will be outlined.

FACULTY OF ECONOMICS AND COMMERCE

Economics  (1 prof., 1 reader, 4 sen. lect., 6 lect., 4 tutors, 1 sen. res. fellow, 1 vis. lect., 1 res. fellow, 2 hon. res. assoc.)

CEC270  Agricultural Economics and Marketing

CEC370  Economics of Natural Resources  The application of economic analysis to questions about natural resource use, management and conservation. The exploitation of mineral and fish stocks, forests, water, and the environment, taking account of the physical and biological characteristics of these resources where appropriate. Examination of public policy issues: mineral taxation, the management of common property resources and the role of resources in economic development. Emphasis on the role of capital theory in analysing decisions concerning resource stocks.

SGG110  Human Geography for Economists  A broad range of topics in human geography is considered including: trends, balances and imbalances in world population and resources; factors influencing, and patterns in, the organisation of rural and urban space; and interactions between regions. These themes are integrated by a consideration of socio-economic inequalities at global, national and regional scales.

SGG206  Economic Geography for Economists  This unit comprises two compulsory streams - Industrial Geography and Transport Geography - and one further stream chosen from Population Geography, Social Geography, Geography of Asia and People and Environment.

FACULTY OF LAW  (1 Dean, 1 Head of Dept., 1 prof., 1 reader, 4 senior lecturers, 10 lecturers, 3 tutors)

LAW425 Environmental Law This course will look at how competing interests in land use and development between governments, developers and conservationists are resolved: how decisions are made and how they may be challenged; and what environmental duties and safeguards have been introduced by legislation. The course will also focus on some international environmental issues. Topics covered include access to the courts, environmental planning, environmental impact assessment, and environmental controls over major development, the world’s natural and cultural heritage, trans-boundary pollution and marine pollution.

FACULTY OF SCIENCE

Botany (1 prof., 4 readers, 2 lecturers, 2 senior tutors)

SBT304 Field Botany The course will include studies of marine and terrestrial systems.

Geography and environmental studies (1 prof., 1 reader, 6 senior lecturers, 3 lecturers, 3 senior tutors, over 30 staff)


SGG345 Rural Systems Spatial analysis of rural systems, with special reference to location theory, farming systems, rural settlement, current economic and social changes in the countryside, and the integrated management of rural resources.

SGG381 Environmental Impact Assessment and Decision Making Historical development of environmental impact assessment, ideological perspectives on the environment, the relationship of impact assessment and planning, techniques including EIA, cost benefit, risk assessment and social impact; the Tasmanian processes, and case studies.

Graduate Environmental Studies Prerequisites: Honours or four-year degree or equivalent

BESB11 Environmental Planning The role of traditional urban and industrial planning in the provision of environmental quality is explained and critically examined, and the extent to which the new practice of environmental planning has been both accepted and successful in overcoming deficiencies is assessed. On account of the population/resources problems faced at a global level, it is impossible to address the theory and practice of planning adequately without reference to human population pressures; thus, issues in demography, of population control, and patterns of resource consumption and distribution are covered in the unit. There are further additional considerations other than land use planning which relate to environmental decision-making, however, and the theory and practice of environmental impact assessment comprise the third major segment of this course.

BESB12 Resources, technology and Energy The course addresses some key environmental issues from the perspective of the physical and engineering sciences. The role of energy in society, including energy supply and demand, conventional and renewable energy, and energy conservation, is dealt with. Pollution control technology for reducing air, water and noise emissions are reviewed. Management of material resources such as minerals, water, or forestry in Australia and the Antarctic are covered briefly.

The aim of the course is to introduce students to the ‘technological fix’ approach and show how this must be integrated with social, biological, political, philosophical and future studies to achieve an holistic approach to environmental problem solving.

BESB13 Ecosystems The course has two main components. One is devoted to the biological aspects of populations (excluding human populations, which are a subject of BESB11 Environmental Planning). Included is a strong theoretical component in which the basic biological background to the functioning of plant and animal populations is studied, as well as the parameters critical to population growth. The second component concerns ecosystem theory, and progresses to the problems of managing populations and ecosystems. The emphasis here is not only theoretical but, in order to provide case study examples, puts students in touch with a range of persons involved in ecosystem and land management in Tasmania.

BESB21 Environmental Values The subject examines the political, sociological and philosophical aspects of contemporary environmental concern. Various developments in ethical philosophy are examined, as is the place of ‘environment’ in traditions of western political thought. The course then considers new social movement theory, the sociological base of support for environmentalist aspirations, environment policy-making process, environmental law, perceptions of growth, and phenomenologies of place.

Geology (1 prof., 3 readers, 4 senior lecturers, 2 lecturers)

Zoology (1 prof., 6 senior lecturers, 1 lecturer, 1 senior tutor)
SBZ160 Concepts of Biology SBZ160 is a prerequisite for second-year courses in agriculture, biochemistry, botany, microbiology and zoology. It covers basic principles common to all life science disciplines. Includes Managed Ecosystems - limiting factors, pests, control mechanisms, shifting cultivation in lowland tropics, irrigated systems (rice), tropical "forest" crops, temperate forest management, mixed farming, intensive production, orchard and vine crops, aquaculture.

SBZ1320 Animal Ecology This course develops a basic understanding of the principles and applications of animal ecology. One part deals with the subdisciplines and behavioural ecology and sociobiology, covering such topics as fighting and assessment of opponent; sexual selection and the evolution of mating systems; co-operation, helping and altruism. A second part covers the basis of descriptive ecology dealing with topics such as animal abundance and distribution; population dynamics; competition and predation; and community ecology. A third part deals with applied ecology and examines fire ecology; the harvesting and management of natural populations; the problems of introduction; extinctions.

FACULTY OF ENGINEERING AND SURVEYING (1 Dean, 1 Dir., 3 profs., 15 sen. lect., 12 lect., 2 tutors, 3 hon. res. assist., 5 part-time lect., 21 others)


FACULTY OF AGRICULTURAL SCIENCE (1 Dean, 1 prof., 3 readers, 5 sen. lect., 7 res. fellow., 16 hon. res. assoc., 1 sen. tutor, 8 others)

Table G.2.b. Course descriptions, Tasmania State Institute of Technology, 1988-89.

B1210B522 Agroforestry A study of the principles and techniques involved in maximising the combined value of tree crops and crops/animals grazing beneath. Prerequisite: Years 1 and 2 of Applied Biology major.

B1410LA3 Landscape Architecture A practical introduction to ecological principles, including an analysis of the principal systems comprising the ecosphere, concepts of habitat and niche, food webs, and the implications of human intervention.

ED310C807 Environmental Studies This unit is based in the field and integrates environmental elements from science, mathematics and social studies. The experience is based on a two day residential excursion.

ED310E810 Philosophy of Education: Social and Political Philosophy This unit provides a critical analysis of key social-political concepts related to educational theory, such as freedom, equity, disobedience, rights.

ED310EC60 Environmental Pursuits Philosophies of outdoor education in Tasmania, school programmes, camping facilities, organisation of camps.

MN110PA41 Public Administration This unit provides students with an understanding of political institutions and political ideologies and considers behavioural characteristics of Australian government and public policies.

MN110PP10 Public Policy Analysis This unit aims to provide a forum for discussion of the determination of contemporary public policy in Australia. It describes the role of theory in the analysis of public policy, the institutional framework within which public policy is analysed, implemented and evaluated, the role of mass media and the application of models to specific policy issues.

OB410PE11 Planning Project 1 This project focuses on the practical aspects of preparing a regional plan. The history, theories and current ideas and philosophies relating to regional planning are included with emphasis on the Tasmanian and Australian experiences.

OB410PE14 Planning Issues 1 In this unit issues and theories are covered which are of current concern to planners. Students are expected to lead in these discussions and debates.

OB410PE23 Planning Studies 2 The planning for the use of Natural Resources has been frequently on a short-term basis. This unit covers the theories and philosophies of planning concerned with the longer-term use of the natural resources. Environmental Impact Studies are introduced as well as management plans dealing with national parks, state reserves and local open space networks.
Policy making is a complex and often conflicting endeavour for both planning professionals and politicians. Case studies are used to help students work through the process of policy making. The evaluation of planning projects is covered in order to acquaint students with the end results of decision making both in a theoretical and practical sense.

The first part of this unit covers the ecological principles and systems used in environmental planning. The second part focuses on the concepts of Ekistics which attempt to integrate the natural processes with the cultural or man-made processes. Local case studies serve to complement the theory.

This unit examines relationships between the functions and structures of government in Australia and evaluates the advantages and disadvantages of centralisation and decentralisation.

### Table G.3.a. Course descriptions, University of Alaska (Fairbanks), 1988-89.

**COLLEGE OF LIBERAL ARTS**

**ALASKA NATIVE STUDIES (1 assoc. prof., 3 assist. profs.)**

- **ANS310** Alaska Native Corporations. An examination of Native corporation goals and methods as they implement the Alaska Native Claims Settlement Act and establish themselves within the larger political economy.

- **ANS415** Comparative Economic Development Processes: Applications for Native Alaska. Comparative examination of economic development processes in third and fourth world societies. Emphasis is placed on the identification of different economic development theories and practices, and on their applicability to socioeconomic conditions of Alaska Native people.

**ANTHROPOLOGY (3 profs., 3 asso. profs., 11 assist. profs.)**

- **Anth305** Comparative Political and Legal Systems. An examination of political systems and the law from a comparative standpoint. The primary focus will be on case studies drawn from non-industrial societies, developing nations, and parapolitical systems or encapsulated societies, such as native peoples in the U.S. Major areas of coverage will be political structures and institutions; social conflict, dispute settlement, social control, and the law; political competition over critical resources; and ethnicity.

- **Anth306** Economic Anthropology. This course addresses the fundamental issue of the relationship between economic and other social relations. The primary focus is on preindustrial societies because a central task of the course is to determine the relevance of formal economics to small-scale societies and developing nations. Included for study are such topics as exchange, formal and substantive economics, market economics, rationality, political economy, and the economics of development.

**GEOGRAPHY (1 prof., 1 assoc. prof., 1 assist. prof.)**

- **Geog302** Geography of Alaska. Regional, physical and economic geography of Alaska. Special consideration of the state's renewable and nonrenewable resources, and of plans for their wise use. Frequent class study of representative maps and visual materials.

- **Geog402** Man and Nature. The relationship of man with the land he occupies, study of the physical environment and human occupation of the world's major regions, the significance of cultural diversity, differing patterns of livelihood, settlement, and population change.

- **Geog405** Political Geography. Geographical analysis of the evolution, structure, internal coherence, and sources of strength of individual nation states, with emphasis on nations of the Pacific realm and Arctic periphery. Consideration of regional blocs, spheres of influence, and potential for international cooperation.

**HISTORY (2 profs., 2 assoc. profs.)**

- **Hist115** Alaska, Land and its People. A survey of Alaska from earliest days to present, its peoples, problems, and prospects.

- **Hist341** History of Alaska. Alaska from prehistoric times to the present.
PHYSICAL EDUCATION (2 Assist. profs.)

PE307 Techniques in Camping and Outdoor Recreation In-depth study of advanced skills and organizational techniques.

POLITICAL SCIENCE (2 profs., 1 assoc. prof., 3 assist. profs.)

PS210 Alaska Government and Politics A comprehensive introduction to the state's government and politics, including political history (as a territory and state), Constitution, political parties, interest groups, elections, public opinion, Governor, Legislature, Judiciary, administration; local government and public policy issues.

PS212 Introduction to Public Administration Theories and practice of public administration, especially as applied to federal agencies. Study of organization, planning, and decision making in implementing public policy.

PS263 Alaska Native Politics An introduction to the political development, organization, interests and activities of Alaska Natives; treatment of ethnic leadership issues, history of federal Indian policy, evolution of Native leadership, village and regional government, land claims, and community politics from the Alaska Native brotherhood to ANCSA to the Alaska Native Coalition.

PS403 Public Policy Discussion of the way in which the policy process works and how policy analysis is carried out. Examples of policy issues from recent cases, especially in Alaska.

PS 481 Geopolitics and the International Environment Relationship of the international environment (topography, demography, natural resources, technological change, and divergent patterns of economic development) and world politics.

SCHOOL OF MANAGEMENT

BUSINESS ADMINISTRATION (4 profs., 9 assoc. profs., 4 assist. profs., 2 lecturers)

BA160 Tourism Principles and Practices Forces which influence the international and domestic hospitality, leisure, travel, and recreation industries. Socio-economic models and measure of regional impact, demand, and supply.

BA303 Advanced Leadership Comprehensive analysis of leadership styles and functions applicable to formal organizations.

BA465 Tourism Destination Planning and Development Tourism resource characteristics, location, and market demand considerations. Analysis of development potential, planning processes and procedures, capital and personnel requirements, and tourism destination developments.

BA590 Administrative Policy The broad aspects of administrative policy and the major social, political, legal, economic, and international forces impacting on complex organizations. Development of an intuitive systematic scientific understanding of the design and use of formal systems for comprehensive long-range planning and policy formulation in large corporations.

ECONOMICS (2 profs., 3 assoc. profs., 5 assist. profs., 2 visiting assist. profs.) M.S. in Resource Economics

Econ137 The Alaskan Economy A broad introductory examination of economic problems in Alaska; analysis of historical trends and current patterns of economic growth; particular emphasis on present and future alternative economic policies, and their potential impacts.

Econ235 Introduction to Natural Resource Economics Introduction to microeconomic principles and their application to natural resource issues. Specific topics include supply, demand, marginality, optimality, elementary production economics, economic rent, and comparative advantage. These principles are applied to agency budget allocation decisions, multiple use, resource valuation, conservation, market failure, and public outdoor recreation problems.

Econ335 Intermediate Natural Resource Economics Extension of concepts developed in Econ 235, using a higher level of economic analysis in examining natural resource issues. Specific topics include welfare economics and economic efficiency concepts, benefit/cost analysis, resource allocation overtime, resource taxation, common property problems, externalities, public goods, valuation of non-market resources, and land use planning issues.
Econ 635, 636  Resource Economics  The theory, methods of analysis, and current literature of natural resource economics and policy. Topics include socially optimal intertemporal use of resources, common property resources, externalities, property rights, public goods, benefit-cost analysis, amenity values and other non-market resource services, and environmental policy.

RURAL COLLEGE

DEPARTMENT OF BEHAVIORAL SCIENCES AND HUMAN SERVICES (7 profs., 6 assoc. profs., 8 assist. profs., 4 instructors)

PSY 380  Human Behavior in the Arctic  A study of human behavior as it relates to cold climates. Emphasis will be placed on living systems in Alaska and behavioral characteristics that have to do with stress and isolation. Material will include structural design as related to behavioral research.

PSY 638  Social Policy and Social Change  Analysis of social policy issues related to community health, empowerment, and change will lead to an understanding of how spontaneous and planned social change takes place. Particular attention will focus on issues in the development of new settings in cross-cultural and rural contexts.

SWK 320  Rural Social Work  Preparation for practice in rural areas where there is a need for more than one delivery system, an understanding of rural customs, and a scarcity of resources. Emphasis will be on preparation for practice nationally with unique features of Alaska incorporated at key points.

SOC 201  Social Problems  A study of the major problems facing contemporary society, including analysis of factors giving rise to the problems. Emphasis is given to cross-cultural differences regarding the types and extent of problems that exist in the ethnic subcultures in Alaska.

SOC 301  Rural Sociology  Application of the principles of sociology to the study of rural social systems in the U.S. and abroad. Topics covered include: societal processes, changing values, economic development, demographic change, agrarian reforms, planned change, and rural community networks. Part of the focus will be on the rural communities of Alaska.

SOC 345  Sociology of Education  Examination of the ways in which social, political, and economic forces influence what happens in schools with focus on how the organization of schools affects what teachers can do in the classroom, how peer groups affect student learning, and how national political and economic concerns determine what becomes an educational issue.

SOC 406  Environmental Sociology  The study of the interaction between society and physical environment including the ecological complex - population, organization, environment, and technology - which is used as the analytical framework to study the societal-environmental interaction.

EDUCATION (3 profs., 10 assoc. profs., 8 assist. profs., 7 instructors)

Ed 338  Education and Economic Development  An examination of both theory and evidence linking varied forms of education to economic growth and development. A comparative approach is utilized to explore similarities and differences between rural Alaskan regional development and systematic nation-building efforts in developing countries.

Ed 345  Sociology of Education  Examination of the ways in which social, political, and economic forces influence what happens in schools with focus on how the organization of schools affects what teachers can do in the classroom, how peer groups affect student learning, and how national political and economic concerns determine what becomes an educational issue.

Ed 462  Alaskan Environmental Education  Environmental concepts, motivational and discovery techniques, and practical skills for utilizing the environment inside and outside the formal classroom in all subject areas. Course content includes information on curriculum materials (K-12), interpretive and audiovisual aids facilities, environmental problem solving and applications of environmental education to situations from the public schools to summer campus, short courses, and workshops for individuals of any age.

Ed 611  Learning, Thinking and Perception in Cultural Perspective

Ed 612  Cultural and Philosophical Foundations of Education  Students will be introduced to the nature of philosophical inquiry and apply a philosophical perspective to examining assumptions inherent in cultural systems and culturally organized behavior. Education as a function of culturally organized behavior is based upon assumptions which are not always explicit.
Ed616 Education and Socio-Economic Change. An examination of social change processes, particularly in relation to the deliberate development of new institutions and resulting forms of new consciousness. Emphasis is placed on the role of education and schooling.

Ed618 Higher Education: Basic Understandings. Historical and philosophical foundations of higher education, both in America and abroad.

RURAL DEVELOPMENT (1 prof., 1 assoc. prof., 1 assist. prof., 2 instructors)

RD265 Perspectives on Subsistence in Alaska. Examines the socio-economic, cultural, legal and political dimensions of subsistence lifestyles in Alaska.

RD300 Rural Development and Rural Communities. A comparative and theoretical approach to the process of change and development in cross-cultural contexts, particularly in relation to their effects on rural communities.

RD450 Managing Community Development Projects and Programs

COLLEGE OF NATURAL SCIENCES

BIOLOGY AND WILDLIFE: (12 profs., 6 assoc. profs., 5 assist. profs., 1 instructor)

Biol103 Biology and Man. Introduction to the fundamental principles of biology; emphasis on their application to man in the modern world. Course is designed for non-science majors.

Biol104 Natural History of Alaska. Aspects of the physical environment peculiar to the north and important in determining the biological setting; major ecosystem concepts to develop an appreciation for land use and wildlife management problems in both terrestrial and aquatic situations.

Biol1478 Field Ecology. An intensive experience in the collection and interpretation of ecological data. The course consists of concentrated study for 10-12 days in early May. Students will engage in the design, execution, and analysis of field projects dealing with various aspects of ecology.

Biol1479 Ornithology Field Trip. Techniques of field ornithology, emphasizing identification of birds and bird-habitat relationships. The course consists of preparation during the spring semester followed by a field trip of 10-12 days in early May.

Biol1614 Grazing Ecology. The dynamics of herbivory, emphasizing the grazing process, and including mechanisms of feeding, feeding behavior, habitat and plant selection, physiological influences on feeding, plant and community level responses, plant defenses against herbivory and management of grazing systems.

Biol1618 Biogeography. Spatial and temporal geography of plants and animals; emphasis on environmental and historical controls of patterns of distribution.

Bot475 Plant Communities of Alaska - Field Course. A series of field trips to the plant communities of interior Alaska; emphasis on identification of vascular and non-vascular plants and the processes affecting the structure and evolution of Alaskan plant communities.


WF302 Fish and Wildlife Ecology and Management. Introduction to ecology and management of wildlife and fish populations. Identification, life history and management of Alaskan birds, mammals and commercial and sport caught fish.

WF304 Wildlife Internships. Programs designed to provide undergraduate students with practical experience in wildlife management in public or private agencies. Projects are approved by faculty member and supervised by professional agency staff.
WF401 Wildlife Management Techniques  Methods of collecting, analyzing and disseminating data, either for a research project or for implementing wildlife management plans. A brief discussion of the usefulness of a technique will precede its description or application. Techniques for determining sex, age, food habits, movements, distributions, reproductive history, physical condition, population size, and habitat status, for collecting, organizing and analyzing field observations, and for public information and education will be considered.

WF402 Advanced Wildlife Biology and Management  Explores and analyzes complex management situations involving predator-prey groups and groups of competing or otherwise interrelated species. Discussion of theory and issues in habitat and ecosystem management.

WF417 Wildlife Management: Forest and Tundra  Description of tundra and forest ecosystems including major groups of birds and mammals. Biological, economic, and political factors important in the conservation of major species.

WF615 Advanced Topics in Wildlife Management  Political, economic, administrative and ecologic aspects of wildlife management.

WF692 Graduate Seminar  Topics in fish and wildlife management explored through readings, talks, group discussions and guest speakers with a high level of student participation.

GEODESIC AND GEOPHYSICS (Geology: 4 profs., 4 assoc. profs., 4 assist. profs., 8 adjunct; Geophysics: 6 profs., 4 assoc., 2 assist, profs.)

Geos212 Geology of Alaska  An overview of the geology of Alaska for non-majors. Modern geologic processes in Alaska will be used as a basis for understanding past geologic evolution of the region. The origin and recovery of Alaska's petroleum and mineral resources.

SCHOOL OF MINERAL ENGINEERING
DEPARTMENT OF MINING AND GEOLOGICAL ENGINEERING (3 profs., 7 assoc. profs., 2 assist. profs., 1 instructor)

Min101 Minerals, Man and the Environment  A general survey of the impact of the mineral industries on man's economic, political, and environmental systems.


SCHOOL OF ENGINEERING
CIVIL ENGINEERING (6 profs., 4 assoc. profs.)

CE441 Environmental Engineering  Introduction to fundamentals of environmental engineering including theory and application of water and wastewater engineering practice. Conservation, quality, treatment, and distribution of water supply. Wastewater characteristics, collection, treatment, and disposal. Introductory information on solid waste management and air pollution control.

CE442 Environmental Engineering  Advanced topics in environmental engineering. Each of the following subjects will be allocated about an equal portion of time for topic coverage. Environmental law and health, air pollution, solid waste management, toxic and hazardous wastes, animal waste management, noise pollution, water quality modeling, wastewater collection systems, chemical/physical processes, theory of sedimentation, disinfection, biological processes, onsite treatment, sludge management, advanced waste treatment and other.

ES429 Ethics and Liability in Professional Practice  The professional, moral, ethical, and legal responsibilities of a professional in today's society and workplace.

EQS201 Environmental Protection  The study of pollution control and abatement with emphasis on air, water and land pollution; health protection; and environment impact. Other topics to be presented include pesticides, hazardous wastes, radioactive wastes, energy, population control, ecology and environmental law. This course will supplement and complement ALR 101 - Conservation of Natural Resources.
EQE604  Environmental Quality Evaluation  Topics of environmental impact statements, environmental law (local, state and federal), and environmental quality. Impact from projects of mining, highways, airports, pipelines, industrial development, water, wastewater and solid waste, and others - theoretical considerations and case studies.

SCHOOL OF AGRICULTURE AND LAND RESOURCES MANAGEMENT
DIVISION OF FOREST SCIENCES  (1 prof., 2 assoc. profs., 4 assist. profs.)

DIVISION OF PLANT AND ANIMAL SCIENCE  (1 prof., 5 assoc. profs., 5 assist. profs., 1 instructor, 3 research scientists)

DIVISION OF RESOURCES MANAGEMENT (2 profs., 2 assoc. profs., 2 assist. profs.)

ALR101  Conservation of Natural Resources  Consideration of natural resources including discussion of their biological and physical nature, social and economic aspects of use, conflicts of use, and alternative means for conservation.

ALR201  Processes of Natural Resources Management  An introductory course in natural resources management institutions and processes. Emphasizes public lands and resources, but considers private firms and native regional corporations as well.

ALR300  Internship in Natural Resource Management  Supervised programs designed to provide carefully selected upper division or graduate students with practical experience working with government units or agencies in natural resources management. Opportunities to apply theories and practical application, observe procedures and operations of the agencies, and become better prepared for professional employment.

ALR340  Natural Resources Measurements  Introduction to the techniques and instrumentations used in the measurement and inventory of natural resources. Measurements used by managers of land, timber, range, wildlife, water, and recreation resources will be discussed.

ALR350  Introduction to the Forest System  The physiological and ecological foundations for forest resource management. Forestry concepts involving soils, silvics, silviculture, fire, pathology, and entomology are discussed. Emphasis on Alaska's forest resources.

ALR360  Outdoor Recreation Planning  The course develops on the basic theory and practices related to the allocations of natural resources for recreational purposes, including concomitant services related to that use. Macrobehavioral patterns are studied as they influence the allocation process.

ALR370  Introduction to Watershed Management  Examination of the hydrologic cycle and the influence of land management techniques on water quantity, quality, and timing. Topics of water yield, soil erosion and non-point pollution, snowpack management, and land use alternatives.

ALR400  Natural Resource Policies  The origin and significance of public policies in land, water, forest, wildlife, mineral, petroleum, agricultural and aesthetic resources. Focuses on Alaskan and relevant national issues.

ALR401  Natural Resources Legislation  The background and importance of selected federal and Alaskan legislation in land management, resource conservation and environmental areas.

ALR430  Land-Use Planning  History, legal framework, principles, processes, and practices of land use planning. Important Alaskan issues and problems are emphasized.

ALR450  Forest Management  Introduction to forest land management for production of goods and services; relation of timber production to other forest land uses; topics include sustained yield, allowable cut, management planning inventory, valuation.

ALR451  Regeneration of Alaskan Woody Plants  Consideration of major aspects of reproduction and regeneration of important woody plants in Alaska. The course will be particularly useful to persons presently or potentially working in land management involving vegetation type conversions, sustained harvest, rehabilitation, and related fields.

ALR452  Forest Protection  The basic principles and practical management systems for forest protection from fire, insects, and diseases are presented. Emphasis is on understanding the role of these factors in managing forest ecosystems, and problems and techniques particularly important in the forest of high latitudes, especially in Alaska.
ALR453 Harvesting and Utilization of Forest Products  The first half of this course will be an in-depth study of timber harvesting systems including timber cutting, yarding, and transport processes. Both manual and mechanized aspects will be considered. The second half of the course will cover the technology of processing wood into various products including lumber, plywood, veneer, pulp, and energy.

ALR460 Principles of Outdoor Recreation Management  Theories, practices, economics, and problems fundamental to the use of land and related natural resources for recreation.

ALR461 Interpretive Services  Naturalist and other visitor programs in outdoor recreation areas: philosophy, planning, and development of interpretive programs; resources, agencies, users, interpretive media, and program evaluation.

ALR462 Alaskan Environmental Education  Environmental concepts, motivational and discovery techniques, and practical skills for utilizing the environment inside and outside the formal classroom in all subject areas. Course content includes information on curriculum materials (K-12), interpretive and audiovisual aids facilities, environmental problem solving and applications of environmental education to situations from the public schools to summer campus, short courses, and workshops for individuals of any age.

ALR630 Planning Theory  Detailed analysis of principles and processes of solving complex group problems; focused on land planning in Alaska.

ALR631 Planning Practicum  Application of principles and processes through group projects focused on Alaska land or resource problems.


ALR641 Natural Resources Applications of Remote Sensing  An introduction to the interpretation of remote sensing data and applications to natural resources. Course topics include a discussion of types of remote sensing data and product displays, the advantages and limitations of data types, and techniques of data interpretation for various natural resources problems. Emphasis is placed on vegetation survey and inventory, wildlife habitat, forest and range management, agriculture, geobotanical correlations, and change detection-monitoring.

ALR672 Dynamics of Nitrogen in Forest Ecosystems  Consideration of the state and dynamics of nitrogen in the complete forest ecosystem, including its basic chemistry and changes in these features with forest disturbances.

ALR675 Applied Ecosystem Science  Modern concepts of ecosystem science and their application to solving problems of land use and management. Worldwide patterns and control processes of and management implications for major ecosystems.

ALR680 Environmental Decision Making  The potential and actual role of science in natural resources and environmental decision-making. Explores the roles of values and analysis, and of techniques such as modeling, forecasting and technology assessment in political decisions.

Table G.3.b.  Course Descriptions, University of Alaska - Anchorage, 1988-89.

COLLEGE OF ARTS AND SCIENCES

ANTHROPOLOGY

ANTH354 Culture and Ecology  Anthropological approaches to the relationships between cultural and ecological systems. The notion of culture as an adaptive system and the role of various cultural subsystems in different adaptations.

BIOLOGICAL SCIENCES

BIOL104 Natural History of Alaska  A survey of important biological, physical and geological features of Alaska, and their development over time. Includes study of major landforms, ecosystems, wildlife and native peoples. Cross-Reference: GEOL 104.

BIOL139 Introduction to Forestry  Survey course emphasizing basic concepts of forest management, utilization and conservation. Includes identity, characteristics and values of forest lands and forests. Covers cultural, ecological and technical conditions which influence use and management. Special Notes: Community service course.
BIOL177  Wildlife Field Study  A short intensive summer course of wildlife study, following nesting habits of birds, food and habitat choice of large mammals, and the behavior patterns of a variety of birds and mammals. Experience gained in locating, recording, and interpreting data from wildlife. Additional practice in tracking, stalking, photography and sound recording as opportunity permits.

BIOL309  Biogeography. Ecological basis and historical patterns of the distribution of plants and animals on a world-wide basis. Current theories regarding origins of these distributions are examined.

BIOL373  Environment Biology  An introductory course in environmental science. Human impact on environment; population, resources and pollution. Politics and environmental issues.

BIOL375  Terrestrial Ecosystems of the World  A survey of the major terrestrial ecosystems of the world from the tropical rain forest to the Arctic tundra. Geographic distribution, climate and topography will be described as will the structure and functions of the ecosystem including biomass, productivity and susceptibility.

BIOL475  Northern Ecosystems  Analysis of the tundra and tundra ecosystems. The geography, climate and soils of tundra and taiga. Biomass and productivity of these systems, their role in the global carbon cycle, their new and traditional uses and their susceptibility to human disturbance.

GEOGRAPHY

GEOG103  World Economic Geography  Study of world economic activities. Physical and cultural bases, spatial growth and distribution patterns, and their significance in interregional and international development.

GEOLOGY

GEOL115  Environmental Geology  Introduction to profound impact of geologic factors on community and individual lives. Geologic hazards, water supply, waste disposal, mineral and energy development, and land use planning. Relationship of these factors to political decision making.

HISTORY

HIST115  Alaska: Land and Its People  A survey of Alaska from earliest days to present: its peoples, problems, and prospects.

HIST200  History of Alaska Native Heritage  History and prehistory of Alaska Native peoples. Consideration of traditional culture, culture contacts, and current issues facing Alaska Natives.

HIST341  History of Alaska  Introduction to background of Alaska and its relationship to America and the world, including anthropological aspects of native groups, land bridge theory, Russian discovery, occupation and management, Orthodoxy, purchase, American organization and development, gold rushes, Congressional definition and federalism, native claims history, statehood, oil and the disposition of Alaska lands.

POLITICAL SCIENCE

PS231  Introduction to Alaska Government  General survey of Alaskan political system. Includes Alaska Constitution and its origins, structure and functions of government in Alaska, and political processes and public policies.

PS241  Selected Topics in Contemporary Public Policy  Seminar on contemporary public policies, selected from local, state, national, and international levels of government.

PS301  Public Administration in the Political Process  Techniques and problems of administering public policy. The changing face of the executive branch in the political process.

PS302  Public Policy Process and Analysis  The process of public policy adoption and implementation with emphasis on the rational actor, bureaucratic, and governmental process models. Extensive use of case studies.
SOCIETY

SOC 221 Introduction to Political Sociology  Introduction to social nature of politics and to nature and distribution of power in society. Examines how social institutions are engaged in political processes of different societies and complex relationships existing between social and political change. Cross-Reference: PS221.

SOC 222 Small and Rural Communities  Overview of organization, viability, change and problems of small communities and villages in rural areas; their relations to larger and regional systems; and factors which affect their future as autonomous units.

SOC 373 Strategies of Community Change  Practical methods for planning, organizing and implementing community development programs in urban and rural settings. Course covers both planned programs of community change and general community organizing. Students will be expected to develop a project for community action.

SOC 404 Environmental Sociology  Critical analysis of interaction between society and environment from an ecological perspective, focusing on processes of industrial and economic growth, natural resource development, community change and social impact assessment, environmental values and environmental movement, land use planning and resource management decision-making, and comparative perspectives on man's relation to and use of natural environment.

SCHOOL OF BUSINESS

BUSINESS ADMINISTRATION

BA 112 Tourism, Principles and Practices  Survey of tourism fundamentals: why tourists travel, components of tourism, economic and social impacts of tourism, destination development, and travel market research.

BA 113 Alaska Visitor Industry  Survey of Alaska visitor industry: historical overview, travel characteristics, public and private organization involvement, wholesale and retail functions, and market research and strategies.

BA 14 Systems Theory and Analysis  Theory and design of complex interactive systems; system philosophy, components of general systems theory, system design, principles, and methods. Survey of application of systems concept to business, economics, and public admin.

COLLEGE OF CAREER AND VOCATIONAL EDUCATION

VE 611 Philosophical Foundations of Vocational Education  Study of theory, development and philosophical foundations of vocational education. Relationship of vocational education to general education. Overview of vocational education in Alaska, including secondary, postsecondary, proprietary and applied programs along with concepts of career education.

SCHOOL OF EDUCATION

ED 351 Workshop on Alaska  A workshop consisting of lectures and demonstrations by authorities in anthropology, biology, education, geography, mining geology, history, literature, art, wildlife, and various other teaching fields.

ED 602 Studies in Outdoor Education  Research of selected topics in elementary outdoor education. Participants will be involved in the development of instructional materials and resources based on outdoor learning experiences that are suited to their particular needs, interest and grade level.

SCHOOL OF ENGINEERING

ENGINEERING SCIENCE

ES 150 Technology and Society  An introductory course which integrates the conceptual tools required to analyze the impact of technology with a broad cross-section of applications. Includes such societal needs as energy generation and use, transportation, communications, water supply, waste disposal, industrial work, and health care. Presents the basic tools of mass and energy balance, present worth discounting, and trade-off analysis. Discusses the factors which limit technological progress and emphasizes the impact of technology on our environment.
ENVIRONMENTAL QUALITY ENGINEERING

EQE601  Environmental Quality Science Measurements  Theory and laboratory procedures for determining quality of water supplies. Natural water quality, pollution loads and water and wastewater treatment plant parameters. Familiarization with "Standard Methods for Examination of Water and Wastewater." Experiments on unit processes of treatment systems are included along with consideration for solid waste and air pollution monitoring.

EQE604  Environmental Quality Evaluation  Topics of environmental impact statements, environmental law (local, state, and federal), and environmental quality. Impact from projects of mining, highways, airports, pipelines, industrial development, water, wastewater and solid waste, and other theoretical considerations and case studies.

SCHOOL OF PUBLIC AFFAIRS

ECONOMICS

ECON337  Economic Development  Problems of economic development illustrated with case studies; theories of growth and development; and analysis of major policy issues. The emphasis of this course is on Third World countries.

ECON435  Economics of Resources  Economic analysis of resource use and development. Topics covered include economics of non-renewable resources, forestry, and fisheries; environmental economics; and public resource management. Examples are presented of Alaska resource development and management experience.

ECON625  Economics and Public Policy  An examination of economics in relations to public policy, both as a determinant of policy and a tool of administration.


ECON650  Alaska Economic Issues  Current issues related to Alaska's economic development. The course applies economic concepts and methodology to current issues related to Alaska's economic development. Topics covered include the effects of changing oil revenues, passage of Alaska Native Claims Settlement Act, local hire legislation, changing state population, etc. Alaska business leaders representing relevant industries and institutions are utilized as speakers in order to involve participants in personal interaction with decision-makers.

JUSTICE

JUST451  Research and Policymaking  An overview of social research methods and procedures as related to justice policy development, implementation and assessment. Students are exposed to the policy-making process, qualitative and quantitative information-producing tools, research utilization strategies and research proposal writing.

JUST455  Rural Justice  Multi-disciplinary study of "bush justice" in rural Alaska and in other Arctic settings including Greenland and Canada. A study of the interplay of law ways of Alaska Natives and early white populations with the developing military, territorial and state systems. Special focus on small village justice systems, traditional and modern; roles of police, councils, judges and others in the system, criminal and civil law; and alternatives to urban models proposed or tested in rural settings.


PUBLIC ADMINISTRATION

PADM606  The Policymaking Process  Examines nature of public policy and policymaking process. Considers policy environment, types of policy, and models of policy process. Topics include problem recognition and agenda setting, policy analysis, implementation, and evaluation. Uses Alaskan and national cases to illustrate basic concepts and issues.

PADM620  Internship in Public Administration/Policy  Applied work experience in public administration or policy analysis. Students perform equivalent of three months full time work in approved state, federal, local, or private agency, under supervision of senior agency employee in cooperation with faculty advisor. Internship journal and final internship report required.

PADM630  Administrative Problems in Alaska  Rural and small city administration, impact of government on economy; fiscal management policies, technical assistance, loans, subsidies, contracts, public enterprise, and resource administration.
PADM632 Quantitative Approaches to Policy Analysis Applies regression analysis and related techniques to broad range of policy issues. Focusses on use of parametric statistics as basis for policy decisions, using Alaska data to test policy oriented hypotheses.

PADM634 Resource Policy Administration Examines politics and economics of natural resource issues and Alaska cases. Focuses on uses of basic political science and economic concepts in analyzing resource policy issues, as well as alternative policy objectives, means, and consequences in resource policy administration.

PADM635 Policy Analysis and Program Evaluation Critical examination and application of approaches to policy analysis and program evaluation for public sector.

PADM650 Community and Regional Planning Surveys roots and major activities of planning profession. Addresses planning process as it has evolved at local and regional levels, emphasizing relationships between physical, economic, and social factors in development of effective planning strategies.

PADM659 Administrative Policy Seminar Capstone course for Master of Public Administration program. Provides students with experience in planning, design, and performance of an applied research project dealing with a practical administrative or policy problem. Emphasizes student participation, including presentation of a major policy or administrative report.

PADM661 The Social Environment of Planning Examines social context in which planning takes place, the role of government in determining nature of planning process, impact public can have on planning in different political systems, organization of political and social groups to participate effectively in planning cycle, and the dormant role of social groups that do not participate.

PADM662 Legal Issues in Planning Focuses on three major areas of law: constitutional issues (due process, property rights, civil rights), environmental legislation and state and federal planning laws, and formulation of laws directed to physical and social issues.

PADM668 Seminar Topics in Planning Various subjects such as planning process, implementation, and management of resources.

PADM671 Selected Topics in Public Administration Examines selected public administration issues.

PADM689 Doctoral Seminar in Public Administration Scope and methods of public administration, historical and philosophical perspectives, and role of government bureaucracies in society. Part of joint perspectives, and role of government bureaucracies in society. Part of joint University of Alaska Anchorage/University of Southern California doctoral program.

Table G.3.c. Course Descriptions, University of Alaska (Juneau), 1987-88.

SCHOOL OF EDUCATION AND LIBERAL ARTS

ANTH402 Cultural Change and Theories of Applied Anthropology An intensive survey of the materials of culture change, particularly directed or planned culture change. Various methods and theories of applied anthropology are explored, as are the various approaches, values, practical aspects, theoretical implications, and ethics of each.

ECON440 Economic Development Factors leading to economic growth; problems of growth theory; economic growth in the advanced and lesser developed countries; desirability of continued growth.

ED548 Educational Leadership and Decision Making Review of selected contemporary education organizations and events in relation to patterns of executive action and resultant effects.

GEOG402 Human Ecology Relationships of human beings with the land they occupy; study of the physical environment and human occupation of the world's major regions; consideration of the significance of cultural diversity, differing patterns of livelihood, settlement and population change.

GEOG405 Political Geography Geographical analysis of the evolution, structure, internal coherence, and sources of strength of individual nation states with emphasis on nations of the Pacific realm and Arctic periphery. Consideration of regional blocks, spheres of influence, and potential for international cooperation.
GOVT 313  Alaska Politics and Government  A consideration of the development and the present organization and operation of the Alaska political and governmental system. Special attention will be given to the constitution, parties and interest groups, the legislature, the governor, local government and current policy issues in the state.

HIST 341  History of Alaska  The Russian background; acquisition, settlement and development of Alaska as an American territory and the 49th State.

SCHOOL OF FISHERIES AND SCIENCE
BIOL 100  Introduction to Life Sciences  Introduction to the scientific method, patterns of life on earth, the relationship between the individual and his/her environment, cell biology, genetics, populations, and evolution.  Designed for non-science majors.

FISH 418  Renewable Resource Management  Develops the abilities to recognize, process and apply critical information in the management of renewable resources by examples from Alaskan fisheries. The computer is explored as a primary tool of resource management.

GEOLOGY

SCHOOL OF BUSINESS AND PUBLIC ADMINISTRATION
BUSINESS ADMINISTRATION
BA 490  The Political and Social Environment of Business  Policy decisions and governmental regulations affecting business as well as the social responsibility of business in society.

PUBLIC ADMINISTRATION
PADM 301  Public Administration in Contemporary Society  Operations of public administration in a political environment. Basic concepts, tools and issues of public administration. Techniques and problems of administering public policy. The changing face of the executive branch in the political process.

PADM 310  Introduction to Public Policy  Introduction to the public policy process. The role of public administration will be examined within the context of the political environment. The policy role of the public administrator will be examined as well as the construction of an analytical framework from which the process of public policy can be explored.

PADM 370  Current Problems in Public Administration  Major public administration issues are explored using contemporary analytical techniques. Themes incorporated in the production of a major project include intergovernmental relations, the role of public sector organizations and public managers as change agents.

PADM 430  Theory and Practice of Public Administration  The comprehensive examination of the theory-practice dichotomy both currently and historically existing in the discipline of public administration. Particular emphasis is placed on the public manager's role in bridging the gap between theoretical concepts and applications of theory.

PADM 601  Politics and Administration  Managing public agencies within the political environment; historical background, class contemporary theory; examination of issues within complex society. Role of the public administrator at the local, state, and federal level.

PADM 606  Formulation of Public Policy  Development of a conceptual framework for the policy process. Relationship between policy and socio-economic forces. How policy is formulated and who influences the legislative decision-making process; role of special interest groups, unions, advocacy organizations, citizen participation groups. Current analytical tools available to the administrator.

PADM 615  Intergovernmental Relations  Complexities of managing programs at the federal, state and local level. The interface between levels of government and the private sector; examination of the budgetary, decision-making, political and policy processes within the intergovernmental arena. Design and evaluation of successful intergovernmental programs. Cross-Referenced: BA 615.

PADM 622  Decision Analysis  Survey of quantitative approaches to decision-making. Philosophy and methodology of operations research. General systems theory, cybernetics, and decision theory. Emphasis on linear programming and simulation as broad alternative modeling methods.
Economics of Public Policy  Examination of economics in relation to public policy, both as a determinant of policy and a tool of administration. Emphasis on government regulation of industry and business influences on government.

Economic Development of Alaska  Alaskan historical trends and the impact of public policy. The current pattern of development, location of economic activities, role of Alaskan Native Corporations, international trade and natural resources extraction.

Natural Resource Administration  Growth of the concept of conserving and developing natural resources; translation into public policy; interrelationships and coordination among principle state and federal resource administration agencies; development and ecology; interest groups affecting resource development. Cross-Referenced: BA 634.

Administrative Policy  Management of the total organization; policy formulation, strategy selection and implementation; corporate organization and control. Cross-Referenced: BA 655.


CORE CURRICULUM

The Natural Environment  The natural environment and man's relationship to it are explored in this course. Various disciplines relating to the natural environment are introduced. These include geology, ecology, meteorology, oceanography, and astronomy. Students will also examine contemporary social issues that are related to the natural environment.

The Social Environment  Introduction to basic factors of the social environment to include geography, natural resources, history, economics and cultural development. Emphasis on the individual in relation to groups. Further, the role placed by technology in shaping the social environment is examined. Students relate the social environment with the individual, natural, and spiritual environments as contemporary social concerns are investigated.

Change  Students examine the concept of change in human systems and briefly review humankind's performance to date along with present world trends. The course reviews selected change theories and models at various levels - individual, group, organization, community, society, world - and analyzes strategies for turning probable futures into preferable paradigms. The course draws from systems theory, the natural sciences, the humanities, the social sciences, and the field of management.

Integration  Exploration of themes and ideas concerning what it means to be fully human. The setting and significance of integration: integration of the self, integration in society, the integrated cosmos, and ultimate spiritual and creative integration. Anthropology, sociology, psychology, religion, ethics, philosophy, history, literature, the arts, mathematics, economics, systems theory and the sciences are all employed.

MANAGEMENT

Introduction to Public Administration  Examines the administrative structure and organization of government at all levels; includes an examination of concepts and techniques of management in the government setting.

Management of Natural Resource Development  This course focuses on the management problems involved in the development of natural resources, including such issues as resource exploration, market identification, project planning, environmental impact management, joint ventures, industry-government negotiations, etc.

The Alaskan Travel Industry  Study of history, philosophy, economics, politics and forces within the Alaskan travel industry; analysis of elements essential to further develop tourism in Alaska.

Tourism Planning  Charts the course for a planned approach to the present and future for organizations and people involved in tourism. The interface among the many developers of tourism and people involved in tourism. The interface among the many developers of tourism is studied. Physical planning is emphasized with the limitations of natural resources in mind.

HUMAN RESOURCE DEVELOPMENT

Leadership  Investigation of common traits of successful leaders to include selecting one's own managerial leadership pattern, understanding and developing subordinates, macro and micro variables, organizational realities and the changing labor work force.
NATURAL RESOURCES

NR203 Natural Resource Conservation: Major concepts of natural resources management including those in the areas of agriculture, forestry, wildlife, fisheries, water, air, energy, mining, and recreation. Consequences of the use and misuse of vital resources.

NR302 Environmental Assessment and Analysis: A study of the scientific methodologies and laboratory techniques that are required to fulfill the legal obligations of natural resource development. Includes E.I.S. preparation and evaluation, air and water quality analysis and monitoring methods.

NR310 Resource Economics: This course relates economic principles to man's efforts to optimize utilization of natural resources. Natural resources and its uses as classified issues of scarcity and growth are addressed, models for optimal utilization are presented, and management techniques are applied to such resource industries as fisheries, agriculture, mining, energy, water and forestry.

NR320 Resource Planning and Politics: The relationship between the political process and resource planning, development, management and conservation. Emphasis is placed upon the development of Alaskan resources and the impact of national and local coalitions.

NR410 Environmental Ethics: Various perspectives and philosophies concerning the natural environment and resource utilization are explored in order to give the student a basis on which to develop her/his own ethical perspective. The human factor in addressing natural resource issues is emphasized.

NR450 Natural Resource Seminar: Exploration of natural resource issues with focus upon attendance of public hearings and off-campus seminars. Oral presentation of a research topic in a classroom situation.

VALUES AND SERVICE

VS420 Ethics, Economics and Critical Choices: An exploration of how such value concepts as justice, equality, humanization and social responsibility relate to the economic enterprise, with particular focus on such issues as debt and creditholism, unemployment and plant closure, multi-national corporations and Third World development and investments.

VS430 Values and Ethics in Professional Education: A study of ethical choices and value conflicts in contemporary professional education, such as the purpose of universal education (moral, social and/or intellectual development), prejudice in the classroom, the roles of teachers and administrators, and public vs. private education.

SS323 Economic Development: An analysis of the nature and significance of barriers to and the future of the potential for economic development of a nation. Special emphasis is laid on theories and strategic factors pertaining to economic growth.

SS495 Comparative Political Economics: A comparative study of political economic systems of selected countries. Emphasis on the three main ideologies of the contemporary world: free enterprise, social democratic and central planning.

MASTERS EDUCATION

EDU A695 Post Secondary Institutions: Teaching Strategies: This course focuses on teaching strategies at the postsecondary level including vocational/technical settings, community colleges and four-year colleges and universities.

EDU B695 Postsecondary Institutions: Curriculum Development: This course provides an overview of the curriculum development process in postsecondary institutions including processes for developing, implementing and evaluating curriculum.

EDU C695 Postsecondary Institutions: Administration: This course focuses on administrative functions as they apply to postsecondary institutions including vocational/technical settings, community colleges and four-year colleges and universities.

EDU D695 Postsecondary Institutions: Current Issues: This course examines current issues in postsecondary education including issues in vocational/technical education, community college and four-year colleges/universities. In addition to specific issues, the course will explore issues identified by participants.
Course Descriptions, Sheldon Jackson College, 1989-90.

FORESTRY (Faculty - 20 outdoor rec. (B.S., M.S.), 1 nat. resource (Ph.D.), 1 Forestry (M.S.))

FOR105/106 (S)  Forestry Practicum  Directed study for hands-on experience in forestry and natural resources. Students are encouraged to pursue their own personal interests with projects and research.

FOR221 (S)  Forest Ecology  An introduction to ecology with emphasis on and application of principles to the forest biome of Alaska. Trees will be studied as individuals and as part of a dynamic forest community.

FOR231 (S)  Forest Mensuration  Practical training in the measurement and compiled inventory of trees, logs, and forest stands. Topics include: log scaling, fixed radius plots, prism cruising, 3-P cruising, cruise design, inventory reports, and related basic statistics.

FOR235  Forest Utilization  An exploration of the timber industry of NW Washington through a prolonged field trip. Wood products, harvesting, government and private agencies, land management, and forest career possibilities are among the wide variety of activities observed.

OUTDOOR RECREATION

OR101  Introduction to Outdoor Recreation  Introduces the scope of outdoor education and recreation. Emphasis will be on the structure, philosophy, and direction of programs offered in the public and private sectors, with special attention to the area of outdoor recreation.

OR120  Outdoor Survival  Introduces knowledge necessary for safe participation in wilderness recreation. Emphasis will be on those topics of survival safety and environmental impact which are of concern to the backpackers and kayakers of Southeast Alaska.

OR293/393  Outdoor Practicum  Provides experience valuable in developing outdoor leadership skills through the assumption of leadership responsibilities on school trips. Additional responsibilities are developed for the second credit.

OR360  Environmental Interpretation  Surveys the broad field of environmental interpretation as it is practiced to promote knowledge about the environment and to serve as the communication link between humans and natural and cultural resources.

OR420  Outdoor Leadership  Study and development of leadership skills. Group dynamics, leadership responsibilities, group management and activity organization in the context of Outdoor Recreation will be investigated and practiced.

PHYSICAL EDUCATION

PE182  Hiking  Provides in-the-field experience in hiking and in elementary outdoor survival skills.

POLITICAL SCIENCE

POLSCI 102 (SS)  State and Local Government  Focuses specifically on the dynamics of policy making, public administration, and operation of government at the local and state level.

POLSCI 205 (SS)  Contemporary Alaska Issues  An exploration of the most significant current policy issues in the 49th state. A specific goal of the course is to train individuals to participate in formulating public policy.


RESOURCES

RES105 (S)  Introduction to Natural Resources, Management and Development  A survey of the earth's natural resources: past, present, and future. Topics include the academic disciplines and professions involved in resource management, the management and planning philosophies utilized in developing natural resources, and the special problems related to the use of Alaska's natural resources.

RES301 (S)  Forest and Range Soils  Introduction to the origins, classification, and management of soils in the U.S. Physical, chemical, and biological properties will be applied to land management situations.
RES305 (S) Wildlife Ecology An introduction to the integrated study of ecological principles, policies, and laws and their relationship to management of wildlife populations and habitat.

RES310 Principles of Outdoor Recreation Planning Covers the basic theory and practices related to the allocations of natural resources for recreational purposes.

RES321 Native Perspectives on Natural Resource Planning and Management An introduction to Native American cosmologies and the contributions made by Native Americans' ingenuity. Emphasis will be on historical and contemporary issues in resource use locally, regionally, and globally.

RES331 (S) Economic Considerations in Natural Resource Management A study of economic principles and their application to natural resource allocations, multiple use, resource management decisions, market failure, welfare, taxation, amenity resources, pollution, land-use planning, and subsistence.

RES341 (S) Photogrammetry Introduction to the technology of remote sensing, and practical application of inventory and analysis of natural resources using photogrammetry techniques.

RES398 Field Studies in Resource Management Supervised programs designed to provide students with practical experience working with government or private agencies in natural resources management.

RES401 (S) Ecosystem Analysis Quantitative study of the environment with investigation into current theories and problems in ecology. Biomass production, carrying capacity, ecosystem dynamics, and consequences of man's activities will be studied and measured using the scientific method.

RES420 Natural Resources Policies and Law The origin, development, and significance of major public policies and legislation related to natural resources management and development. Focuses on Alaskan and national issues relevant to the problems of northern bioregion. An examination of the background and potential importance of selected federal and Alaskan legislation and a study of the legislative process and policy development.

RES422 Silviculture The management and manipulation of our forests for the accomplishment of man's objectives will be studied and applied to Alaska and the nation as a whole.

RES431 Wilderness Management A study of the values, concepts, philosophies, laws, regulations, and individuals involved in the development and management of the U.S. wilderness system.

SCIENCE

SCI498 Senior Project A directed study allowing the students to select and organize a research project related to fisheries, aquaculture, or natural resources. A project proposal must be completed, presented orally, and reviewed by science faculty.

SCI498 Senior Thesis Continuation of the Senior Project. Student will carry out their research project, collecting and analyzing data, and writing a final report in scientific form. Results and conclusions of the project must be presented orally and defended.
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Table G.5. Courses in natural resource subjects by institution and faculty.

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</tr>
</tbody>
</table>
APPENDIX H. RESEARCH BY CENTRES, INDIVIDUAL ACADEMICS, AND STUDENT THESIS FOR NEWFOUNDLAND, TASMANIA AND ALASKA.

Table H.1. Research by Centres, Institutes, or Units.

Table H.1.Nfld.  ISER - Institute of Social and Economic Research - M.U.N.
ISER Books -
ISER Research and Policy Papers (0 of 9 - none related)
ISER Reports (0 of 1 - none related)
ISER Conference Papers (0 of 2 - none related)
(From ISER Annual Reports and Bibliography 1971-1984)


Others:

Table H.1. Tas.a. Centre for Environmental Studies (1975-1987) From Publications List to July 1986

Occasional Papers
Working Papers


Project Reports


Special Publications


Table H.1.Tas.b. Centre for Regional Economic Analysis (CREA) (1980-present)


NOTE: Tasmanian mineral exploration, fishing, forestry, timber rights, agriculture were all subjects of research by the Department of Economics and the Centre for Regional Economic Analysis. P. 14. U. of Tas. 1987. Annual Report.


OTHER CENTRES


Table E.1.A1.a. University of Alaska Research Institutes and Units.

1917 Agriculture Experiment Station
1950 Alaska Cooperative Wildlife Research Unit
1961 ISER (Anchorage)
1963 Inst. of Arctic Biology
1965 Institute of Water Resources
1972 Arctic Environmental Information and Data Centre
1972 Alaska Cooperative Park Studies Unit
1978 Alaska Cooperative Fishery Research Unit

Publications by Agriculture and Forestry Experiment Station, 1984-1987.

LAND USE


FORESTRY


WILDLIFE


RECREATION


ENVIRONMENT


### Table H.I.AK.c. Publications of Alaska Cooperative Wildlife Research Unit

<table>
<thead>
<tr>
<th>Articles by Subject</th>
<th>Majority Journal &amp; Proceedings</th>
<th>Articles by Journal</th>
<th>Majority Journal &amp; Proceedings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moose</td>
<td>7</td>
<td>J. Wildl. Manage.</td>
<td>17</td>
</tr>
<tr>
<td>Caribou</td>
<td>23</td>
<td>J. of Applied Ecology</td>
<td>2</td>
</tr>
<tr>
<td>Reindeer</td>
<td>10</td>
<td>J. Mammalogy</td>
<td>12</td>
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<tr>
<td>Black Tailed Deer</td>
<td>1</td>
<td>J. Range Manage.</td>
<td>5</td>
</tr>
<tr>
<td>Deer Gen</td>
<td>4</td>
<td>Can. J. Zoology</td>
<td>7</td>
</tr>
<tr>
<td>Muskox</td>
<td>10</td>
<td>Can. Field Nat.</td>
<td>5</td>
</tr>
<tr>
<td>Brown &amp; Grizzly Bear</td>
<td>3</td>
<td>Can. J. Anim. Sci.</td>
<td>3</td>
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<tr>
<td>Black Bear</td>
<td>2</td>
<td>Arctic</td>
<td>7</td>
</tr>
<tr>
<td>Polar Bear</td>
<td>1</td>
<td>Trans. of nth N. Am. Wildlife Conf.</td>
<td>8</td>
</tr>
<tr>
<td>Wolf</td>
<td>1</td>
<td>The Condor</td>
<td>2</td>
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<tr>
<td>Fox</td>
<td>5</td>
<td>Nature</td>
<td>1</td>
</tr>
<tr>
<td>Small Mammals</td>
<td>2</td>
<td>J. Wildl. Diseases</td>
<td>1</td>
</tr>
<tr>
<td>Beaver</td>
<td>2</td>
<td>Amer. Zoologist</td>
<td>2</td>
</tr>
<tr>
<td>Marten</td>
<td>2</td>
<td>Ecol. Monographs</td>
<td>1</td>
</tr>
<tr>
<td>S.S. Hare</td>
<td>4</td>
<td>Landscape</td>
<td>2</td>
</tr>
<tr>
<td>Squirrel</td>
<td>2</td>
<td>Animal Behaviour</td>
<td>1</td>
</tr>
<tr>
<td>Marine Mammal</td>
<td>3</td>
<td>Auk</td>
<td>1</td>
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<tr>
<td>Waterfowl</td>
<td>5</td>
<td>Other Journals</td>
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<tr>
<td>Shorebird</td>
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<td></td>
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<tr>
<td>Sea Birds</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Ptarmigan</td>
<td>1</td>
<td></td>
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</tr>
<tr>
<td>Bald Eagle</td>
<td>1</td>
<td></td>
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<tr>
<td>Recreation</td>
<td>2</td>
<td></td>
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</tr>
<tr>
<td>Wilderness</td>
<td>2</td>
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</tr>
<tr>
<td>Habitat Evaluation</td>
<td>5</td>
<td></td>
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</tr>
<tr>
<td>Tech</td>
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<td></td>
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<tr>
<td>Economy</td>
<td>1</td>
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<td></td>
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<tr>
<td>General Wildlife</td>
<td>27</td>
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<td></td>
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<tr>
<td>Disturbance</td>
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<tr>
<td>Development</td>
<td>9</td>
<td></td>
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<td></td>
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<td></td>
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<tr>
<td></td>
<td>147</td>
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</tr>
</tbody>
</table>

Also see Table . Thesis produced by ACWRU.

**Selected Alaska Cooperative Wildlife Research Unit Publications.**


<table>
<thead>
<tr>
<th>Natural Resources</th>
<th>Land Use</th>
<th>Forestry</th>
<th>Wildlife</th>
<th>Tourism Recreation/Parks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alaska Review of Social and Economic Conditions</td>
<td></td>
<td>2</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>ISER Reports</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Occasional Papers</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Research Notes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Research Summaries</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Special Publications</td>
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<td></td>
</tr>
<tr>
<td>Working Papers</td>
<td></td>
<td>1</td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>

NATURAL RESOURCE


LAND-USE


Fischer, V. 1979. DNR organization and responsibilities for land and resources planning, Phase II report to the Commissioner, Alaska Department of Natural Resources. (March 12, 1979). 18 pp.

Fischer, V. 1979. Comprehensive regional planning for Alaska’s lands and resources, Phase I report to the Commissioner, Alaska Department of Natural Resources. (February 9, 1979). 74 pp.


FORESTRY


WILDLIFE


TOURISM/RECREATION PARKS


Table H.2. Research by Individual Academics.

Table H.2.Nfld.a. Memorial University - External Awards; External Grant Research Inventory (1987-88, 1974-75)

| FACULTY OF ARTS |
|-----------------|-----------------|-----------------|
| Dept./Year      | Title           | Supporting Agency |
| ECONOMICS       |                 |                  |
| 1978-79 Hull, D.L. | Economic analysis of the sawmilling industry in Newfoundland | Prov. Dept. of Forest & Agriculture (contract) |
| GEOGRAPHY       |                 |                  |
| 1984-85 Rogerson, R.J. | Herbicide behaviour in a boreal forest podzol | Environment (contract) |
| 1982-84 Staveley, M. | Land alienation as an element in the evolution of Nfld.'s settlement & economy, 1866-1920 | SS HRC |
| HISTORY         |                 |                  |
| 1986-87 Fischer, L. | Economic history and forest research conferences, Switzerland, Yugoslavia, Aug-Sept. 1986 | SS HRC (Travel) |

<p>| FACULTY OF SCIENCE |
|-------------------|-----------------|-----------------|
| Dept./Year        | Title           | Supporting Agency |
| BIOLOGY           |                 |                  |
| 1987-88 Bal, A.   | Study of the effect of herbicide on Kolmina | Eastern Ecological Service |
| Colbo, M.         | Caribou         | Nfld. Forest (In kind) |
| Finney-Crawley, J.| Insect vectors in spread of pinewood and other nematodes to trees in Canada | Agriculture (DSS contract) |
| Gordon, R.        | Incubators and specialized diet for rearing spruce budworm off-season | Can. Forest Service (In kind) |
| Gordon, R.        | Biocontrol strategies for pest insects | NSERC |
| Gordon, R.        | Control of spruce budworm and cabbage maggot using insect growth regulator | E &amp; I (contract) |
| 1986-87 Finney-Crawley, J. | Parasite nematode in forest trees of Nfld. &amp; Labrador | Agriculture (DSS contract) |
| Finney-Crawley, J.| Insect vectors involved in the spread of pinewood and other nematodes | Agriculture (DSS contract) |</p>
<table>
<thead>
<tr>
<th>Researchers</th>
<th>Project Title</th>
<th>Funding Institution/Contract Details</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finney-Crawley, J.</td>
<td>Locally isolated parasitic nematodes for control in spread of forest insect pests ($84,110 for 1984-87)</td>
<td>NSERC</td>
<td>$14,018</td>
</tr>
<tr>
<td>Gordon, R.</td>
<td>Pest insects and their parasites: biocontrol strategies</td>
<td></td>
<td>$21,120</td>
</tr>
<tr>
<td>1985-86 Andrews, E. (Grenfell Coll.)</td>
<td>Amphibians of Western Nfld.</td>
<td>E &amp; I (contract)</td>
<td>$1,300</td>
</tr>
<tr>
<td>Bennett, G.F.</td>
<td>Impact of the spruce budworm spray program on aquatic invertebrate organisms</td>
<td>Nfld. Environment (contract)</td>
<td>$92,030</td>
</tr>
<tr>
<td>Brassard, G.R.</td>
<td>Vegetation resource description and analysis, Gros Morne N.P.</td>
<td>Parks Canada (contract)</td>
<td>$4,963</td>
</tr>
<tr>
<td>Finney-Crawley, J.</td>
<td>Determination of parasitic nematodes in forest trees of Nfld./Lab.</td>
<td>PRUF (DSS contract)</td>
<td>$32,963</td>
</tr>
<tr>
<td>Finney-Crawley, J.</td>
<td>Development of locally isolated parasitic nematodes for control of forest insect pests in Canada</td>
<td>Environment (DSS contract)</td>
<td>$42,055</td>
</tr>
<tr>
<td>Gordon, R.</td>
<td>Physiological studies on pest insects and their parasites</td>
<td>NSERC</td>
<td>$22,000</td>
</tr>
<tr>
<td>Larson, D.</td>
<td>Impact of the spruce budworm spray program on insects in insular Nfld.</td>
<td>Environment (contract)</td>
<td>$25,065</td>
</tr>
<tr>
<td>Lee, R.</td>
<td>Nfld. black spruce &amp; budworm defoliation ($56,772 for 1984-86)</td>
<td>Environment (DSS contract)</td>
<td>$42,980</td>
</tr>
<tr>
<td>1984-85 Bennett, G.</td>
<td>Impact of the spruce budworm control program on non-target organisms</td>
<td>Nfld. Dept. Environment (contract)</td>
<td>$122,275</td>
</tr>
<tr>
<td>Brassard, G.R.</td>
<td>Baseline study for rehabilitating adverse impact due to overuse, Gros Morne N.P.</td>
<td>Parks Canada (contract)</td>
<td>$5,000</td>
</tr>
<tr>
<td>Finney-Crawley, J.</td>
<td>Development of locally isolated parasitic nematodes for control of forest insect pests in Canada</td>
<td>Environment (contract)</td>
<td>$28,037</td>
</tr>
<tr>
<td>Finney-Crawley, J.</td>
<td>Use of nematode <em>Heterorhoditis helfothidis</em> for control of the spruce budworm in insular Nfld.</td>
<td>Environment (contract)</td>
<td>$14,390</td>
</tr>
<tr>
<td>Gordon, R.</td>
<td>Physiological studies on pest insects and their parasites: bio-control strategies</td>
<td>NSERC</td>
<td>$22,000</td>
</tr>
<tr>
<td>Lee, R.</td>
<td>Spruce in Nfld. and its relationship to budworm defoliation, amillaria root rot and four-eyed spruce bark beetle</td>
<td>Environment (contract)</td>
<td>$24,793</td>
</tr>
<tr>
<td>Nolan, R.A.</td>
<td>The molecular basis of <em>Entomophthora egressa</em> virulence for the spruce budworm</td>
<td></td>
<td>$39,680</td>
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<tr>
<td>Year</td>
<td>Name</td>
<td>Project Description</td>
<td>Funding Agency</td>
</tr>
<tr>
<td>-------</td>
<td>-----------------</td>
<td>--------------------------------------------------------------------------------------</td>
<td>------------------------------</td>
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<tr>
<td>1983-84 Bennett, G.</td>
<td>Impact of spruce budworm spraying on non-target organisms</td>
<td>Nfld. Dept. Environ. (contract)</td>
<td>$168,294</td>
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<td></td>
<td>Finney, J.</td>
<td>Use of <em>H. heliothidis</em> for biological control of Nfld. forest pests</td>
<td>Nfld. Dept. Forests (contract)</td>
</tr>
<tr>
<td></td>
<td>Nolan, R.</td>
<td>The molecular basis for <em>E. egressa</em> virulence for the spruce budworm</td>
<td>NSERC</td>
</tr>
<tr>
<td>1982-83 Bennett, G.</td>
<td>Monitoring spruce budworm spray</td>
<td>Nfld. Dept. Environment (contract)</td>
<td>$199,500</td>
</tr>
<tr>
<td></td>
<td>Finney, J.</td>
<td>Use of <em>H. heliothidis</em> for control of spruce budworm in insular Nfld.</td>
<td>Environment (DSS contract)</td>
</tr>
<tr>
<td></td>
<td>Finney, J.</td>
<td>Use of <em>H. heliothidis</em> for biological control of Nfld. forest pests</td>
<td>Nfld. Dept. Forest Resources and Lands (contract)</td>
</tr>
<tr>
<td></td>
<td>Nolan, R.A.</td>
<td>Molecular basis of <em>E. egressa</em> virulence for the spruce budworm</td>
<td>NSERC (strategic)</td>
</tr>
<tr>
<td></td>
<td>Nolan, R.A.</td>
<td>Mass fermentation techniques for production of spores/conidia of <em>Entomophthora egressa</em></td>
<td>Nfld. Dept. Forestry (contract)</td>
</tr>
<tr>
<td>1980-81</td>
<td>No Research</td>
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<tr>
<td>1979-80</td>
<td>No Research</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1978-79</td>
<td>No Research</td>
<td></td>
<td></td>
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<tr>
<td>1977-78 Bennett, G.F.</td>
<td>Environmental impact of spruce budworm control in Newfoundland</td>
<td>YCWP</td>
<td>$22,550</td>
</tr>
<tr>
<td></td>
<td>Bennett, G.F.</td>
<td>Environmental impact of spruce budworm control in Newfoundland</td>
<td>Nfld. Dept. of Cons. Off. &amp; Environment</td>
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<tr>
<td>1975-76</td>
<td>Unavailable</td>
<td></td>
<td></td>
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<tr>
<td>1974-75 Olson, O.A.</td>
<td>Research on the biology and physiology of <em>Kalmia angustifolia</em></td>
<td>Env. Can. (forestry)</td>
<td>$9,000</td>
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</tbody>
</table>

**PSYCHOLOGY**

<table>
<thead>
<tr>
<th>Year</th>
<th>Name</th>
<th>Project Description</th>
<th>Funding Agency</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>1981-82</td>
<td>Lien, J.</td>
<td>Environmental education project</td>
<td>Nfld. Wilderness Society</td>
<td>$2,300</td>
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</tbody>
</table>


PROFESSIONAL SCHOOLS AND COMMUNITY SERVICES

1980-81 Rees, D. 
Newfoundland fuel peat demonstration project 
Gov't of Nfld. $240,000 
Algas $100,000 
Lundrigans (contract) $20,000 

1979-80 Rees, D. 
Peat fuel demonstration project ($902,000 for the period July 1979-Dec 1981) 
Gov't of Nfld. $180,000 
Algas $75,000 
Lundrigans (contract) $15,000 

1978-79 Rees, D. 
Economic Analysis of sawmilling industry in Newfoundland 
YCWP (contract) $9,120 

1977-78 Rees, D. 
Sawmill marketing 
YCWP $11,340 

EXTENSION SERVICES 
1974-75 Lee, G.E. 
Forestry study 
Nfld. $24,829 

Table H.2. Nfld. Memorial University

INTERNAL AWARDS

<table>
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<tr>
<th>Dept./Year</th>
<th>Title</th>
<th>Supporting Agency</th>
<th>Amount Awarded</th>
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<tr>
<td>GEOGRAPHY</td>
<td>1981-82 Sigursvinsson, S. Peatland utilization and livestock farming:</td>
<td>ISER</td>
<td>$3,787</td>
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<tr>
<td></td>
<td>A comparative study of resource development in Newfoundland and Iceland</td>
<td></td>
<td></td>
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<tr>
<td>1976-77</td>
<td>Crane, M. Land use analysis from light planes using colour infrared film</td>
<td>ISER</td>
<td>$240</td>
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<tr>
<td>HISTORY</td>
<td>1980-81 Hiller, J.K. History of the Nfld. forest industry to 1939</td>
<td>SSHRC General Grant</td>
<td>$750</td>
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<tr>
<td>POLITICAL SCIENCE</td>
<td>1976-77 Close, D. (Grenfell Coll)</td>
<td>ISER</td>
<td>$1,000</td>
</tr>
<tr>
<td></td>
<td>The development of agriculture policy in Newfoundland</td>
<td></td>
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</tr>
</tbody>
</table>

Source: Memorial University Research Inventory 1974-75 - 1987-88. 
Table H.2. Nfld.b. 
Source: President's Report 1986-87 Part II Faculty Activities (Service & Research) 

GEOGRAPHY 

BIOLOGY 


CHEMISTRY


PSYCHOLOGY


EDUCATION


ENGINEERING AND APPLIED SCIENCE


Table H.2.Nfld.c. Other publications found at the Centre for Newfoundland Studies.

GEOGRAPHY


HISTORY


BIOLOGY

ENGINEERING & APPLIED RESEARCH

Bajzak, D. and B.A. Roberts. 1984. A forest site classification for the boreal forest of central Newfoundland, Canada (B.28A) using a bio-physical-soils approach. Presented at the joint meeting of the Working Parties No. 1.02-06 and No. 1.02-10 of IUFRO on qualitative and quantitative assessment of forest sites with special reference to soil held in Birmensdorf, Switzerland on Sept. 10-15, 1984. 18 pp.

Bajzak, D. and B.A. Roberts. 1984. Mapping landtypes for forestry evaluation in the Lake Melville area Labrador, Canada. Presented at the joint meeting of the Working Parties No. 1.02-06 and No. 1.02-10 of IUFRO on Qualitative and Quantitative Assessment of Forest Sites with Special Reference to Soil held in Birmensdorf, Switzerland on Sept. 10-15, 1984. 12 pp.


EARTH SCIENCES


AGRICULTURAL SCIENCE

1988 Madden, J.L. and Halfeng Li (MagrSc candidate), Phytochemistry and chrysomelid defoliators, commenced 1987, APPM $14,000.


1987 Madden, J.L. Pests of Eucalyptus-defoliators, commenced 1974.

1986 Madden, J.L. Pests of Eucalyptus-defoliators.

1985 Collaborative work is also being undertaken by Dr. M.A. Line and the CSIRO on the inhibition of Eucalyptus delegatensis growth in tussock grasslands. Part of the funding of this work is provided by the timber industries of Tasmania.

1984 Possible microbial causes of dieback of eucalyptus delegatensis in high altitude Tasmanian soils is under investigation, as is the production of phytotoxins in forest soils where dieback of E. delegatensis is taking place.

1982 A grant was received from the Forest Ecology Research Board for studies on nitrogen transformations in forest soils.

1981 In a study with the Forestry Commission, the identity of the substance involved in attracting the beetle which initiates dieback in myrtles was confirmed.
BOTANY


Potts, B.M. Eucalyptus genetics, commenced 1987, donated funds $1,750.


1986 A grant of $20,599 from the World Wildlife Fund was used to support work on the conservation of endangered eucalypt species.


ENVIRONMENTAL STUDIES
1988 (see geography)


1986 Study of environmental values and their relationships to politics is a relatively new area of research in the Centre. Led by Dr. P.R. Hay, a group of research students investigated issues such as the degree to which the environmental paradigm fits traditional political value systems, environmental social theory and policy making, green politics, and deep ecology.


1985 Or. P.R. Hay joined the Centre in March and during the year began work on the structure of environmental ideologies and the nature of environmentalist political commitment.


1984 Research in environmental development, land use, and environmental policy continued under the supervision of Dr. R. Jones with studies on the Tasman Peninsula and South-West Tasmania.


GEOGRAPHY

1988 (Includes Environmental Studies)

The amalgamation of the Centre for Environmental Studies and the Geography Department saw the development of five major research themes, all of which were well supported by external funds and major publications.


Kirkpatrick, J.B. and N. Gibson, Geographic variation in the genesis of forest/grassland boundaries, commenced 1987, ARGS $10,600.

Kirkpatrick, J.B., R. Peacock (MSc prelim candidate), and P. Cullen (PhD candidate), Ecology and conservation of wet eucalypt forests, commenced 1987, Australian Heritage Commission $3,630.


ZOOLOGY


1986 Professor D.M. Stoddart was awarded a grant of $27,000 from the Forest Ecology Research Fund for a study of the population biology of Tasmania's endemic long-tailed mouse. This species, while not endangered, appears vulnerable to forest clearance.


ECONOMICS AND COMMERCE

1988 Pratt, D.J., The history of the Faculty of Economics and Commerce at the University of Tasmania, commenced 1986.


1987 Professor P. Pearse, a visitor to the department, wrote a major report for the Forestry Commission on forest tenures.

Hagger, A.J. Survey of the Tasmanian economy, Tasmanian economic status and prospects, economic contribution of visitors to national parks.

Madden, J. Multi-regional computable general equilibrium modelling, impact of housing assistance, economic contribution of national parks visitors, survey of Tasmanian economy, analysis of regional economic prospects.


LAW
1988 Bedding, J., World Heritage Convention as it relates to Australia, commenced 1988, thesis topic for PhD.


POLITICAL SCIENCE


1986 Dr. B.W. Davis continued his national and international role as a consultant on national resources management and heritage conservation.

Davis, B.W., Federalism, environmental politics, public sector management.


1984 Dr. Davis received an ARGS grant for his research on natural resources policy and continued to produce a number of reports and submissions to government.


SOCIIOLOGY


1987 Crook, R.K., The role of universities in modern societies, studied in cooperation with scholars in Canada and North America.


1986 Dr. J. Pakulski started a study of the environmental and anti-nuclear movement in Tasmania. The first stage of the study involved short interviews with over 250 participants in mass rallies and blockades around Tasmania.

Holloway, G. 1986. The Wilderness Society: The transformation of a social movement organization. Occasional Paper No. 4, Department of Sociology, University of Tasmania.

1984 Dr. Easthope initiated a study of the organisational form of the Tasmanian Wilderness Society.

Table H.2.Tas.b. Tasmania - Other publications from miscellaneous sources.

GEOGRAPHY


Kirkpatrick, J.B. 1986. The surviving large stands of old growth wet sclerophyll forest and mixed forest in Tasmania and a discussion of their importance for nature conservation. Unpublished.


POLITICAL SCIENCE


BOTANY


ZOOLOGY

Guller, E.R. He came to a lectureship in the University of Tasmania in 1947, retiring as reader in 1982. He has published over one hundred scientific papers, including six on the Tasmanian tiger, and has contributed to several books. His studies have taken him to the United States, Chile, Kenya, South Africa, and the Antarctic. In 1980 he was appointed a Member of the Order of Australia.


CHEMISTRY
1988 The University’s Chemistry Department signed two major research agreements with Industry during the year.

The first was with Australian Newsprint Mills for a five-year collaborative research program on the chemistry of pulp and paper-making. Under the terms of the agreement, the company will provide funding for the program which will be undertaken by Professor Frank Larkins and Dr. Michael Hitchman. A number of problems specifically directed at understanding the chemistry associated with pulp and paper-making from Australian hardwoods will be addressed. The grant will assist in the research training of young Tasmanians, and enable the University to help Industry remain internationally competitive.

PHYSICS
1988 The University’s first commercialised product and a major Tasmanian innovation which is set to revolutionise forestry work was successfully marketed this year. The laser ignition device is the product of a ten-year research program by physicists at the University of Tasmania. The prototype was developed by a Reader in Physics, Dr. Michael Waterworth. The device, which will cut costs and increase safety for forestry workers, has been taken up by Gold Coast laser manufacturer, Laser Dynamics, which plans to market the laser ignition device internationally.


Study Leave
ECONOMICS Economics of fishing, forestry and mining. Professor Harry Campbell, at Western Australia, New South Wales, Queen’s (Canada), British Columbia, Dundee and Sussex universities (26 weeks).

ENVIRONMENTAL STUDIES Developments in environmental political thought and preparation for a major study of fundamentals of ‘green’ theory. Dr. Peter Hay, at Universities of London and Edinburgh, and Coventry Polytechnic (16 weeks).


<table>
<thead>
<tr>
<th>Title</th>
<th>Supporting Agency</th>
<th>Amount Awarded (Aust. $)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AGRICULTURAL SCIENCE</strong></td>
<td></td>
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<tr>
<td>Phytochemical studies</td>
<td>Associated Forest Holdings Pty. Ltd.</td>
<td>$10,500</td>
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<tr>
<td><strong>BOTANY</strong></td>
<td></td>
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<tr>
<td>Conservation of endangered species of</td>
<td>World Wildlife Fund</td>
<td>$20,599</td>
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<tr>
<td>eucalypts</td>
<td></td>
<td></td>
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<tr>
<td><strong>CIVIL AND MECHANICAL ENGINEERING</strong></td>
<td></td>
<td></td>
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<tr>
<td>Seasoning of backsawn Tasmanian eucalypt</td>
<td>Tasmanian Timber Promotion Board</td>
<td>$1,398</td>
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<tr>
<td>species</td>
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<tr>
<td><strong>ENVIRONMENTAL STUDIES</strong></td>
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<tr>
<td>Wood heating research</td>
<td>Coal Corporation of Victoria</td>
<td>$32,192</td>
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<tr>
<td>Test method for domestic woodfuelled</td>
<td>Comalco Aluminium</td>
<td>$12,600</td>
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<tr>
<td>appliances</td>
<td>Dept. of Primary Industry and Energy - NERDCC</td>
<td>$25,079</td>
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<tr>
<td>Impact on air quality of domestic woodburning</td>
<td>Dept. of Primary Industry and Energy - NERDCC</td>
<td>$35,452</td>
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<tr>
<td>heaters</td>
<td></td>
<td></td>
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<tr>
<td>Antarctic environment studies</td>
<td>Dept. of Science, Antarctic Science Advisory Committee</td>
<td>$3,000</td>
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<td>Biomass brochure project</td>
<td>New Guinea Dept. of Minerals and Energy</td>
<td>$5,000</td>
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<td>Solid-fuel heater emission test method</td>
<td>Victorian Solar Energy Council</td>
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### GEOGRAPHY

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<thead>
<tr>
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<tr>
<td>Wet forest research</td>
<td>Dr. J. Kirkpatrick</td>
<td>$34,868</td>
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<tr>
<td>Forest resources</td>
<td>Forestry Commission</td>
<td>$1,500</td>
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### SURVEYING

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<th>Title</th>
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<tr>
<td>Geographic information systems</td>
<td>Lands Department</td>
<td>$65,125</td>
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### ZOOLOGY

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<tr>
<th>Title</th>
<th>Supporting Agency</th>
<th>Amount Awarded</th>
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<tbody>
<tr>
<td>Research on Bettongia gaimardi</td>
<td>National Parks and Wildlife Service</td>
<td>$27,000</td>
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<tr>
<td>Bat roosting requirements</td>
<td>Forest Ecology Research Fund</td>
<td>$35,000</td>
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<tr>
<td>Ecology of the long-tailed mouse</td>
<td>Forest Ecology Research Fund</td>
<td>$26,006</td>
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<tr>
<td>Ecology of the Tasmanian bettong</td>
<td>National Geographic Society</td>
<td>$16,242</td>
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Table H.2.Tas.d.

### OTHER PROJECTS

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<th>Amount Awarded</th>
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<tbody>
<tr>
<td>Gilfedder, L. (MSc student) &amp; Kirkpatrick, J.B.</td>
<td>Ecology and life history of rare Midlands native plants (commenced 1986)</td>
<td>Australian Bicentennial Environment Programme</td>
<td>$11,000</td>
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<tr>
<td>Hughes, J.M.R. (PhD student) &amp; Kirkpatrick, J.B.</td>
<td>Tasmania riverine plant ecology and hydrology (commenced 1983)</td>
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<tr>
<td>Kirkpatrick, J.B. &amp; Gibson, N. (Technical Officer)</td>
<td>Geographic variation in the genesis of forest/grassland boundaries (commenced 1987)</td>
<td>Australian Research Grant Scheme</td>
<td>$33,721</td>
</tr>
<tr>
<td>Kirkpatrick, J.B., Cullen, P.J. (MSc candidate) &amp; Peacock, R. (MSc prelim candidate)</td>
<td>Wet forest ecology (commenced 1987)</td>
<td>Australian Heritage Commission</td>
<td>$28,500</td>
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<tr>
<td>Kirkpatrick, J.B.</td>
<td>Conservation of native ecosystems of Tasmania</td>
<td>University Special Research grant</td>
<td>$2,200</td>
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<td></td>
<td>Conservation-development conflicts in Tasmania</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Synecology of grassy and alpine ecosystems (commenced 1984)</td>
<td></td>
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<tr>
<td>Nunez, M. Ahmad, W. &amp; Zwart, P.</td>
<td>Remote sensing of forest resources (commenced in 1987)</td>
<td>Tasmanian Forest Research Council</td>
<td>$59,700</td>
</tr>
<tr>
<td>Whinam, J. (PhD candidate) &amp; Kirkpatrick, J.B.</td>
<td>Biogeography, ecology and conservation of Sphagnum bogs. (commenced 1986)</td>
<td>Tasmanian Conservation Trust Inc. (National Estate Grant)</td>
<td>$14,000</td>
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<tr>
<td>Wilde, P.D., Hood, D.E. (PhD Candidate) &amp; Grosvenor, S. (MSc candidate)</td>
<td>Economic restructuring and employment change in Tasmania and its regions (commenced 1985)</td>
<td>University of Tasmania Research Grant</td>
<td>$4,500</td>
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</tbody>
</table>
Table H.2.AK. Alaska - Research - Individual (also see Alaska Institutes above - Table H.1.AK)


Table H.3. Student theses.

Table H.3.Nfld.a.

GEOGRAPHY


Robertson, A. Larch - wind


Peters, R.D. 1962. The mink ranching industry in Newfoundland. A dissertation submitted to the Faculty of Memorial Univ. of Newfoundland in partial fulfilment of the requirements for the degrees Bachelor of Arts (Honours) and Bachelor of Commerce. M.U.N. 61 pp.
PSYCHOLOGY

Hill, B.L. 1984. Wildlife related activities, attitudes and knowledge of the Newfoundland and Labrador public. Submitted to the Newfoundland and Labrador Wildlife Division, Dept. of Culture, Recreation and Youth. 146 pp.

ENGINEERING


Masters Theses at U.N.B. on a Newfoundland topic


Table H.3.Nfld.b. Bachelor of Science (Forestry) thesis by Newfoundlander’s 1959-1989 at University of New Brunswick.

<table>
<thead>
<tr>
<th>Year</th>
<th>Name</th>
<th>Thesis</th>
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</thead>
<tbody>
<tr>
<td>1989</td>
<td>Hatcher, P.J.</td>
<td><strong>Portable winch systems for commercial thinning in Newfoundland: Productivity costs and comparisons.</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Alternative management strategies for the Memorial University Research Forest.</strong></td>
</tr>
<tr>
<td>1988</td>
<td>*Carter, B.P.</td>
<td>Spruce budmoth, W. spruce, N.B.</td>
</tr>
<tr>
<td></td>
<td>*Harris, D.D.</td>
<td>Forest seedling production</td>
</tr>
<tr>
<td></td>
<td>*Kleavorick, P.W.</td>
<td><strong>The Importance of wildlife viewing potential in determining destination selection by summer campers at Gros Morne National Park.</strong></td>
</tr>
<tr>
<td></td>
<td>*Lingard, M.L.</td>
<td><strong>Promoting woodlot management in the Province of Newfoundland.</strong></td>
</tr>
<tr>
<td>1987</td>
<td>*Gushue, J.L.</td>
<td><strong>Growth analysis of black spruce from three different stand densities 7 years after pre-commercial thinning in central Newfoundland.</strong></td>
</tr>
<tr>
<td></td>
<td>*Forward, G.H.</td>
<td><strong>Field performance of container and bareroot seedlings in central Newfoundland.</strong></td>
</tr>
<tr>
<td></td>
<td>*Frampton, B.H.</td>
<td><strong>Height growth comparisons of various stock types two years after out planting in central Newfoundland.</strong></td>
</tr>
<tr>
<td></td>
<td>*Head, B.D.</td>
<td>Seed production area, N.B.</td>
</tr>
<tr>
<td></td>
<td>*Mercer, G.V.A.</td>
<td>Microsite - seedling establishment</td>
</tr>
<tr>
<td>1984</td>
<td>*Cook, B.F.</td>
<td>Forest recreation and N.B. pulp and paper industry</td>
</tr>
<tr>
<td></td>
<td>*Davis, R.F.</td>
<td>Forecasting softwood regeneration in mixed wood stands.</td>
</tr>
<tr>
<td></td>
<td>*Tucker, B.J.</td>
<td><strong>The extent of ground disturbance and natural regeneration patterns associated with bulldozed disturbances of Bowater Newfoundland Limited.</strong></td>
</tr>
<tr>
<td>1983</td>
<td>*Cheeks, D.R.</td>
<td>Spruce budworm egg parasite in N.B.</td>
</tr>
<tr>
<td></td>
<td>*Cleary, L.B.J.</td>
<td>Acid precipitation on lake systems.</td>
</tr>
<tr>
<td></td>
<td>Saunders, K. (Miss)</td>
<td>Ottawa Valley white spruce in N.B.</td>
</tr>
<tr>
<td>1982</td>
<td>*Upshall, J.R.B.</td>
<td>Black spruce provenance in N.B.</td>
</tr>
<tr>
<td>1981</td>
<td>*Moore, J.P.</td>
<td>Black spruce provenance in N.B.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year</th>
<th>Name</th>
<th>Thesis</th>
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<tbody>
<tr>
<td>1980</td>
<td></td>
<td><strong>Portable winch systems for commercial thinning in Newfoundland: Productivity costs and comparisons.</strong></td>
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<tr>
<td></td>
<td></td>
<td><strong>Alternative management strategies for the Memorial University Research Forest.</strong></td>
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<tr>
<td>1979</td>
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<td>Spruce budmoth, W. spruce, N.B.</td>
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<td></td>
<td>Forest seedling production</td>
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<tr>
<td></td>
<td></td>
<td><strong>The Importance of wildlife viewing potential in determining destination selection by summer campers at Gros Morne National Park.</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Promoting woodlot management in the Province of Newfoundland.</strong></td>
</tr>
<tr>
<td>1978</td>
<td></td>
<td><strong>Growth analysis of black spruce from three different stand densities 7 years after pre-commercial thinning in central Newfoundland.</strong></td>
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<td></td>
<td></td>
<td><strong>Field performance of container and bareroot seedlings in central Newfoundland.</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Height growth comparisons of various stock types two years after out planting in central Newfoundland.</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Seed production area, N.B.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Microsite - seedling establishment</td>
</tr>
<tr>
<td>1977</td>
<td></td>
<td>Forest recreation and N.B. pulp and paper industry</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Forecasting softwood regeneration in mixed wood stands.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>The extent of ground disturbance and natural regeneration patterns associated with bulldozed disturbances of Bowater Newfoundland Limited.</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Spruce budworm egg parasite in N.B.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Acid precipitation on lake systems.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ottawa Valley white spruce in N.B.</td>
</tr>
</tbody>
</table>
1981 (3)
Kelly, W.T.
Strong, G.D.
West, L.R.
**A tree improvement program for Newfoundland
Intensive silviculture in competing vegetation control
**The effect of spruce budworm defoliation on volume growth in precommercially thinned stands in central Newfoundland.

1980 (4)
Armstrong, B.J.
Burns, G.M.
McCarthy, J.W.
McGrath, M.J.
1979 (3)
Edwards, S.J.
Hearn, B.J.
Lambert, C.T.
1978 (7)
Alexander, H.J.
*Alexander, W.L.
*Day, D.T.
*Brazil, J.F.
Colbert, K.S.
*King, A.O.
*Masters, A.
1977 (2)
*Stratton, E.L.
*Sutton, K.F.
1976 (2)
Cahill, M.J.
Curran, W.J.
1975 (5)
Brown, W.A.
Garland, B.J.
Mercer, W.P.
O'Driscoll, L.J.J.
Williams, D.R.
1974 (3)
Anderson, R.J.
Butt, W.F.
Freeman, H.C.
1973 (8)
Aggas, R.J.
Bulley, E.F.K.
Burry, W.L.
Elliott, D.
Griffin, G.G.
Jones, E.R.
Oldford, G.C.
Small, O.G.
1972 (2)
Matthews, M.K.
Parsons, H.J.
1971 (5)
Joy, D.W.
Martin, W.S.
Mercer, R.D.
Sears, P.O.
**A regional recreation plan for western Newfoundland.
**Regeneration survey in Newfoundland.
**Newfoundland provincial parks policy and zoning of areas for recreation
Master plan for outdoor education at Minto, N.B.
Nutrient levels of spruce and balsam fir on fertilized soils.
Forest taxation in Nova Scotia
**The Zurich-Montpellier method of phytosociology and its application to peatland classification in western Newfoundland.

1970 (9)
Blackmore, E.J.
**A management plan for the Bay D'Espoir area of the province of Newfoundland.
Carter, N.E.
**A comprehensive review of the hemlock looper in Newfoundland.
Downton, I.N.
**Productivity of balsam fir and black spruce in Newfoundland based on observations from permanent sample plots.
Etheridge, P.G.
Direct seeding of burned-over areas.
Hustins, D.G.
**The relationship between several site factors and the productivity of balsam fir in eastern Newfoundland.
Kelly, A.J.
Forestry haul roads.
Serveau, J.E.
Parasite of European pine shoot moth.
Smith, S.M.
The organization and management of different types of agreement forest.
Taylor, H.G.
**Resource management plan for the Roddickton area.

1969 (4)
Byrne, W.P.
Canning, S.G.
Earla, F.M.
Stanley, H.H.
1968 (3)
Case, A.B.
Sharpe, D.T.
White, A.F.
1967 (2)
Husk, C.F.
Marsh, E.C.
1966-1962
None
1961 (1)
Munro, J.A.
**Forest management on crown lands in Newfoundland.
1959 (1)
Saunders, G.L.
**Conservation Education among Newfoundland youth.

*Noted in U.N.B. Forestry Focus 1988-1977
**Thesis on Newfoundland topic

Forest Engineering BScFE Thesis noted in U.N.B. Forestry Focus.


<table>
<thead>
<tr>
<th>Year</th>
<th>Name</th>
<th>Title</th>
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<tbody>
<tr>
<td>1989</td>
<td>Cormier, G.</td>
<td>Shortwood forwarder productivity: A Newfoundland study.</td>
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<tr>
<td>1984</td>
<td>None</td>
<td>No engineering thesis listed at all.</td>
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</tbody>
</table>

BOTANY

1987

1986
Davidson, N.J. 1986. Eco-physiological studies of factors determining the distribution of subalpine eucalypts at Snug Plains, S Tas. Ph.D.


1985

1984
Potts, B.M. 1983. Hybridization and cline variation in some Tasmanian eucalypts. Ph.D.
ENVIRONMENTAL STUDIES

1988 (see Geography)


1986

Piller, G. 1986. Sustained yield in Tasmanian forest management: An examination of the conflicts between sustained yield management and the provision of non-wood values. M.Env.St.


1985


1984


1981


PoliTICAL SCIENCE

1988


1982


SOCIOLOGY
### Table H.3.Tas. Student thesis and projects.

**RESEARCH PROGRAMS DEALING WITH LAND BASED NATURAL RESOURCES AND POLICY IN TASMANIA AT THE DEPARTMENT OF GEOGRAPHY AND ENVIRONMENTAL STUDIES, UNIVERSITY OF TASMANIA**

<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
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<tbody>
<tr>
<td>Carlington, B. (Ms)</td>
<td>National parks management in Tasmania.</td>
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<tr>
<td>Skira, I. PhD student</td>
<td>History of the mutton birding industry/regulation in Tasmania.</td>
</tr>
<tr>
<td>Flanagan, R. PhD student</td>
<td>History of the environment movement in Tasmania.</td>
</tr>
<tr>
<td>Stadler, T. (Ms) PhD student</td>
<td>Land degradation in south-eastern Australia, policy history.</td>
</tr>
<tr>
<td>Barker, P. PhD student</td>
<td>Forest ecology</td>
</tr>
<tr>
<td>Scott, J. PhD student</td>
<td>Vegetation disturbance due to grazing on Macquarie Island.</td>
</tr>
<tr>
<td>Wardman, R. PhD student</td>
<td>Tasmanian eucalypts: Ecology, taxonomy and distribution.</td>
</tr>
<tr>
<td>Gilfeddr, L. (Ms) MSc student</td>
<td>1. Rare plants from remnant lowland grasslands of Tasmania's midlands.</td>
</tr>
<tr>
<td></td>
<td>2. Rare plants in Tasmania's world heritage area</td>
</tr>
<tr>
<td>Crowley, K. (Ms) Masters student in Environmental Studies Research</td>
<td>Industrial policy and environmental conflict in Tasmania using power analysis as a conceptual framework.</td>
</tr>
</tbody>
</table>

#### Other Student Theses


Centre for Environmental Studies. Number of graduates by year of completing their course (1986 and 1987 figures include students who have submitted their thesis for examination) Source: Modified from: Todd, 1987. p. 7. Table 3.

<table>
<thead>
<tr>
<th>Year</th>
<th>Master Coursework</th>
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<td>7</td>
<td>-</td>
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<tr>
<td>1977</td>
<td>11</td>
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<tr>
<td>1978</td>
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<td>1979</td>
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<tr>
<td>1982</td>
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<td>1983</td>
<td>6</td>
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<td>1984</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>1985</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>1986</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>1987 (March)</td>
<td>1</td>
<td>1</td>
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<tr>
<td>TOTAL</td>
<td>60</td>
<td>4</td>
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### Table H.3.AK.a. Number of thesis produced through Alaska Cooperative Wildlife Research Unit by general subject area. M.S.

<table>
<thead>
<tr>
<th>Animal Type</th>
<th>Total</th>
<th>1950's</th>
<th>1960's</th>
<th>1970's</th>
<th>1980's</th>
<th>Ph.D. Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moose</td>
<td>8</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>1</td>
<td>1976</td>
</tr>
<tr>
<td>Caribou</td>
<td>9</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Reindeer</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blacktail Deer</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Whitetail Deer</td>
<td>5</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Muskrat</td>
<td>5</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
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Selected List of Theses completed by Students working with the support of the Alaska Cooperative Wildlife Research Unit


**Smith, M.C.** 1967. Red squirrel (Tamiasciurus hudsonicus) ecology during spruce cone failure in Alaska.

**Streubel, D.P.** 1968. Food storing and related behavior of red squirrels (Tamiasciurus hudsonicus) in interior Alaska.


**Salo, L.J.** 1970. A comparison of management practices and economic importance of moose, muskrat, hare and ptarmigan in Alaska and Finland.


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<td>Wilhelm, R.D., II.</td>
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<td>Ph.D. Dissertation Seasonal patterns of nitrogen mineralization and nitrification following harvesting in the white spruce forests of interior Alaska. Univ. of Alaska Fairbanks.</td>
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<td>Masters Thesis Height growth of Larix laricina (Du Roi) K. Koch on a variety of sites in interior Alaska. Univ. of Alaska Fairbanks.</td>
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<td>Ph.D. Dissertation Investigations into some of the major controls on the productivity of a black spruce (Picea mariana [Mill.] B.S.P.) forest ecosystem in the interior of Alaska. Univ. of Alaska Fairbanks.</td>
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APPENDIX I. SERVICE FUNCTIONS BY UNIVERSITIES IN NEWFOUNDLAND, TASMANIA, AND ALASKA.

Table I. Nfld. Memorial University service.

M.U.N. Extension Service

Conferences

1971 Lewisporte area conference - Developing natural resources.
1971 Agricultural development conference
1971 Happy Valley development conference
1978 Sawmills conference
1980 Public participation in resource development assessment
1980 Forum on resource education for educators and leaders of youth groups.
1986 The power of alternatives (wood/peat)
1987 A design for development?
1987 Regional forums on self reliance.

Seminars

1978 Newfoundland and Labrador dependency or development.
1989 The Newfoundland rural economy: Past, present and future (fishery, forestry, agriculture, mining) co-sponsored by CUSO

Resource Camps

1978 Forestry Pasadena, Bonne Bay 16 students
1979 Forestry Dowd Lake (Bishops Falls) 14 students
1980 Forestry Dowd Lake (Bishops Falls) 16 students
1981 Forestry Sandy Camp (Grand Falls) 19 students

Decks Awash

February 1979 Vol. 8 No. 1 Sawmilling
February 1984 Vol. 13 No. 1 Conservation and the environment

Special Studies

1974 A study of the image of the wood harvesting sector of Newfoundland's forest industry.
1979 Forest resource inventory, Fogo Island

OTHER DEPARTMENTS

GEOPGRAPHY

1984-85 Forestry in Newfoundland seminar series

BIOLOGY

1987-88-89 Biology summer camps
1971 Short course on environmental education
1977-Present Memorial University Botanical Garden at Oxen Pond, Interpretation Centre.
1958 MUN co-sponsor of conference on prescribed burning in forestry, agriculture and wildlife management.
1959 MUN co-sponsor of symposium on land use. Newfoundland Research Committee.

Individual Service

1980-81 Dr. C. Poole Principal, Grenfell College Chairman, Royal Commission on forest protection and management.
1986 Dr. D. House, Director ISER Chairman, Royal Commission on employment and unemployment.
1973 Dr. G.A. Royce, Dept. of Economics Member of capital and labour productivity and availability committee of the federal/provincial task force on forestry.
1973
G. Billard, D. Curran, D.L. Hull
Submitted brief to task force on forestry.

1980-81
Dr. D.H. Rendell
Dr. J.M. Kerr, Dean forestry, U.N.B.
Written submission to Royal Commission on forest protection and management.

1984,85,86
Dr. J. Lien
Speaker at Newfoundland section C.I.F. annual meeting
Founding president The Wilderness Society of Newfoundland and Labrador


Lien, J. Member of Advisory Committee for development of resource curricula by the Department of Culture, Recreation and Youth, Government of Newfoundland and Labrador.

Lien, J. Member of Advisory Committee for development of wilderness education materials. Gov't. of Newfoundland and Labrador.


Lien, J. Chairman of Board, Heritage Foundation for Terra Nova National Park. Director, Wilderness Society of Newfoundland and Labrador. Member, Ray Simmons Great Outdoors Program.


Nicol, K. Hiking, skiing, outdoor recreation articles in popular journals.

Larson, D.J. Forest Spray Review Committee, Newfoundland Department of Environment.


Montevecchi, W.A. Executive member (past President) Natural History Society of Newfoundland and Labrador.


Membership in Organization
The Natural History Society, large percentage of members are M.U.N. professors and staff (see Appendix G)

The Wilderness Society (see Appendix G)
Table 1. Tas. University of Tasmania service.

Environmental Law Reform Group

(Comprised of: -Ralph Chapman, Senior Lecturer in Administration
-Bruce Davis, Senior Lecturer in Administration
-Richard Jones, Senior Lecturer in Botany, Co-ordinator Master of Environmental Studies
-Sam Lake, Senior Lecturer in Zoology
-Derek Roebuck, Professor of Law
-Colin Winkler, Tutor in Administration)


CONFERENCES

1982. Symposium on Tasmanian rainforests - Recent research results.


1987. The tall eucalypt workshop (Brown et al., 1987). Participants:
Prof. Bill Jackson Botany Department, Univ. of Tasmania
Dr. Jamie Kirkpatrick Geography Department, Univ. of Tasmania
Dr. John Madden Agricultural Science, Univ. of Tasmania
Dr. Jim Reid Botany Department, Univ. of Tasmania
Dr. Alastair Richardson Zoology Department, Univ. of Tasmania
Prof. Mike Stoddart Zoology Department, Univ. of Tasmania

1987. Ecopolitics Conference (organized by Dr. Peter Hay)
"One of the highlights of the year was the Ecopolitics Conference organised by Dr. Peter Hay. Some 300 people attended including leading politicians and academics."
(Source: University of Tasmania Annual Report, 1987. p. 10.)

OTHER INDIVIDUAL SERVICE


R. Jones
-1971 Lake Pedder Action Committee
-1972 United Tasmania Group (Greens Party)
-1973-82 Vice president Australian Conservation Foundation
-Founder of Centre for Environmental Studies - Univ. of Tas.
-University of Tasmania - Richard Jones Memorial Lecture established in his name after accidental death in 1986
-World's First Greens Party (started by R. Jones, Univ. of Tasmania)
"The inaugural Richard Jones Memorial Lecture was given by British 'green' political activist Jonathon Porritt and drew an audience of 600."
(Source: University of Tasmania Annual Report, 1987. p. 10.)

-1983 Delegate to National Conservation Strategy Conference held in Canberra (June 10-13)

Kirkpatrick, J.B.
"In April Dr. Jamie Kirkpatrick, Reader in Geography, received an Australian Heritage Award at Rippon Lea homestead in Melbourne. Dr. Kirkpatrick won the award for his outstanding contribution
to the preservation of Australia's heritage, which also won him a place in the finals of the Bicentennial BHP Awards for the Pursuit of Excellence."
(Source: University of Tasmania Annual Report, 1987. p. 16.)

- Consultant's reports. 1988:
  - Mapping of tall eucalypt communities in Tasmania.
  - Botanical status of the Lemonthyme and Southern Forests.


- 1984. Documents taken into Evidence of the Legislative Council Select Committee on State Forestry:


Kirkpatrick, J.B. 1986. Known significance of that part of the Western Tasmania National Heritage Area that lies within the boundaries of the former Australian Paper Manufacturers concession. Report to Australian Heritage Commission.


Norm Sanders earned a Ph.D. Geomorphology Univ. of Tasmania.
- Lectured in Environmental Studies
- Elected to State Parliament In February 1980
- Also 2nd Director of the Tasmanian Wilderness Society
- Author of book "A Time to Care: Tasmania's Endangered Wilderness"


"Harry Bloom, emeritus professor of chemistry at the University of Tasmania, was quoted in the Hobart Mercury newspaper as saying the developers 'seemed to regard Tasmania as a bunch of ignorant islanders.'" In reference to proposed Welsleyvale pulp mill.
Dr. B.W. Davis

"Bruce W. Davis is a Senior Lecturer in Administration in the Department of Political Science, University of Tasmania. Mr. Davis possesses qualifications in engineering, economics and administration and has numerous publications within the fields of natural resources management. He is a consultant and adviser to a number of government agencies at State and Commonwealth levels.

- Chairman, South West Tasmania Committee, advising State Cabinet on Land-use matters in the South-West Conservation Area.
- Chairman, Tasmanian Interim Heritage Committee
- Commissioner, Australian Heritage Commission
- Author, portion of National Conservation Strategy
- Past President, Tasmanian Conservation Trust.
- Councillor, Australian Conservation Foundation.
- Delegate, International Union for the Conservation of Nature."
(Source: Senate Standing Committee on Science, Technology and the Environment. p. 2108.)

-Gave testimony at the Senate Standing Committee on Science, Technology and the Environment. (Reference: Land use policy)
Held in Hobart on Tuesday, 17 April 1984. pp. 2106-2139.

1983. Delegate to National Conservation Strategy Conference held in Canberra (June 10-13)

Dr. A.J. Kellow

"Dr. Aynsley John Kellow, Lecturer, Centre for Environmental Studies, University of Tasmania, Hobart, Tasmania, was called and examined."
(Source: Senate Standing Committee on Science, Technology and the Environment. p. 2199.)

-Gave testimony to the Senate Standing Committee on Science, Technology and the Environment. (Reference: Land use policy)
Held in Hobart on Tuesday, 17 April 1984. pp. 2199-2216.

Dr. W.D. Jackson, Prof. of Botany. Species location maps for eucalypt trees in his book "Forest Trees of Tasmania" 1981

Table I.A1. University of Alaska service.

UNIVERSITY OF ALASKA PRESS
1963 The Land Resources of Alaska
1984 Environmental Atlas of Alaska
1986 Alaska Trees and Shrubs

COOPERATIVE EXTENSION SERVICE
Newsletters
1968-present Alaska Forest Products newsletter
1981-present Alaska Branching Out

Publications:

Land Economics (Land Use Planning)
A-00011 Answers to questions about land & living in Alaska.
A-5-050 1/2" videocassette T120 - Land & resource management (Part 1, 2 & 3)
A-6-050 1/2" videocassette T60 - Land Use Planning
A-6-052 Land use planning workbook

Forestry
A-0-060 The spruce beetle in Alaska's forests
A-0-061 Carpenter ants: Insect pests of wood products
A-0-062 Gall & woolly aphids on spruce & hemlock
A-0-063 Birch aphids
A-0-064 Wood boring insects in Alaska
A-0-065 Celebrate Arbor Day - A guide for schools
A-0-066 Insects & diseases of Alaskan forests
A-0-0335 Transplanting trees successfully

Proceedings:


Publications written for other Organizations:
Gasbarro, T. Land and resource management.

Institute of Northern Forests Guide to Alaska Trees

ISER (Anchorage)
1974
Alaska growth policy - A discussion of issues

1976
Alaska Lands Symposium - Yale school of Forestry and Environmental Studies. Dr. George Rogers, participant.

1980

Other University of Alaska co-sponsored Conferences
1977
North American forest lands at latitudes north of 60 degrees

1984
Inventorying forest and other vegetation of the high latitude and high altitude regions

1986
Alaska soil survey and land use workshop

1987
Alaska forest soil productivity workshop

Individual Contributions to Conferences
1984
E.C. Packee
Forest industry opportunities in Interior Alaska


Packee, E.C. 1988. Assistant professor of forest management, presented an invited paper, "Larch in North America," at the Northern Forest Silviculture and Management Symposium held in Lapland, Finland, in August. The symposium was sponsored by the International Union of Forest Research Organizations (IUFRO) Working Party SI.05-12 which includes participants from countries which have northern forests. Dr. Packee is working party chairman and in that capacity will be participating in a similar symposium in Heilongjiang Province of the People's Republic of China in September 1988. The working party evolved from a series of annual workshops initiated in 1979 by the School of Agriculture and Land Resources Management of the University of Alaska Fairbanks. The symposium in Finland was the ninth annual meeting of the group. While in Scandinavia, Dr. Packee observed forestry practices and research projects in Sweden and southern Finland. Agroboiass. 20(1): 42.

OTHER PUBLIC SERVICE

INDIVIDUAL MEMBERSHIPS

Land Use Advisors to Federal-State Alaska Land Use Council


Dr. J.C. Kim, School of Business and Public Affairs, Univ. of Alaska, Anchorage. Member 1985.


Mr. S. Colt, Assistant professor of Economics, Univ. of Alaska, Anchorage. Member 1988.

Weeden, R.B., Alaska Conservation Representative employed by coalition of local and national conservation groups to lobby in Alaska Legislature, 1969-70.

- Director of Division of Policy Development and Planning, Office of the Governor. 1975-76.


A six volume series published between 1974 and 1977 was prepared under her direction. Univ. of Alaska, Arctic Environmental Information and Data Center. (Source: Joint federal-state land use planning commission for Alaska, May 30, 1979, p. 12.)

V. Fischer, Former ISER Director, Several terms in Alaska State Senate.
### Table J.1. Newfoundland environmental groups active in land use issues.

<table>
<thead>
<tr>
<th>The Natural History Society of Newfoundland and Labrador (St. John's)</th>
<th>The Wilderness Society (St. John's)</th>
<th>Tuckamore Wilderness Club (Corner Brook)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Year established</strong></td>
<td>1929 (several starts since 1929) 1965 (in its present form)</td>
<td>1980</td>
</tr>
<tr>
<td><strong># of members</strong></td>
<td>Less than 100</td>
<td>Less than 100</td>
</tr>
<tr>
<td><strong>% Academics</strong></td>
<td>Approximately 50%</td>
<td>Approximately 50%</td>
</tr>
<tr>
<td><strong>Paid Staff</strong></td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td><strong>Publications</strong></td>
<td>-The Osprey (since 1970)  -Field Checklist of the Birds of the Island of Newfoundland</td>
<td>Environmental Education Resource Directory for Newfoundland and Labrador</td>
</tr>
<tr>
<td><strong>Main Purpose</strong></td>
<td>-Conservation of Newfoundland's plants and animals.  -Encourage interest in all forms of nature study.</td>
<td>To provide well informed input into government and private resource development</td>
</tr>
<tr>
<td><strong>Other Notes</strong></td>
<td>Several presidents members of Memorial University. Largest and oldest conservation group in Newfoundland</td>
<td>Founding president and secretary members of Memorial University</td>
</tr>
<tr>
<td><strong>Major Issues</strong></td>
<td>Has lobbied Federal and Provincial governments on several issues primarily through letters published in Osprey</td>
<td>Vocal public advocacy group on forest spraying, Main River, pine marten, wilderness areas.</td>
</tr>
</tbody>
</table>
Table J.2. Tasmania environmental groups active in land use issues.

<table>
<thead>
<tr>
<th></th>
<th>Tasmanian Conservation Trust Incorporated</th>
<th>The Wilderness Society</th>
<th>Australian Conservation Foundation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Year established</strong></td>
<td>1968 (Hobart)</td>
<td>? (Hobart)</td>
<td>? (Hobart)</td>
</tr>
<tr>
<td><strong># of members</strong></td>
<td>Several hundred</td>
<td>Large membership Australian wide</td>
<td>3,785 (in 1987) Australia wide</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(more than 100 in Tasmania)</td>
</tr>
<tr>
<td><strong>% academic</strong></td>
<td>High</td>
<td>?</td>
<td>3/35 Councilors for 1988/89 are</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>university faculty</td>
</tr>
<tr>
<td><strong>Paid Staff</strong></td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td><strong>Publications</strong></td>
<td>-The Tasmanian Conservationist (since 1968)</td>
<td>-Wilderness News (since 1979)</td>
<td>-Conservation News (since 1968)</td>
</tr>
<tr>
<td></td>
<td>-Forest Industry Strategy for Tasmania</td>
<td>-Branching Out (Newsletter)</td>
<td>-Habitat Australia</td>
</tr>
<tr>
<td></td>
<td>-Others</td>
<td>-Several Visitors Guides to Heritage Forests</td>
<td></td>
</tr>
<tr>
<td><strong>Main Purpose</strong></td>
<td>To make every effort to ensure that the land, water, and other resources of Tasmania and the Commonwealth are used with wisdom and foresight and that competing demands on them are resolved in the best long term interests of the State and Nation.</td>
<td>A society to foster wilderness</td>
<td>Conservation, World Heritage</td>
</tr>
<tr>
<td><strong>Major Issues</strong></td>
<td>All environmental issues.</td>
<td>Wilderness World Heritage Sites</td>
<td>All environmental issues.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Forests</td>
<td></td>
</tr>
<tr>
<td><strong>Other Notes</strong></td>
<td>-First president of the Trust, Dr. J.L. Davis, Geography, Univ. of Tasmania</td>
<td>-Former Director now a &quot;Green&quot; member in the Tasmanian Parliament.</td>
<td>1973 changed from conservation club to a lobby group more critical of governments. Dr. R. Jones at the centre of this change.</td>
</tr>
<tr>
<td></td>
<td>-Opposed amalgamation of Univ. of Tas Centre for Environmental Studies and Geography Dept. (Tas. Cons. No. 197, June/July 1987)</td>
<td>-Wilderness shops in 9 locations (3 in Tasmania)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-Held a public meeting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>National Audubon Society (Anchorage)</td>
<td>Alaska Center for the Environment (Anchorage)</td>
<td>Northern Alaska Environmental Center (Fairbanks)</td>
<td>Southeast Alaska Conservation Council (Juneau)</td>
</tr>
<tr>
<td>-------------------------------------</td>
<td>-----------------------------------------------</td>
<td>-----------------------------------------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td><strong>Year established</strong></td>
<td>1914 (Alaska)</td>
<td>1971</td>
<td>1969</td>
</tr>
<tr>
<td><strong># members</strong></td>
<td>2,600 (Alaska)</td>
<td>One of the largest Alaska-based</td>
<td>Coalition of 12 southeast Alaska groups (1970 - 1987)</td>
</tr>
<tr>
<td><strong>% academic</strong></td>
<td>?</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td><strong>Paid staff</strong></td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td><strong>Publications</strong></td>
<td>Center News</td>
<td>The Northern Line</td>
<td>Ravencall</td>
</tr>
<tr>
<td><strong>Main Purpose</strong></td>
<td>Believes sound economic growth can be achieved without loss of environmental quality</td>
<td>Environmental advocacy and education.</td>
<td>Last Stand for the Tongass National Forest</td>
</tr>
<tr>
<td><strong>Major Issues</strong></td>
<td>Broad Interests</td>
<td>State land management</td>
<td>Wise use and conservation of southeast Alaska's natural resources</td>
</tr>
<tr>
<td><strong>Other Notes</strong></td>
<td>Trailside Discovery Camp (Env. ed. programs)</td>
<td>Tongsess National Forest</td>
<td>Also has Washington, D.C. office</td>
</tr>
</tbody>
</table>

Note: There are 61 different environmental groups in Alaska.
5 of these are Alaska-based staffed organizations with offices in Alaska.
6 National groups have staffed offices in Alaska.
2 Staffed environmental law firms
5 Statewide coordinating bodies including the Alaska Lands Act Coordinating Committee