MASTER'S THESIS

M-1079

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THE GROWTH OF SCIENTIFIC RESEARCH IN CANADA:
ITS IMPLICATIONS FOR A NATIONAL FOREST POLICY
AND THE PLANNING OF FEDERAL FORESTRY RE-
SEARCH.

Carleton University, M.A., 1966

Political Science, public administration

University Microfilms, Inc., Ann Arbor, Michigan

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AND THE PLANNING OF FEDERAL FORESTRY RESEARCH

By

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A thesis submitted to Carleton University:
partial fulfillment of the requirements
for the degree of Master of Arts in
Public Administration.

School of Public Administration
Carleton University
Ottawa, Canada.
August, 1966.

ABSTRACT

Part of this thesis deals with the growth of scientific activity in Canada and the concomitant need to co-ordinate most of this growth which has been conducted under the aegis of the federal government. The recent action taken by the federal government in setting up both the Science Secretariat and the Science Council is discussed, and the observation is made that in the years ahead the Science Secretariat will be increasingly called upon to give advice on the determination of research priorities for Canada, thus playing a decisive role in the allocation of already scarce resources for scientific research.

Most of the thesis is concerned with one area of the scientific quest: forestry research. Through interviews, correspondence, the extensive use of quotations from original and secondary sources, an attempt is made to clearly show that it is federal government policy that forestry in Canada should evolve as rapidly as possible so as to be able to hold its own in this new era of technology and science with which it finds itself intrinsically involved.

The reorganization of the Department of Forestry and Rural Development to fit this need is discussed, and a critical analysis is made of certain value orientations held by professional foresters. The conclusion is made that foresters may find that, in this new era of scientific advancement, their assumed role as forest land managers is in danger of being usurped by other highly-trained and competent groups within the social sciences and scientific communities.

ACKNOWLEDGEMENTS

I have always been skeptical of acknowledgements: most of them appear to be either gleeful exercises by indulgent masochists, or inflictions imposed on proud authors in order to deflate their distended egos.

The past nine months, however, have cured me of all such suspicions. The credit goes to the many people who contributed significantly to the information in this thesis. Not to have acknowledged their contributions would have been downright plagiarism. A special thanks goes to Dr. J. R. Weir, Deputy Director of the Science Secretariat, who gave many hours of his precious time to answer my frenzied questions with studied patience and good humour. Dr. Weir discussed with me the significance of the Secretariat, his hopes for scientific development in Canada, and readily made available to me all pertinent speeches and documents apropos to my thesis topic.

Thanks are also due to Mr. R. H. Dowdell, Chief of Personnel, Department of Forestry, who originally suggested to me a topic dealing with the planning and co-ordinative aspects of federal forestry research. However, as the months went by, and correspondence and interviews were conducted, the wider implications of such research work became more evident, necessitating a study which I have found extremely fruitful. Throughout all this time Mr. Dowdell gave of his precious time, answered my questions when feasible, and helped in no inconsiderable way in facilitating interviews and obtaining information needed to complete this thesis.

I should also thank Professor A. M. Willms for his critical analysis of the first half of this manuscript, and on the whole, supervising my work. This thesis had the potentialities of mushrooming into a magnum opus. Professor Willms, however, was instrumental in limiting its size and relevance. Lastly, my sincere thanks go to the staffs of the Parliamentary Library, the Public Archives of Canada, and the Library of the Department of Forestry and Rural Development.

All conclusions arrived at in this work are my own. All my correspondents were also informed that although I solicited their views on the topic because of their expertise, I, however, reserved the right to interject any critical analysis I deemed necessary after considering their views and other relevant material.

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CHAPTER I

THE GROWTH OF SCIENTIFIC RESEARCH IN CANADA: CONCOMITANT PROBLEMS AND PROFFERED SOLUTIONS

With the increasing importance of science to technology, and, incidentally, to defence, science has relatively recently and suddenly begun to impinge on government policy. Under these circumstances the need for government scientific facilities and permanent advisers has arisen, and there has been an enormous increase in government science. The fact that science has become a matter of government policy and interest has brought with it the customary advantages and disadvantages. Public interest always means increased support, but also always means increased control and diminished freedom. The reconciliation of these two opposing factors in government, in industry, and even in universities, is the most important problem facing science in the next decade or two.¹

In this most pungent and aphoristic style, the late President of the National Research Council of Canada, Dr. E. W. R. Steacie, clearly enunciated the central dilemma facing modern science. Within scientific and political circles in Canada, and indeed in many parts of the world, Dr. Steacie's views on the growth of scientific research are well known. Naturally, he welcomed any growth of first-class research, but he viewed with alarm any statements coming from the "empire builders" who "are always with us",² calling for the planning and co-ordination of

¹ E. W. R. Steacie, Science in Canada: Selections from the Speeches of E. W. R. Steacie, J. D. Babbitt (ed.), (Toronto: University of Toronto Press, 1965), p. 118.

² Ibid., p. 130. See also pp. 132, 133.

scientific research. The august scientist and administrator conceived such planning "as an evil, even if it is an essential evil".³

During his lifetime Dr. Steacie frankly admitted that he had conceived of no concrete answers to this central dilemma. Scientific research in any industrialized society today calls for a tremendous outlay of funds. Who then must call the tune? If the tune is to be called by the scientific quest itself, what conceivable motive will be his who pays the piper? It is possible that Dr. Steacie saw fit to argue in this vein because of the alarming statements about the control of science emanating from supposedly responsible political and social circles.⁴ However, we are still left with the questions which must be answered: What is good or bad research? How much money must a government allocate for scientific endeavours? How are these funds to be divided? In reality, to borrow Harold Laswell's theme, who gets what, when, and how?

In this fierce competition for funds many view with some misgivings the accompanying growth of scientific bureaucracy. "Big Science", it is claimed, is spending money instead of thought, there are too many administrators, and the injection of the journalistic flavour into "Big Science" tends to upgrade the spectacular rather

³Ibid., p. 131.

⁴This has been particularly true for at least the last decade because of the tremendous interest and activity in technology. For example, in 1961 the U. S. Senate Sub-committee on National Policy Machinery expressed the preposterous notion that science "is a tool . . . , an instrument for accomplishing things having nothing to do with science." Quoted in Carl F. Stover, The Government of Science (California: The Fund for the Republic Inc., 1962), p. 40.

than the perceptive.⁵ In the United States it has been calculated that the rate of change of the country's research and development budget corresponds to a doubling time of seven years. Since the doubling time of the Gross National Product is about 20 years, this means that at the present rate the United States will be spending all of its money on science and technology within the next sixty-five years.⁶ Evidently this will not be allowed to occur, but the gravity of the problem can be clearly seen from this calculation. It is useless to argue that scientific research must not be planned or co-ordinated. Less than forty years ago it was A. N. Whitehead who poignantly pointed out that "the greatest invention of the nineteenth century was the invention of the method of invention".⁷ Imaginative planning and co-ordination must be resorted to if the vast store-house of scientific knowledge man has so far discovered, and is yet to discover, is to be utilized for the benefit of mankind. Rather, the germane question to which mankind must address itself is, how must this be done to ensure efficiency on the one hand, while, at the same time, preventing the stifling of scientific inquiry brought about by an all-encompassing, ubiquitous bureaucracy? This, indeed, is a matter of high national policy.

It has been observed that major scientific discoveries occur, not in increasing numbers as the number of scientists increases, but rather in bursts which themselves resemble the character of the biological sigmoid growth curve; a slow growth rate in infancy, a maximum period of growth in adolescence, and a marked decline in the growth

⁵ Alvin M. Weinberg, "Impact of Large-Scale Science on the United States", Science, July 21, 1961. Vol. 134, pp. 161-164. See also the searching article by D. R. Flemming, "The Big Money and High Politics of Science", The Atlantic Monthly, Vol. 216, 1965, pp. 41-45.

⁶ Weinberg, op. cit., p. 163.

⁷ A. N. Whitehead, Science and the Modern World, Twelfth Reprint; Cambridge: University Press, 1953), p. 120.

rate in maturity.⁸ It is evident that the world today is witnessing a tremendous growth in science, an adolescent period, as it were. This fact has been rather cogently stated in the book, Canada: An Appraisal of its Needs and Resources:

. . . what characterized the great bulk of research and development (R and D) prior to, say, 1940 was its ad hoc, generally unorganized nature especially as far as business was concerned. Even in government and the universities, however, the scale of research efforts, if more highly organized and more of a continuing activity than in business, was relatively small. Since 1940, and especially following the successful splitting of the atom, a veritable "industry of discovery" has grown up in all the highly developed countries of the world. If R and D was small-scale, sporadic, and unappreciated as a separate activity only two decades ago, today it is big business growing bigger, obviously here to stay and in danger of receiving accolades out of all proportion to possible results.⁹

In Canada, one of the indices of such growth has been the impressive allocation of funds to the National Research Council. Table I shows that between 1954 and 1963, a period of 9 years, the National Research Council's annual budget increased from \$13 million to \$38 million, a growth of \$25 million. The earlier period between 1920 and 1940 also shows a spectacular annual increase of close to \$1 million. Most of this growth, however, has occurred in the physical sciences (physics, mathematics and chemistry), the main reason for this being that growth in research activity was a direct result of the need for research for defence purposes, and, as a consequence, the physical

⁸

Dr. J. R. Weir, Deputy Director of the Scientific Secretariat, in a speech entitled "Science and National Development", delivered at Guelph, Ontario, February 2, 1966.

⁹

George W. Wilson, Scott Gordon, et al., Canada: An Appraisal of its Needs and Resources, (Toronto: University Of Toronto Press, 1965), p. 359.

TABLE I*

National Research Council: Operating Expenditures excluding expenditures for buildings, services rendered by other departments, and non-research activity selected years 1916-63.

1916 - 17	10,155
1920	99,872
1925	121,011
1929 - 30	462,639
1935 - 36	629,338
1940	1,056,385
1950	8,157,506
1954 - 55	13,355,776
1959 - 60	26,055,700
1961	29,059,809
1962	33,857,417
1963	38,110,940

Source: 1916-30, Organization and Activities of the National Research Council, Ottawa (Ottawa, Nov. 1931), pp. 111-12. 1933-40, from Annual Reports of the National Research Council of Canada for these years. 1950-63, prepared by the National Research Council's General Services Office.

*Taken from Wilson et al., op. cit., p. 360.

sciences took precedence over the biological sciences.¹⁰ There is, therefore, a need to counteract this imbalance in certain fields.¹¹ Also, although these statistics show a marked growth in Canada's support of research and development, it is still felt that Canada is far from developing its research capacity. This nation spends less than one percent of its gross national productivity on research and development as compared with 2.5 percent in the United States of America and 2.11 percent in Great Britain.¹² Indications are, however, that the national government will continue to allocate larger sums of money to scientific research and development until, in its wisdom, it deems that financial support for research is at a level which bears a "reasonable relationship" for Canada to other kinds of national expenditure.¹³

In effecting this steady growth certain issues must be faced and resolved. In the past Canada has been very fortunate in attracting trained scientists to come to this country. But, due to the better opportunities now offered to these scientists in their homelands, this traditional source has now become limited.

¹⁰ Information gleaned from an interview with Dr. J. R. Weir, Deputy Director of the Scientific Secretariat, on June 3, 1966.

¹¹ Dr. J. R. Weir, "Canadian Food Research Programmes", a speech given to the Food Research Institute, Canada Department of Agriculture, Ottawa, on September 9, 1965. p. 12.

¹² Ibid., p. 8. See also Table 2, "Scientific Research and Development", The Royal Commission on Government Organization, Report, (23; Ottawa: The Queen's Printer, 1962), p. 198. (Hereafter called the Glassco Report). But Dr. C. J. MacKenzie has taken objections to these statistics. See Report to Prime Minister on Government Science, (Ottawa, 1964), p. 32.

¹³ Dr. J. R. Weir, "Environment and Effective Research", in a speech given to the Agricultural Institute of Canada, Central Ontario Branch, in Toronto on January 19, 1966, pp. 3-4.

Also, other countries are experiencing the same problems of supply and demand, thus confronting this country with the very real possibility that many of our better qualified young scientists may leave the country. Indeed, the "brain drain" to the United States has generated much discussion in the press and in academic and economic circles over the past few years.¹⁴ No nation has succeeded in making substantial progress toward raising the level of welfare of its people without building its own technological base. To do this requires manpower, or the programmes in the years ahead will at best be only second rate with disastrous consequences for Canada.

Indications are also that this spiralling growth of research activity aided by the availability of ready funds, will not continue ad infinitum. The scientific community is, therefore, faced with the extremely delicate and difficult task of determining the balance of Canada's research activities during the condition of dynamic equilibrium which is anticipated.¹⁵ In trying to alleviate this problem and also to keep up the level of research activity, there is a very grave danger that Canada may over-reach itself. Dr. C. J. MacKenzie, in his 1964 report to the Prime Minister, found it imperative to warn that:

The small countries such as Canada will realize first that no country can hope to cover all the possible fields of scientific development; any country that tries to do this is doomed to scientific mediocrity, as spreading scientific resources of manpower too thin is disastrous to any first rate production.¹⁶

¹⁴ A concise, well-documented, discussion of the problems appears under the heading "Education and Economic Growth," Second Annual Review, Economic Council of Canada, (Ottawa: The Queen's Printer, 1965), pp. 71-95.

¹⁵ Dr. J. R. Weir, op. cit., p. 3.

¹⁶ Dr. C. J. MacKenzie, op. cit., p. 31.

Among other things, there will be a need to make some attempt to clarify the distinction between the various kinds of research, and to allocate funds appropriately. This distinction is by no means an easy one to effect, for not all scientists are agreed as to what is, for instance, basic as compared to what is applied research. The National Research Council of the United States has supplied an explanation of applied research and also an explanation as to what is meant by basic research:

Applied research includes those activities frequently distinguished as development. It includes also fundamental studies when these are undertaken with a specific practical end in view and supported in proportion to their estimated contribution to that end. Applied research excludes activities of investigators whose choice of problems and manner of attacking them are determined almost entirely by personal curiosity and purely scientific considerations.¹⁷

In this day of rapid technological change, applied research has not suffered due to the lack of financial resources. What has been troubling many scientific experts and knowledgeable laymen, however, is that in man's attempt to benefit from the immense advantages which accrue to him from the discoveries of science, there is a grave danger of relegating pure research to a secondary position on the totem pole of scientific importance. The Rt. Hon. Viscount Hailsham, the first British Minister of Science, warns of this very danger:

. . . science is not intrinsically a matter that should, or indeed can for long, be pursued solely for the sake of the wealth or the power that its pursuit may bring. All genuine science has its origin in the intellectual curiosity of the free human spirit,

¹⁷ Quoted from "Function and Philosophy of the Program Directorate", a speech given by Dr. J. C. Woodward in Ottawa, March 6, 1961.

in its creative genius, in its power of insight. It is not something which can be dictated to either by theologians or idealogues -- or, in the long run, by rulers . . . because it is the nature of scientific research to discover something which is intrinsically new.¹⁸

There are basically three different kinds of advantages which flow to the community from the efforts expended in basic research. First, it is a major input to the advance of applied science and technology, thus ensuring further advances in technological endeavours. Experience has time and again shown that an applied research and development programme undertaken with the purpose of solving specific practical problems, benefits from a close relationship with basic research. Second, basic research is the basis, indeed, the indispensable framework, for the provision of higher education in science and technology. Finally, a point which so often seems to be forgotten, is that a group of scientists working on basic research provides an important reserve of capability in applied research and development should an emergency arise for their services.

The need to take cognizance of these facts and to rectify the existing anomalies mentioned earlier become imperative for two reasons: firstly, there is a definite awareness in scientific and political circles that the spiralling expenditures on science cannot be allowed to continue forever -- a ceiling on spending will have to be made by policy makers in all societies conducting scientific research. Secondly, manpower resources are not unlimited, and the prediction of future needs are, at best, an educated guess. Whether

¹⁸ Lord Hailsham, Science and Politics, (London: Faber and Faber Ltd., 1963), p. 12.

this small minority of potential first class researchers does exist, whether it is right or wrong to channel our best brains into scientific research to the detriment of the humanities and social sciences -- all are highly contentious issues needing clarification.

In the United States of America, federally supported research activities are, at present, coming under a searching scrutiny. The immediate cause, of course, is the budgetary squeeze due to the war in Vietnam, but more fundamental is the fact that the spiralling expenditures of the last two decades is now drawing to a close.¹⁹ Searching questions as to science policy-making are emanating from the executive branch, the press and Congress.²⁰ The most significant development, however, has been the critical analysis made of the role of the National Science Foundation by the Committee on Science and Astronautics of the House of Representatives. In submitting its report earlier this year, (commonly known as the new Daddario report), the subcommittee, inter alia, stated:

. . . it is now apparent that as the nation's scientific resources, including manpower, become more and more in demand to meet the exigencies of modern living, the Federal departments and agencies will depend more heavily on the Foundation to pursue avenues of research which they themselves cannot provide or afford. At the same time, the government will need better overall evaluation of the status of our science resources and of individual scientific disciplines and their potential. The Foundation is the logical government component to provide such assistance.²¹

The new Daddario report has been critical of the failure of scientific leadership in the United States to give some assessment

¹⁹Philip H. Abelson, "National Science Policy", Science, (January 28, 1966), p. 407.

²⁰Ibid., p. 407.

²¹Emilio Q. Daddario, "A Revised Charter for the Science Foundation", Science, (April 1, 1966), p. 43.

as to what constitutes a balance in the allocation of funds between basic and applied research. The recommendation of the subcommittee suggests placing the whole problem with the National Science Foundation. As one commentator so adroitly puts it: "The N. S. F. Board has been selected as the new fount of wisdom, or, perhaps more accurately, the holder of the buck".²²

To a lesser extent, but just as probing, has been the queries and searching analyses posed by knowledgeable persons concerned with the problem in Canada. The significant point which stands out among all the queries and analyses is that there is a definite lack of a national scientific policy for Canada. Where is Canada going in the world of science? Is there too much expenditure on applied as compared to basic research? Should all basic research be supported, or are there definite areas which have been neglected and badly need funds? Has the allocation of funds to the various scientific agencies across the nation been adequate? What needs to be done, and how? These blueprints as guides for Canada's political masters have not been forthcoming.

It was the war theatres of Europe which poignantly showed up the failure of Britain and Canada to utilize science for the safety and well being of their peoples. The telling evidence came from the novel German war adaptations. In 1916, the Union Government in Canada set up by an Act of Parliament the National Research Council, first as a Council without laboratories, and later with its own laboratory facilities. It has no Minister as compared to the departments, but reports to a nine-man Committee of the Privy Council on Scientific and Industrial Research. The departments under these nine ministers do, in some way, participate in the research efforts of the government. For a considerable time

²² Philip H. Abelson, op. cit., p. 407.

the Chairman of the Committee had been the Minister of Trade and Commerce, but since April 1963, the Minister of Industry has been Chairman.²³ The National Research Council is a crown corporation, having a governing body of independent, non-government scientists; can earn revenue and spend it, and can erect its own buildings. Dr. Steacie jealously guarded these powers when he was alive, and his predecessor has also maintained the same policy.²⁴ In Britain, organizational arrangements followed a different line however. The 1918 Haldane Committee on "The Machinery of Government" pointed out the importance of research in the formulation of government policy, and recommended that there should be a basic difference between departmental activities and what they termed "research in general". Departmental establishments were to be formed to undertake certain scientific endeavours necessary to expedite prescribed responsibilities, while non-departmental organizations should be administered by the research council pattern of organization.²⁵ Lord Hailsham considered this recommendation, which was accepted by the British Government, as one of considerable genius and foresight.²⁶ The Committee of Enquiry into the Organization of Civil Science paid glowing tribute to the Haldane Committee:

It is a striking tribute to the prescience of the Haldane Committee that the basic principle of the autonomous Research Council which it originally sponsored should have stood the test of time so successfully and that, when the need for adjustment became apparent, the nature of the essential changes required should appear to be on lines which the Committee itself foresaw.²⁷

²³ See Appendix I

²⁴ E. W. R. Steacie, op cit., pp. 122, 128, 130, 131, 136-145.

²⁵ A resumé of the 1918 Haldane Committee's recommendations is contained in Committee of Enquiry into the Organization of Civil Science, (London: Her Majesty's Stationery Office, 1963), p. 13.

²⁶ Lord Hailsham, op. cit., pp. 24-25.

²⁷ Committee of Enquiry into the Organization of Civil Science, (London: Her Majesty's Stationery Office, 1963), p. 55.

In Canada, however, there has seldom been a Chairman of the Committee of the Privy Council on Scientific and Industrial Research who was not preoccupied with executive departmental problems requiring his almost undivided attention. Consequently, ministers have had little time for leisurely thought about scientific matters. This was a marked deviation from Lord Haldane's most important recommendation, and has been unfavourably commented upon by informed Canadian observers of the scientific scene.²⁸ In the United Kingdom this recognition and co-ordinated growth of scientific activity reached its zenith in 1959 by the appointment of a senior minister of the then Conservative Government as the Minister of Science. This recognition is considered the ideal by Canadian authorities, but it is felt that this is not feasible at the present time.²⁹ Because of this over-all lack of co-ordination and the need for a clearly enunciated scientific policy, it is felt in some scientific circles that government research has suffered somewhat in the past.³⁰

The Report of the Royal Commission on Government Organization traced the growth of scientific activity under federal govern-

²⁸ C. J. MacKenzie, op. cit., p. 9. The Glassco Report, in making a strong indictment of the machinery for co-ordination and consultation, stated that one of the "principal reasons for the failure of the existing organization to function as intended was "the lack of a single Minister having responsibility for guiding Cabinet in the making of policy." The Glassco Report, 4: op. cit., p. 221.

²⁹ Interview with Dr. J. R. Weir, Deputy Director of the Scientific Secretariat, on October 25th, 1965.

³⁰ Dr. C. J. MacKenzie, op. cit., p. 9.

ment auspices and was critical of (1) the lack of suitable machinery for informing and assisting the Prime Minister and Cabinet on scientific policy decisions. Moreover, such arrangements for consultation were, to say the least, less than adequate. (2) Scientific activity in Canada, like Topsy, had just grown without any adequate co-ordination. As a result, "responsibility for the expansion of various activities has been borne by individual ministers without any evidence of their relation to national policy as a whole".³¹ After giving a brief description of the Privy Council Committee, The National Research Council, and the Advisory Panel for Scientific Policy, the Report continued:

The foregoing pattern would appear to provide a reasonably workman-like approach, although it is subject to objection on the grounds of the poverty of provision for advice from non-government sources, apart from the universities. In practice, however, the system has failed to function as intended. The Privy Council Committee has met infrequently, and between 1950 and 1958 was not called together at all. The National Research Council has turned aside from its original duty of advising on broad national policy and has concentrated its efforts, albeit with conspicuous success, on the support of research and scholarships in the universities and, in a general way, on its own laboratories and establishments and the fields of science in which they operate. The Advisory Panel met formally fourteen times in its first ten years of existence and has since been convened only infrequently. Proposals for new scientific programmes have usually reached Cabinet on the recommendation of individual Ministers, via the Treasury Board, with support provided in some cases by interdepartmental committees or recommendations from scientific and industrial groups outside the government. The Treasury Board has itself provided the principal review. In these circumstances, new programmes have depended for their adoption on the persuasive powers of Ministers concerned, on the weight of non-departmental support, and at times on an assessment by the permanent staff of the National Research Council.³²

³¹The Glassco Report, op. cit., p. 218.

³²Ibid., pp. 220, 221.

In this short paragraph the Glassco Commission pin-pointed the most important problems facing the organization of civil science in Canada. The Commission made the following recommendations to rectify the problem: the setting up of a Central Scientific Bureau, (C.S.B.), a National Scientific Advisory Council, (N.S.A.C.), the appointment of a Scientific Secretary to act as secretary for the C.S.B., and to serve as a secretariat for the N.S.A.C., and the designation of the President of the Treasury Board as the Minister responsible for the scientific policy of the country, and the co-ordination of existing activities in the field of research and development.³³

Sometime in 1963 the Canadian Government appointed Dr. C. J. MacKenzie, a former President of the National Research Council, to make specific and detailed recommendations concerning the organization of civil science in Canada. In his interim report of January 1964, Dr. MacKenzie made two recommendations for immediate action: (1) that a Scientific Secretariat be established to assemble and analyse information about the government's scientific programmes and their interrelation with other scientific activities throughout Canada. This recommendation was substantially the same as recommended by the Glassco Commission, and (2) the setting up of a National Committee on Scientific Policy which again had been recommended by the Glassco Commission. However, Dr. MacKenzie felt that before such an advisory committee could be brought into being, the government should re-examine the role of the National Research Council and define more clearly, in consultation with the Council, what relationship should exist between it and the proposed new committee.

On April 20, 1964, the Prime Minister, the Right Honourable Lester B. Pearson, announced, in the House of Commons, that the

³³Ibid., p. 224.

government had accepted these recommendations, and had appointed Dr. F. A. Forward, formerly head of the Department of Metallurgy at the University of British Columbia, as the Director of the Scientific Secretariat.³⁴ In doing so, the Prime Minister announced that the second recommendation will be the subject of study by the government, and, in particular, by the Privy Council Committee on Scientific and Industrial Research, during the ensuing months. The Scientific Secretariat's first task was to assist the Privy Council Committee in this study. On February 11, 1965, a press release from the office of the Prime Minister announced the appointment of three Deputy Directors and an Executive Secretary to the Government's Scientific Secretariat.³⁵

On April 26, 1966, The Minister of Industry, the Hon. C. M. Dury, moved the second reading of Bill No. C -- 149 to provide for the establishment of a Science Council of Canada, (See Appendix II). The proposed Council was given definite terms of reference,³⁶ showing that the clear intention of the government is to rectify the serious indictment made by the Glassco Commission that "the scientific policy of Canada today is the result rather than the cause of growth in the many scientific activities undertaken by government".³⁷

³⁴Canada, House of Commons Debates, III (1964), 2752.

³⁵Dr. Louis Paul Dugal, Dean, Faculty of Pure and Applied Science, University of Ottawa; Dr. John Robert Weir, Dean, Faculty of Agriculture and Home Economics at the University of Manitoba; and Dr. J. Rennie Whitehead, Director of Research, R. C. A. Victor Co. Limited. Dr. Elwyn Owen Hughes, Scientific Attaché at the Canadian Embassy in Washington, was appointed Executive Secretary.

³⁶For the Council's specific duties see section 11 of the Bill, (Appendix II). When the Bill went to the Senate, Senator M. Grathan O'Leary (PC - Ontario) stated that: "This is the most important thing to come before this house since I've been here". The Ottawa Citizen, Thursday, April 28, 1966. A further article in the Citizen on April 30, 1966, claimed that: "Canada is on the threshold of a new age in Science. The country has come to terms with the reality that science holds the key to increased productivity, prosperity and health." See also an editorial in The Ottawa Citizen, May 9, 1966.

³⁷The Glassco Report, op. cit., p. 218.

The Bill which seeks to clarify the position of the National Research Council vis-à-vis the Science Council of Canada has not been given final approval by Parliament at the time of writing this chapter.³⁸

On May 27, 1966, a communique issued by the Prime Minister's office announced the appointment of Dr. O. M. Solandt, Chancellor of the University of Toronto as Chairman, and Dr. Roger Gaudry, Rector of the University of Montreal, as Vice-Chairman of the Science Council of Canada. The release made it clear that the Prime Minister will report to Parliament on the work of the Science Council. A further announcement on June 8, 1966 named the twenty-three additional members and four associate members of the Council.³⁹ While the Science Council of Canada has a purely advisory role, that of the Scientific Secretariat is two-fold.⁴⁰ First, the Secretariat will have the responsibility of assembling and analyzing information and preparing briefs and other studies for consideration by the Council. The Secretarial body will provide professional and administrative assistance for the Council, will prepare reports and undertake day to day services for the Council that will ensure continuing and active relations with appropriate government agencies and with industry and the various professional organizations across the nation. Secondly, the Secretariat, although having no line authority whatsoever, vis-à-vis the government departments engaging in scientific endeavours, will act as a catalyst in generating hard thinking in the departments as regards their programmes. In the first place, the secretarial body, being in the Privy Council, has

³⁸ Government authorities, however, envisage no difficulty for the bill's passage.

³⁹ The Ottawa Citizen, Thursday, June 9, 1966.

⁴⁰ All information stated about the Secretariat has been obtained during two interviews with Dr. J. Robert Weir, Deputy Director of the Scientific Secretariat, Office of the Privy Council. (October 25, 1965 and June 3, 1966).

the ear of the Prime Minister and the Cabinet. Secondly, the former practice of slicing budgets for scientific research by a certain fixed percentage is now considered obsolete; the departments have now been called upon to assume full responsibilities for their budget priorities and programmes. The Secretariat will be asked to advise on the feasibility of certain research projects, and to give opinions on the priorities. It would seem that this body is in a very powerful position to influence government expenditure in scientific research in the various departments.

The Secretariat will consider it rather poor planning on the top level if a department approaches it for advice regarding programme priorities. This is clearly not within its terms of reference, and is a problem which only the department itself could solve. The Secretariat has no intention of becoming involved with the allocation of funds to specific projects, or in the management of research institutions as do the National Research Council and the comparable body to the Secretariat in France. If it did so, by necessity some other body would usurp its position, for it definitely would not be an "independent or disinterested adviser qualified to give counsel on scientific policies or programmes and the priorities which should be accorded."⁴¹

It was thought best to position the Secretariat in the Privy Council's office, mainly for two reasons: (1) In the world of political expediency, science may not have been accorded the importance of having a senior minister in the Cabinet. The formulation of a scientific policy for Canada could have serious setbacks if a non-influential junior minister was appointed to the post. What may

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The Glassco Report, op. cit., p. 216.

even be worse is that the junior minister may have no interest in scientific matters whatsoever, placing the need for a co-ordinated scientific policy right back where it was before the Glassco Report. (2) The Scientific Secretariat should be located in the Prime Minister's office, reporting directly to him. Here it is felt that science would be accorded the prestige, authority, and the level of consideration that comes out of the Prime Minister's office.

The foregoing compendium of facts has attempted to give some information about the present state of scientific organization in Canada. What are some of the pressing needs and likely solutions to the disorganization which has persisted in the past?

First of all it is clear that the development of a scientific policy is not going to be an easy task. Francis Bacon once said that science is power. In today's world, with every organization concerned with science trying to obtain government support, the problem of allocation is going to be difficult indeed. In effect, science is not only power, but also politics. Another significant factor is that a science policy cannot be made without reference to national goals. Would there now be a more clear-cut description of the goals and relative priorities facing this nation? As it has been earlier shown, since the Secretariat is located in the Privy Council, and appears to have a direct line of communication to the Prime Minister, what the members of that body state in public should give some indication as to what type of advice is being given to the Prime Minister for the formulation of a scientific policy.⁴² First of all there has been a clear call for an enunciation of a policy for science. The meshing of science policy

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Information based on speeches made by Drs. F. A. Forward and R. J. Weir over the past year.

to national goals is a difficult task but World War II provided the evidence that the effort can be rewarding. At that time the nation had one overriding goal which was clear to everyone: to win the war. Accomplishments during the war were unprecedented, and they have not been surpassed since, in rate or quality. Secondly, there has been a critical look at the large proportion of what is called "in-house research" within the government's own establishments. The greater allocation of funds to universities and private agencies appears to be a priority. Thirdly, there has been a consistent call from at least one member of the Secretariat for the creation and development of strong regional laboratories located so that their facilities and scientific personnel can be properly integrated with the research and educational programme of the universities. Fourth, the creation of at least two centres of excellence in each of the major fields of agriculture, and fifth, the need to encourage industry in the development of its own research programme, particularly in the applied and developmental areas of research.

The call for regional laboratories and research institutions of excellence will definitely find much support within academic circles in Canada.⁴³ Recently, Dr. John H. Chapman, deputy superintendent of the Defense Research Telecommunications Establishment in Ottawa, and the man who headed the team responsible for orbiting Canada's Alouette Satellites, stated that there was a definite need for at least two or three elite engineering schools in Canada of the calibre of the Massachusetts Institute of Technology, Michigan, Stanford, or the University of California at

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Dr. C. J. MacKenzie felt that Canadian scientific research has suffered to some extent by the lack of these scientific organizations or research councils. See Report to Prime Minister, op. cit., pp. 8, 9. Also see Hans Eichner, "A National University", Saturday Night, June 1966, pp. 46, 48.

Berkeley. Quoting Frederick E. Terman, vice-president of Stanford University, he stated: "If you want to win a race, you don't train twenty men to be five-minute milers -- you train one, two or three four-minute milers."⁴⁴ There is, therefore, a feeling that science and technology will benefit greatly from these first-class establishments. But, as with everything else in life, this creation could lead down the primrose path if proper safeguards are not taken to ensure that the institutions do not become sterile. To quote Lord Hailsham:

You may gather together all the most promising intellects in a subject, build them a town, equip them with all the most lavish facilities, and the thing will go off like a bomb -- at first. But in five years time? In ten? In fifteen? What then? Unless active steps are taken to redress it, there is danger that intellects will be staler, new blood will not be forthcoming, the stimulus of youth will be absent. From a proportion of those engaged, the research potential may have disappeared; even the scientific questions will have changed. Instead of a research institute you would then have a monastery which had lost its faith -- isolated, stereotyped, remorselessly carrying on activities with a diminishing margin of useful results.⁴⁵

The point Lord Hailsham has emphasized is that the organization could only succeed if there is a close association between basic and applied science, and an interminable interchange of personal contacts among industrial, government and university researchers. This is a better formula for success than any formalized pattern of organization.

In the years that lie ahead, Canadians are going to witness a definite change in the topsy-like approach to science which has been the accepted philosophy for the last fifty years. A new era is here -- that much is certain. Already the winds of change are blowing over professional associations and universities. The Canadian Institute of Forestry, for example, is now preparing for a nation-

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The Globe and Mail, Saturday, April 16, 1966, p. 10.

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Lord Hailsham, op. cit., pp. 22, 23.

wide assessment of forestry education at the universities; as alluded to earlier, engineers, physical scientists and agronomists are concerned with the need to develop elite institutions for teaching and research; and there is an overall concern that the whole educational system and the allocation of funds for manpower training and development are highly inadequate to meet commensurate needs.⁴⁶

The problems to be faced are numerous, but this chapter has concentrated on at least three areas: (1) the determination of priorities in the scientific quest in an attempt to properly allocate scarce resources, (2) a new outlook on the administration, evaluation, and support of our science programmes within the government, and (3) the distribution of responsibility and a scheme for the constant interchange of personnel and ideas among government laboratories, universities, industrial, domestic and foreign facilities.

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The Robbins Committee on Higher Education in the United Kingdom stated:

We should be very sorry, however, if our inability to present quantitative estimates of the future demand for highly qualified manpower were to give the impression that in our view there is nothing to be said about the need for educated people in a modern community . . . we wish to state unequivocally that -- always provided that the training is suitable -- there is a broad connection between the size of the stock of trained manpower in a community and its level of productivity per head . . . It is easy to think of an overproduction of particular kinds of expertise, difficult as it may be to predict it. But we may be fairly confident that the Government would have to go much further than anything our present projections indicate before the country was over-supplied with trained talent in general . . . when it is remembered that the other advanced countries of the world are all tending in the same direction, the risk still seems to be of too little higher education rather than too much.

Great Britain, Committee on Higher Education, Report, (London: Her Majesty's Stationery Office, 1963), p. 73.

No one today seriously opposes the broad concept that, as scientific or any other activity grows in size and complexity, and commences to be a major consumer of personnel, funds and facilities in our economy, some consideration should be given to increasing the efficient utilization of scarce resources through suitable planning and co-ordination. The converse, however, is particularly true in Canada in the renewable resources fields -- agriculture, fisheries, forestry and wildlife. This country has been blessed with an abundant supply of fish, fowl, timber and wide expanses of some of the best agricultural lands in the world. These resources have always been treated in the past, as inexhaustible. Today, however, our scientific experts know better than this. Old concepts could easily lead a nation thinking in this manner down the primrose path of dalliance. Delay in discarding these concepts could prove disastrous, for there is a definite need for a science policy in the renewable resources. If this need is not so glaring in the field of agriculture, the casual observer can easily detect such a necessity for the whole field of forestry. The needs are paramount, but the difficulties which lie across the path seem, at times, to be insurmountable.

CHAPTER II

THE IMPORTANCE OF THE FOREST RESOURCES TO THE CANADIAN ECONOMY: AN HISTORICAL RESUMÉ

As was shown earlier in this work, one of the main arguments put forward by those concerned with the proper planning of government research is that Canada cannot afford to spread her scientific resources too thinly, for to do so would doom this country to scientific mediocrity. Canada has a long and varied history in the exploitation of its natural resources. The specific one with which this thesis is concerned, forestry, has been of considerable importance to the Canadian economy, prior to Confederation and up to the present day.¹ Along with this growth of economic importance there has been a concomitant growth of research activity to discover ways of increasing productivity and the better utilization of the resource. Because of its decided importance to Canadian prosperity, this is an area in which Canada must concentrate proper funds and develop coherent policies to ensure the effective allocation and expenditure of financial resources.

Much of the Canadian effort in renewable resources research has been outstanding. In the field of agriculture, for example, wheat improvement has been of major economic

¹In 1962, forest products amounted to 27% of Canada's total exports, and Canada ranks third among the world producers of merchantable timber, producing more than 10% of the world's output, and led only by the U. S. and the Soviet Union in volume, (taken from an unpublished paper prepared by Dr. W. E. Haviland et al., for the National Forestry Conference held at Montebello, Quebec, February 21-24, 1966).

importance. The development of Marquis wheat saved and firmly established the threatened wheat industry of the Central Plains. When Marquis succumbed to wheat stem rust, Canadian researchers developed rust-resistant varieties of wheat which have saved the Canadian farmer well over \$2,000,000,000 since 1938.² Canadian agricultural scientists have also contributed to research in animal and poultry breeding, new varieties of cereals, grasses, legumes and tree fruits, and the development of pesticides and herbicides for utilization by farmers.

In forestry research, Canada has been a leader in the development of the techniques of forest inventory.³ Through the work of the forest products laboratory, useful results have been realized in wood chemistry, timber mechanics and timber physics, and there has been the development of machinery to increase the utilization of valuable wood at the sawmills. Canadian forest entomologists and pathologists have established international reputations in research, and have made significant contributions to the Canadian National Collection of Insects and genetical studies of Canada's forest insects, and in disease studies.⁴

THE DEVELOPMENT OF FOREST POLICY

As Canada continues to grow in population and economic and technological sophistication, some semblance of an embryonic

² J. R. Weir, "Plant and Animal Breeding," Resources for Tomorrow Proceedings, Vol. I, (Ottawa: The Queen's Printer, 1961), p. 76.

³ J. D. B. Harrison and D. W. MacLean, "Survey of Forest and Forest Products Research Organization and Activities," Resources for Tomorrow Proceedings, Vol. II, (Ottawa: The Queen's Printer, 1961), pp. 708-712.

⁴ Interview with Dr. J. R. Weir, June 3, 1966.

formulation of policy for the renewable resources can be discerned -- embryonic in the sense that there never was any specific blueprint by any government for the development of its natural resources, but an ad hoc arrangement to suit the conditions or needs of the particular age. Instead of just vaguely saying that forest resources were the basis of much of Canadian industry in its early history, an analysis of the importance of the industry becomes more meaningful if a functional interpretation of its importance is attempted. In other words, what was forestry doing for the Canadian economy at particular times and in particular areas? A brief review of such policies at different stages of development is not merely of historical and academic interest; indeed, it is indispensable to the understanding of existing policies, and could throw some light on some of the reasons for the development of the federal scientific bureaucracy discussed in the preceeding chapter.

The development of forestry policy in Canada has moved through several stages during the past three hundred years: exploitation, revenue-raising, protection, and today, a concern for assuring supply and a desire to utilize, as much of the tree as it is economically possible. Each stage, therefore, shows a growing sophistication of use, and an awareness to adopt policies to ensure the better utilization of the resource.

Early exploitation of timber reserves in Canada was mainly concerned with the production of naval timber.⁵ The latter part of the seventeenth century and the early eighteen

⁵ A. R. M. Lower, The North American Assault on the Canadian Forest, (Toronto: The Ryerson Press, 1938).

hundreds saw a tremendous increase in the volume of timber cut and exported to Great Britain. Increasing amounts of timber were being exploited farther and farther inland, thus necessitating the use of navigable rivers to transport scows of wood coming from the interior. Inspectors in Upper Canada were appointed to police the waterways, and to measure the amount of the various products on board the scows. Government soon found it necessary to introduce legislation which would police the handling of logs and which also provided for the levying of a charge on the material moving through the rapids, the revenue so raised being used for navigational improvements.⁶

As the importance of timber and lumber exports increased, the government of the Province of Canada began to recognize the economic importance of the industry. By the mid-nineteenth century, the government had established a system of public auctions to dispose of timber on Crown lands. As regards the development of some sort of rudimentary policy, Lower observed:

. . . the direction of public policy from 1867 on was not vested in the government of the Dominion, but in the new provincial administrations. While that involved no change in the Maritime Provinces, in Ontario and Quebec the provincial administrations, whether from greater efficiency, from greater zeal or from the fortunate coincidence of the new regime with a new and larger prosperity, from the first rolled up much larger revenues from their forests than had the former Province of Canada. The new administration displayed a happy ingenuity in devising new levies on their timber, roughly commensurate with its advance in value, and so by the end of the period the Crown forests were among the most considerable of provincial sources of revenue.⁷

⁶Ibid., pp. 27-42.

⁷Ibid., p. 161.

As Lower intimated, this new importance of the forest industry was due to "a new and larger prosperity." From the 1870's onwards the paper manufacturing industry, faced with growing North American demands, had exhausted its supply of rags from the cities and had turned to the straw of the agricultural belt. Almost overnight, the forest resources became a vast reservoir of available raw material which could be utilized. Processes for the manufacture of both mechanical or ground wood pulp and various chemical wood pulps were put in operation. Spruce, balsam fir, hemlock and poplar were favoured in these earlier processes, and the first mills were erected in the same areas of North America which had fostered the timber and lumber industries. By the turn of the twentieth century, North America saw major developments in utilization and forest management practices. Forestry policy had evolved from plain exploitation, through revenue-raising, to protection and then to replacement and conservation, in an attempt to prevent outright depletion. In the United States, the conservation movement had its hey-day under such leading personalities as Dr. Franklin Hough, John A. Warder, Bernhard E. Fernow, Gifford Pinchot and Theodore Roosevelt.⁸ Bernhard Fernow, who spent some years in Canada, also contributed to the development of Canadian forestry.⁹ Fernow claimed that the meeting of the American Forestry Congress in Montreal in 1882, had such strong impact in Canada that it was the direct cause of the fire protection laws passed a few years afterwards by various provinces

⁸ Samuel T. Dana, "Pioneers and Principles," Perspectives on Conservation, Henry Jarrett (ed.), (Baltimore: The Johns Hopkins Press, 1961), pp. 24-45.

⁹ See Bernhard E. Fernow, History of Forestry, (revised edition), (Toronto, 1907), Fernow was the first Dean of the Faculty of Forestry, University of Toronto.

in the dominion.¹⁰

The twentieth century saw the federal government becoming more and more involved in forestry.¹¹ Under the chairmanship of Sir Wilfrid Laurier "The Canadian Forestry Convention" was convened in Ottawa on January 10-12, 1906. The convention dealt with such themes as: silviculture, natural regeneration, protection from insects, fire and diseases and the management of forest preserves. The convention recommended the desirability of holding the forests under Crown ownership, of taking stronger measures in the protection of the forests, a vigorous programme in afforestation, the need for greater forestry education at the professional level, and the adoption of professionally acceptable forestry practices by timber operators. This conference led to the creation of forestry schools, and the establishment of forest services by various provincial governments.¹²

One of the main recommendations made by the conference was the desirability of forming a commission on conservation in Canada. In May, 1909, the Cabinet approved the principle of establishing a commission representing the federal and provincial

¹⁰ Ibid., p. 432.

¹¹ The turn of the century saw the establishment of a forestry organization in the Department of the Interior. For a detailed history of federal forestry organization in Canada see L. Sayn-Wittgenstein, The Development of the Federal Forestry Organization in Canada, M. A. thesis, School of Public Administration, Carleton University, 1962.

¹² For a full discussion of the proceedings of the Convention see Report of the Canadian Forestry Convention, (Ottawa: Government Printing Bureau, 1906). See particularly the paper given by Dr. Robert Bell, Acting Director of the Geological Survey of Canada, entitled: "The Alarming Destruction of our Forests by Fire," pp. 30-33, the resolutions of the conference, pp. 184-187, and particularly the closing remarks made by Sir Wilfrid Laurier, p. 187.

governments and the universities.¹³ During its eleven years of existence, the Commission of Conservation accomplished valuable work in such areas as fish and wildlife, water and forestry. Apart from reports on forest surveys of particular regions, and papers on forest fire protection and silviculture, the forestry experts performed a service to other fields through land-use and watershed studies.

From the very beginning, however, the Commission began encountering opposition to its activities. It has been claimed that the Commission misinterpreted its role as a research agency; its proper function was to be a body with a federal, provincial and university representation to act as a co-ordinating agency and a clearing house for studies on conservation. But as the commission grew in size, it began probing into areas outside its jurisdiction, in spheres belonging to other federal agencies and departments, particularly the Department of the Interior. Primarily for these reasons, the Borden government, in 1921, dissolved the Commission.¹⁴

Prior to 1920 the federal government was mainly concerned with forest inventory and fire protection. The establishment of large permanent forest reserves, particularly in Western Canada, was undertaken.¹⁵ The 1920's ushered in a new era of growth in Canada. Greatly increased investment in natural resources led to an accompanying investment in secondary industries such as transportation and pulp and paper plants. The demands of the timber and pulp and paper industries on the forest resources of Canada emphasized the need to consider the scarcity of these resources and the methods to be implemented to ensure a continuous supply

¹³For the debate in the House of Commons see, Canada, Parliament, House of Commons, Official Report of Debates, 12 May, 1909, pp. 6362-6383.

¹⁴Canada, Parliament, House of Commons, Official Report of Debates, 26 May, 1921, pp. 3958-3971.

¹⁵L. Sayn-Wittgenstein, op. cit., p. 5.

of raw material. This need engendered a new emphasis in natural resource management. Past crusaders, and government forest policy practices as well, seemed to have been mainly concerned with conservation per se because of the seeming threat of depletion. On the other hand, both the provincial and federal governments were still in the dark concerning an accurate extent of the forest resources and the rate of depletion. It is no wonder that there were no strong efforts made by any government in Canada to achieve some semblance of co-operation in the management of Canada's forest resources.

However, when Canada played host to the Second British Empire Forestry Conference in 1923, forestry experts from all over the Empire voiced criticisms of this country's inadequate measures in conservation activities and in forest inventory work. The ideal in forest management practice was held up to be the regulated state forest; a forest yielding a commercially adequate regular supply of timber. The Conference also stressed the concept of multiple use,¹⁶ and the need for fire prevention education and the education of the public to the importance of the forest in the Canadian economy.¹⁷ By the middle 1920's forestry experts were beginning to be impatient with forestry practices in Canada. They were convinced that these practices would lead to eventual depletion of an important resource. The following quotation illustrates the frustration felt by these professionals at that time:

In Canada we are prone to glorify ourselves and our forbears in the wisdom displayed in retaining in the Crown the title to forest lands. We boast of our

¹⁶ Using the forest simultaneously for watershed maintenance, livestock grazing, timber production, wildlife, and recreation.

¹⁷ For a full resume of the Conference see Empire Forestry Journal, I, (London: MacMillan and Co. Ltd., 1922-1923), 145-146, 154-206.

eighty or eighty-five per cent public ownership of forest lands; we gratuitously extend our pity to our great neighbour to the south, where the eighty per cent has been alienated. Let us recall, however, the parable of the talents. Can it be said, that occupying this splendid position as regards ownership, we do anything about it? Can it be said that generally for Canada the public lands are handled one whit better than are private timber lands? Just as the pseudo-orthodox churchman considers that the mere attendance at divine service on the Sabbath-Day, together with an odd beside prayer, entirely satisfies the requirements of his spiritual welfare, we are liable to convince ourselves that our favourable conditions of land-tenure are sufficient unto our forestry salvation; we, and the church man, count only on the fire hazard (and even fail perhaps to appreciate the extent of that), neglecting the responsibilities in according proper treatment to growing timber, and growing man, neglecting also the effects upon the regeneration of both man and timber.¹⁸

The forest industries in Canada show a strong tendency toward vertical integration. That is, industrial organizations which manufacture and sell pulp and paper, lumber and other forest products usually supply their own raw materials by carrying out logging operations on lands which they own or on public lands upon which they hold cutting rights. This is particularly true for the pulp and paper industry, which owns nearly one-fifth of the private forest land and which has partial interest in approximately four-fifths of the public forests currently licensed for production.¹⁹ It is no wonder then that in the 1920's, officials from the Canadian Pulp and Paper Association, faced with the tremendous expansion of pulp and paper plants, began to voice

¹⁸ "The Facts and Possibilities of Silviculture in Canada," paper given by E. H. Finlayson, a senior federal forestry official, at the meeting of the British Association for the Advancement of Science, Toronto, August 13, 1924. Empire Forestry Journal, III, (London: The Empire Forestry Association, 1924), 190-200.

¹⁹ Royal Commission on Canada's Economic Prospects, The Outlook for the Canadian Forest Industries, (Ottawa: The Queen's Printer, 1957), p. 19.

certain misgivings about the potential supply of raw material for their operations.²⁰ The need for further forestry research, particularly as it affects the pulp and paper industry, was recognized, and in 1920 the Canadian Pulp and Paper Association joined its own research activities with those of McGill university and the federal government, and the Pulp and Paper Research Institute of Canada became a joint enterprise between these three parties.²¹

With the coming of the depression in the 1930's, public discussion of conservation and rational development became more intense. The drop in world prices for all resource products led to a new emphasis on diversification of use, a need for technological research, and for the application of its results to ensure a ready market for forest products. The extent of economic loss resulting from forest diseases needed to be studied, and more research on forest entomology and silviculture was deemed to be required. In November, 1935, a conference on Forest Research was held at the National Research Council in Ottawa, under the chairmanship of the late General A. G. L. McNaughton, then President of the Council. One of the more interesting papers at the conference was given by Mr. A. Koroleff, a forester with the Canadian Pulp and Paper Association, outlining what he felt were the basic

²⁰ See the article entitled, "The Pulp and Paper Industry of Canada," by Mr. Edward Beck, Secretary of the Canadian Pulp and Paper Association, (C.P.P.A.), Empire Forestry Journal, Vol. III, July 1924, pp. 63-69. The 1922 Report of the C.P.P.A. stated that the rapid exhaustion of the Canadian pulpwood forests "is ruinous to the future of the industry . . . the rate of forest depletion is now dangerously high in the sense of involving imminent and certain peril of a grave handicap to the Canadian pulp and paper industry . . . not in a hundred years from now, not in fifty years from now, but in ten or fifteen years or even less." Reported in Empire Forestry Journal, Vols. I-II, 1922-23, p. 148.

²¹ The Institute had simple beginnings in 1913 as a branch of the Forest Products Laboratories of Canada. See L. Sayn Wittgenstein, op. cit., pp. 16-17.

failures of the forestry profession and the forest industries in Canada. Mr. Koroleff noted that the forests of Canada were undoubtedly deteriorating, this being primarily due to the lack of basic scientific knowledge of soils and of the "inner life" of the forests. Canadian foresters had therefore failed to provide leadership in forest management. As a result there had been a lack of balance in apportioning funds for research, and a failure to impress on high officials of government, on the one hand, and on pulp and paper companies on the other, the importance of research in forest management.²²

The advent of World War II saw a new approach to rational development of the Canadian economy adopted by McKenzie King's government. The Canadian government was well aware that the war was making radical changes in the economy of the nation, and at the end of the conflict the government would have to find solutions to pressing problems facing the country. For this reason, the government set up the Advisory Committee on Reconstruction as early as 1943, to make a study of all areas of economic and social life in Canada, and to make a blueprint of society which was to be established at the termination of the war.²³ The subcommittee on Conservation and Development of Natural Resources made very important and far-reaching recommendations which were considered by the Dominion-Provincial Conference on Reconstruction held in Ottawa

²² National Research Council. Canada Conference on Forest Research, November 1935. (mimeographed copy available at the N. R. C. Library.) See also A. Koroleff's paper reported in The Woodlands Review, Vol. 6, No. 7. (Montreal: C.P.P.A. publication, 1936).

²³ Canada, Parliament, Advisory Committee on Reconstruction, Final Report of the Subcommittee, September 24, 1943 (Ottawa: The Queen's Printer, 1944), pp. 1-12.

during August 1945.

The subcommittee considered that resource development was to be a unified problem and recommended the establishment of a National Development Board which, in turn, was to be advised by regional committees representing the natural resources. The subcommittee recommended, inter alia, the urgent need for aerial, topographical and soil surveys.

Recommendation seven states in part that: "The longer-term programs of conservation, of research, and of surveys, may be considered to be properly the responsibility of the Federal Government".²⁴ The Dominion-Provincial Conference approved, in large part, the recommendations of the subcommittee on Natural Resources. The federal government adopted a clear policy on the division of duties between itself and the provincial governments; the federal government assumed responsibility for basic surveys and research on a national scale, essential for "the conservation, development and management of natural resources". These responsibilities included the development and conservation of resources which are inter-provincial in nature or which have important inter-provincial or regional effects, and the protection of regional watersheds (afforestation of the east slope of the Rocky Mountains). The federal government also clarified its policy on providing assistance to provinces for resource development in areas coming under provincial jurisdiction. This covered such areas as soil erosion control, forest management and forest protection, and forest entomology and pathology.²⁵

²⁴ Ibid., p. 6.

²⁵ F. J. Thorpe, "Historical Perspective on the Resources for Tomorrow Conference". Proceedings, Vol. I, p. 10.

In 1954 a national conference was held at Ottawa under the sponsorship of the Canadian Forestry Association, the Canadian Chamber of Commerce, the Engineering Institute of Canada, the Agricultural Institute of Canada, and the Canadian Institute of Forestry. One interesting suggestion made to the Conference was the need to establish a federal Department of Forestry.²⁶

This resumé has attempted to show how forestry policies in Canada have run the gamut from sheer exploitation, without any regard for tomorrow, revenue raising, protection and conservation to the final recognition of the need for more research efforts and the adoption of some overall rational approach to the efficient utilization of the products from the forests. In effect, the seeds of this final recognition were sown by the forestry conservation movement of the late 1800's and early twentieth century. The Laurier government, recognizing this need for research in the natural resources, had established a national forum for the discussion of many topics related to resource development. The Commission stimulated interest in the examination of problems in each resource field, and it was certainly a set-back for resource development when the Borden government deemed it necessary to abolish the Commission rather than to reform it.

It was not until 1945, twenty-three years after the abolition of the commission, that a large-scale examination of natural resources was again undertaken by the various Canadian governments. At the Reconstruction Conference there was a new departure from the emphasis on conservation as an end in itself. As was advocated by the Royal Commission on Dominion-Provincial Relations, the development of the primary industries of Canada was considered in relation to all industrial development, which was a novel approach to Canadian economic growth. This theme was

²⁶Ibid., p. 11.

further emphasized in the Resources for Tomorrow Conference held in Montreal in 1961.²⁷

The 1960's have ushered in a new era for resource management in this country -- a concern for rational development. Chapter I was preoccupied with the growth of scientific knowledge in the world, and the attempt by the Canadian federal government in the past few years to create an effective body of scientific advisors to help determine the overall scientific priorities for the nation. This chapter has been concerned with the slow, almost imperceptible growth of some semblance of policy regarding Canada's forest resources. This growth of scientific knowledge, coupled with the growing recognition of the need for priorities on the one hand, and the glaring need to further develop a rational approach to research and economic development of the forest resource on the other, seemed to have meshed together in the 1960's. It appears that the federal government has not only recognized this need for research in the renewable resources, but it is preparing to do something about it. Lessons have been learned from the mistakes in the past. Unlike the 1909 Commission of Conservation, the Scientific Secretariat has no departmental responsibilities whatsoever, undertakes no research activities in any scientific field, and is directly responsible to the Prime Minister of the country. One of the major criticisms levelled at the Commission of Conserva-

²⁷The Hon. Walter Dinsdale, in opening the conference, set the tone for this new emphasis:

We are concerned less with resource development as such, and more with the promotion of economic development The relationship of natural resources to our goals of economic development must be well understood, and then we can more consistently adapt our jurisdictional, administrative, research, management, information-extension and other activities on all government levels. These problems have become especially urgent as Canada moves toward an urbanized industrial economy. See Resources for Tomorrow. Proceedings, Vol. III, p. 7.

tion by the government in 1921, was that not being responsible to a particular minister, the body had become "irresponsible".²⁸

This awareness of a new era has already had some repercussions. The nation's forestry schools, for the first time, are recognizing the need to train foresters as well as forest scientists.²⁹ A survey of forestry education in Canada is to be undertaken sometime later in 1966 to determine the inadequacies of the present educational system and the needs for the future. The federal forestry department is in the midst of a reorganization which, it is hoped, will have fruitful implications for forestry research in Canada. Treasury Board, during the summer of 1966, has given its approval of the expansion plans for the department. This approval gave the department attendant authority to double its personnel within the next five years, as well as to make major increases in capital expenditures. Each year these increases will be included in the department's estimates, thereby being subjected to necessary parliamentary approval.³⁰

Within the administrative organization, the functions of the foresters and forest scientists are two fold: to advise government on policy, and to give effect, so far as funds and powers are provided, to approved policy. Governments are not always easily persuaded to look beyond immediate necessities, and it may well be the case that the right advice having been tendered and rejected, the responsibility has passed from the forest scientist to higher quarters. To the writer of this thesis, all the

²⁸ Canada, Parliament, House of Commons, Official Report of Debates, 26 May 1961, p. 3969.

²⁹ Letter from Dr. J. H. G. Smith, Professor of Forestry, University of British Columbia, to the author of this thesis. May 1, 1966.

³⁰ The Board has stipulated, however, that at no time must the federal forestry department's research endeavours exceed 75% of the total forestry research efforts in the country. Industry, the universities and provincial governments must ensure the other 25%.

evidence that he could gather during interviews and in correspondence with leading experts in forestry point to the fact that the federal government is attempting to heed the advice of its experts, and lead the way in developing some semblance of a rational approach to research and developmental problems in the renewable resource field of forestry. This judgement may be termed too premature in view of the fact that events are too recent to make such a far-reaching assessment. But the events of the last six years certainly show an increasing awareness, by both provincial and federal governments, to take a new approach to many of the problems facing the renewable resources.³¹

This new approach has long been overdue. Canadian governments have followed a policy of retaining title to natural resources to a greater extent than is common in other advanced western countries. It is true that land for agriculture has, since early Canadian history, been cheaply sold or even given away. But during the last one-hundred years or so, governments have been reluctant to alienate natural resources such as forests, and petroleum resources, water and wildlife. As a result, we now find that throughout the most recently settled parts of the nation, title to most forest land remains firmly in the hands of the provincial governments.

It is not the intention of this thesis to investigate the desirability of a policy of maintaining Crown ownership of natural

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Mr. R. M. Burns, the Director of the Institute of Intergovernmental Relations at Queen's University, had this to say on the subject:

In the resource field, we have a somewhat different approach, with the fairly recent creation of the Council of Resource Ministers. While it is too early to make any final judgement on this somewhat corporate approach to the question of intergovernmental co-operation, there can be no doubt that it has interesting possibilities, especially where there is a pre-dominant provincial interest. (underlined for emphasis). "The Machinery of Federal-Provincial Relations," Canadian Public Administration, (Vol. VIII, December, 1965), pp. 527-528.

resources. But, as Dr. P. H. Pearse, a British Columbia economist, indicates, "It is reasonable to assume that where governments choose to remain the landlord, their objective is to manage the resources in such a way that the nation or province will derive a maximum benefit from these assets."³² As Pearse contends, this has unfortunately not been so, leading to a startling amount of economic waste, and creating problems of rural poverty and retarded technology. Since the Dominion-Provincial Conference of 1945, the federal government's responsibility to conduct the greater part of forestry research has never been questioned. Conflict arises, however, between the federal research bureaucracy and foresters in industry and provincial government employment as to what are the forestry research priorities in Canada.

For more than a half century, the professional philosophy of a majority of Canadian foresters has been strongly influenced, if not dominated, by the existence, in this country, of a vast forest area supporting volumes of timber, apparently sufficient to supply indefinitely, all of the nation's demand without need for major expenditures on silviculture. Dr. D. A. Wilson, Economic Advisor to the federal Deputy Minister of Forestry, has stated that the forest resources of Canada, at present, are underdeveloped, that is, there are vast areas of forest capable of supporting forest industries which are not yet in operation. "It is also the case that, taking the whole of the forest area which is now being operated, the present harvest is below the level of sustainable cut on a technical forestry basis."³³

According to the 1965 Canada Year Book, the productive forests of Canada cover an area of 967,946 square miles, constituting

³² P. H. Pearse, "Public Management and Mismanagement of Natural Resources in Canada," Queen's Quarterly, (Vol. LXXIII, Spring 1966), p. 87.

³³ D. A. Wilson, "Wood Products -- The Supply of Timber from Canadian Forests." (Unpublished paper presented to the National Forestry Conference, February 22, 1966, at Montebello, P. Q.)

the reserve from which forest production will be obtained for many years to come. The supply of merchantable timber on this area is estimated at 751,883,000,000 cubic feet, and the utilization, in 1962, of 3,424,000,000 cubic feet therefore represented less than one-half of one percent of the supply.³⁴ It has been argued that Canada could satisfy its timber needs for well over one-hundred years by concentrating on forest access and protection programmes, and by continuing advances in the technology of long-distance wood delivery.³⁵ Hardy L. Shirley, Chairman of the Food and Agricultural Organization Advisory Committee on Education in Forestry, is reputed to have said, "No nation has taken effective steps to conserve forests until it has faced, or thought it faced, the pinch of scarcity."³⁶ It is submitted that this observation is particularly true for Canada. This country has an undistinguished record of forest land misuse and neglect, a record written in most, if not all, the provinces.

Coupled with this insouciant attitude towards the management of a seemingly unending resource is the problem of empire building and parochial outlooks on the part of administrators working within the renewable resource fields. In Chapter IV, after an examination has been made of recent organizational changes in the Department of Forestry, a much more comprehensive analysis will be made of this attitude in the light of the new era now opening up for the renewable resources of this country.

³⁴ Canada. 1965 Canada Year Book. Official Statistical Annual of the Resources, History, Institutions and Social and Economic Conditions of Canada. (Ottawa: The Queen's Printer, 1965), pp. 507-509.

³⁵ For a recent statement of this viewpoint see Bruce Thomson, "Role of Forest Industry in Research," Forestry Chronicle, Vol. 40. See also the evidence given by Mr. D. W. Ambridge, President, Abitibi Power and Paper Company Ltd., before the Standing Committee on Mines, Forests and Waters, Monday May 18, 1959. Canada, Parliament, House of Commons, Standing Committee on Mines, Forests and Waters, 1959, Minutes and Proceedings. pp. 658-661.

³⁶ Article by K. W. Hearnden. The Forestry Chronicle, (Vol. 41, September 1965), p. 285,

D. V. Smiley, in an article entitled "Public Administration and Canadian Federalism", viewed with approval "the attitudes, procedures and values common to particular groups of program specialists -- foresters, social workers, civil engineers",³⁷ and so on. Questioning Professor Corry's analysis that one of the major difficulties of dominion-provincial relations has been the growth of administrators and specialists in the service of the provincial governments, who now have a definite interest in maintaining a strong bargaining position for the provinces vis-à-vis the federal government, he went on to assert:

It may also well be true, contrary to the Corry analysis, that officials in these specialized intergovernmental groupings do not look single-mindedly to their hierarchical superiors for rewards. Once such a community of interests and purpose is established officials may come to that community for influence and status.³⁸

In the case of the forestry profession this assertion is nothing else but a pipe-dream. In the House of Commons debates on the establishment of the Department of Forestry in 1960, Mr. D. M. Fisher, then member of Parliament for Port Arthur, made the astute observation that relationships among federal and provincial government foresters and industrial foresters are far from sweetness

³⁷ Donald V. Smiley, "Public Administration and Canadian Federalism," Canadian Public Administration, (Vol. VIII, September 1965), p. 378.

³⁸ Ibid., p. 379. Professor Smiley's argument was primarily based on a speech given by Professor Harry M. Cassidy, former Director of the School of Social Work, University of Toronto. See the First Annual Conference of the Institute of Public Administration, Proceedings, Phillip T. Clark, (ed.), (Toronto, 1949), pp. 162-166.

and light as Dr. Smiley presumed.³⁹ Added to this also is the conflicting interests of different experts concerned with the alternative use of the forests. The training of many of these professionals leads them to concentrate their attention on their specific interest, paying lip-service to the concept of multiple-use. Foresters, for example, define "good forestry" as growing and harvesting the maximum volume of wood, which, in reality, is nonsense unless they are willing to concede that they are interested only in wood for its own sake. Alternative uses and combinations of uses of forest resources must be considered and evaluated in a way which does not involve arbitrary priorities among users. This is not likely to be achieved as long as wildlife, forest recreational facilities, and timber exploitation are rigidly classified by use and placed under the jurisdiction of departments and agencies with single-minded interests. This criticism applies to both the federal and provincial administrations.

CRITICISMS OF PRESENT POLICIES

The national government is fully aware, more than ever before, that Canadian forests are valuable assets basic to endeavours to achieve several desirable economic objectives. The pulp and paper industry has grown over the years to become Canada's leading bread-winner. In 1959, it was estimated that the value of its output exceeds \$1,400,000,000 annually, accounting for almost five percent of the Gross National Product. In 1958, the industry's shipments abroad were valued at more than \$1,000,000,000, account-

³⁹ Canada, Parliament, House of Commons, Official Report of Debates, Vol. V, 1960. Session, pp. 6073-6074. See also the scathing criticism of federal research policy made by Mr. R. G. McKee, former Deputy Minister of Forests of British Columbia, at the Canadian Institute of Forestry Annual meeting at Fort William, Ontario. Forestry Chronicle (Vol. 41, December 1965), pp. 400-401. In the same publication see a rebuttal by Dr. V. J. Nordin, a senior federal forestry official. Ibid., p. 511.

ing for a fifth of all Canadian exports and a third of the nation's exports to the United States. In addition, the industry gives employment to some 245,000 seasonal employees to gather the pulp-wood harvest, making it the leading industrial wage payer with total wages and salaries exceeding \$500,000,000 annually.⁴⁰

It is claimed that research on the raw material needed to engender this prosperity is inadequate. Hardy L. Shirley's comment, alluded to earlier, seems to be true when applied to Canada, for "the pinch of scarcity" is yet to be felt in this country. The Canadian pulp and paper industry spends only about six-tenths of one percent of the sales dollar on research and development. This expenditure compares unfavourably with such expenditures by the industry in the United States, the United Kingdom and Scandinavia. Moreover, it is far below the average of two cents per sales dollar spent by manufacturing industries in the United States and three cents or more spent by the chemical industry.⁴¹

Foresters concerned with replenishing the supply of raw material point to the fact that vast acreages of forest land across the nation lay denuded or covered with weeds and undesirable tree growth because the provincial and the federal governments have reneged in their responsibilities to do something to rectify the mistakes of the past and present.⁴² It has been estimated that for the year 1962, the federal government collected a total tax of

⁴⁰ See evidence given by Mr. W. A. E. Pepler, Canadian Pulp and Paper Association official to the Standing Committee on Mines, Forests and Waters, 1959, op. cit., pp. 605-607.

⁴¹ Letter from Dr. Lincoln R. Thiesmeyer, President of the Pulp and Paper Research Institute of Canada, to author, April 12, 1966.

⁴² K. W. Hearnden, Forestry Chronicle (Vol. 41, September 1965), pp. 288, 289.

\$152,500,000 from the forest products industry.⁴³ In the Shared-cost Forestry Agreements (1963), the federal government gave back to the provinces, in all, \$7,910,001. In addition to the expenditures noted, the federal government contributed nearly \$137,000 for the spraying of 823,000 acres of budworm-infested New Brunswick forest. These figures show an expenditure of about 5% of the amount (\$152,500,000) derived from the taxation of the forest industry. Similarly, foresters decry the provincial efforts in reforestation. Table II shows relevant data on provincial expenditures on reforestation.

Foresters point to the fact, shown in Table III, that in New Brunswick, for example, well over \$2,000,000 were derived from the forests by the province, and yet only \$37,000 were spent in replenishing the supply of raw material, thus leaving over 69,000 acres of land denuded of forest growth. As the statistics show, this pattern has more or less been repeated in every one of the seven provinces where information was available. In British Columbia, where close to half of each dollar engendered in the province comes from the forest industry,⁴⁴ (not to mention those industries not directly connected with the forests, but dependent on revenues derived from them), the figures shown in Table II give some indication as to the money spent on research projects in relation to total forest revenues and expenditures. These statistics show that expenditures on research on the raw material have always been less than 1% of the total revenue derived from forest products. The highest expenditures during the ten year period have been just over one-half of one percent in 1951-52. Furthermore, since 1951-52, there has been a steady decline in

⁴³ Ibid., p. 288.

⁴⁴ Gordon McG. Sloan, The Forest Resources of British Columbia, Vol. I (Victoria: The Queen's Printer, 1956), pp. 9-10.

TABLE II*

SOME FOREST STATISTICS FROM PROVINCIAL SOURCES FOR THE YEAR, 1963

PROVINCE	STUMPAGE ^a RECEIPTS \$	ACRES CROWN LAND			(NON A.R.D.A.) PROVINCIAL EXPENDITURE REFORESTATION \$
		CUTOVER	REFORESTED OR TREATED	NO. OF SEEDLINGS PLANTED	
Newfoundland	80,400	INFORMATION NOT AVAILABLE			
Nova Scotia	192,000				
New Brunswick	2,303,400	70,000	775	200,000	37,000
Quebec	14,053,700	462,000	69,300	1,748,000	742,000
Ontario	11,418,100	300,000	98,000	30,500,000	2,650,000
Manitoba	841,100	34,000	5,000	2,900,000	86,000
Saskatchewan	363,400	28,000	1,500	174,000	97,000
Alberta	2,504,000	63,000	8,800	243,000	52,000
British Columbia	29,800,000	358,000	215,000	2,680,000+	
INDUSTRY ON T. F. L.					1,100,000

*Source: K. W. Hearnden, Forestry Chronicle (Vol. 41, September 1965) p. 288.

^a Stumpage value is the value per one-hundred cubic feet (log scale) of standing timber. In determining stumpage the variables taken into consideration include the estimated cost of extraction, manufacture and shipment, and the probable selling price of the finished product. (Author's note).

TABLE III*

EXPENDITURE FOR RESEARCH AND PERCENTAGE
RELATIONSHIP TO TOTAL FOREST REVENUE AND EXPENDITURE

1 YEAR	2 TOTAL EXPENDITURE PROJECTS	3 TOTAL FOREST REVENUE	4 PERCENT COLUMNS (2) to (3)	5 TOTAL FOREST EXPENDITURE	PERCENT COLUMNS (2) to (5)
1946-47	\$22,809.00	\$4,880,233.00	0.47	\$2,149,819.00	1.06
1947-48	13,894.00	7,010,039.00	0.20	2,961,018.00	0.47
1948-49	25,076.00	7,977,676.00	0.31	4,002,521.00	0.63
1949-50	29,716.00	8,331,497.00	0.36	4,764,070.00	0.62
1950-51	29,341.00	10,089,885.00	0.29	4,770,096.00	0.62
1951-52	73,105.00	13,703,715.00	0.53	6,749,922.00	1.08
1952-53	81,013.00	18,016,025.00	0.45	7,745,362.00	1.05
1953-54	57,609.00	17,578,625.00	0.33	7,724,876.00	0.75
1954-55	55,964.00	19,130,835.00	0.29	7,847,531.00	0.71
1955-56	55,977.00	23,867,706.00	0.23	9,033,336.00	0.62
1956-57	154,639.00			13,385,137.00	1.20
TEN YEAR AVERAGE					
1946-47 to 1955-56					
	\$44,450.40	\$13,057,623.60	0.35	\$5,774,855.10	0.76

* Gordon McG. Sloan, The Forest Resources of British Columbia, II (Victoria: The Queen's Printer, 1956), p. 629.

research expenditure in proportion to the total revenue collected from forest products. Dr. C. D. Orchard, a former Deputy Minister of Forests in British Columbia, stated, in his evidence to the Sloan Commission, that the Forest Service could spend "to the utmost advantage double the money that we are getting for forest research and that wouldn't begin to fill the need that exists."⁴⁵

The frustration of foresters is summed up in an article written recently by Mr. K. W. Hearnden, a past president of the Canadian Institute of Forestry:

Forestry management in general, and reforestation, in particular, are not receiving a fair measure of the public attention and financial support which we see accorded to other activities in the public domain. It is obvious that forestry is low on the priority lists of our governments, in spite of the major contribution being made, year after year, by our forests to their coffers and to the prosperity of our citizens. In contrast to the open-handed spending of our Federal Government in every other field, reforestation, in 1963, was assisted to the extent of only one half of one per cent of the tax revenues taken from the forest industries. Our Provinces too, have been drawing on forest capital to finance other activities, and in 1963 spent less than 8 per cent of stumpage revenues on reforestation. Compare these outlays with the 200 million dollars in Federal-Provincial grants being provided to enable Canadian municipalities to mark the 1967 Centennial, and with the island-in-the St. Lawrence building, "Expo '67" venture which, we are told, will cost the Canadian taxpayer nearly half a billion dollars, and the measure of Canadian forestry is taken.⁴⁶

Because of the importance of the forest industry to the Canadian economy, forestry experts and industrialists now urge the need for "the essential co-ordination of forestry policy."⁴⁷ Policy,

⁴⁵Ibid., Vol. II, p. 629.

⁴⁶K. W. Hearnden, op. cit., pp. 288-289.

⁴⁷R. M. Fowler, "Summary by Plenary Session Chairman, Subject I," National Forestry Conference, February 21-24, 1916, Summaries and Conclusions, (Ottawa: The Queen's Printer, 1966), p. 12.

in any sphere of endeavour, is never conceived in a vacuum: relevant considerations as regards the impact that policy may have on other spheres must be considered and weighed. So it is with the renewable natural resources. The objective of a renewable resource policy should be to secure for the economy, as a whole, the greatest possible present and future benefits from the resources consistent with the balanced exploitation of all resources. This implies integrated use of the forest and the soil, and their development consistent with the probable demands upon them within the predictable future. Pepler seemed to have this in mind in his discussion of forest policy:

To determine a sound and proper policy, it is necessary to know what the values are, measure the importance of each and then, by a series of comparisons and a process of selection, arrive at the highest priority value or combination of values. Not only economic considerations are involved but social, aesthetic, and spiritual ones as well. Furthermore, future values must be taken into account along with present benefits.⁴⁸

Pepler went on to assert that when a resource is abundant and population scarce, there are few problems because there is a surplus of values. This changes, however, when the resource becomes more scarce as the population increases. It becomes imperative to adopt managerial and technical skills to husband the resource, since policies must be adopted for a complex of activities. He concluded:

Canada is rapidly moving from the first situation toward the second. That is why the time is ripe for a searching look at our accumulation of forest legis-

⁴⁸ W. A. E. Pepler, "Review and Assessment of Present Forest Policies," Resources for Tomorrow, Proceedings, Vol. II, p. 736.

lation and forest practice to determine wherein it falls short of constituting a forest policy compatible with our present and future needs.⁴⁹

This assessment by Pepler provokes a multiplicity of questions when it is applied to the whole question of research in the renewable resource of forestry. Who determines these values, and who decides what emphasis must be placed on specific values when they are subjected to a hierarchical position for research purposes? In his summary conclusions at the Montebello Conference in February this year, R. M. Fowler, President of the Canadian Pulp and Paper Research Association, warned that Canada has never had to feel the problem of wood shortages, but sometime within the next decade or two the "pinch of scarcity" will become evident if Canada continues with present forestry methods and arrangements.⁵⁰ Mr. Fowler, in enumerating the constitutional and political difficulties in trying to effect this co-ordination, made the following observation:

It involves difficult political decisions -- difficult because they are long-range decisions and -- if the Minister will excuse me -- the fact is that a politician is not good at making long-

⁴⁹ Ibid., p. 736. This statement is reminiscent of one made by Dr. Charles M. Hardin of Chicago University, ". . . we need some governmental means for taking the whole field of natural resources as a policy area, and subjecting it to rigorous comparative evaluation with the other large areas of national policy." Perspectives on Conservation, Henry Jarrett (ed.), (Baltimore: The Johns Hopkins Press, 1958), p. 227. In the area of Canadian research development this author sees the Scientific Secretariat attempting to do just that. But, particularly in the natural resources area where the federal government has few jurisdictional powers under the B. N. A. Act, the road to some semblance of success is a difficult one indeed.

⁵⁰ R. M. Fowler, op. cit., p. 9.

range decisions. He thinks in terms of two or three or at most four years -- and wants his results now. You don't get quick results in growing trees or applying a forestry policy.⁵¹

Fowler concluded his remarks by warning that "someone had better get down soon to detailed and specific plans."⁵²

In this thesis no distinction has been clearly made between forestry management policies and scientific research policies. Rightly, there should be no such distinction, for research should not be divorced from management policies which are being pursued in the exploitation of the forest resources in Canada. Research in forestry should be geared to tackle the problems which are encountered in effecting proper husbandry of the forests.

The arguments put forward here are confusing -- both to the layman and the practising forester. There are forest scientists who argue for the need for more research, both applied and basic. Others argue that this expenditure is in reality money down the drain. Quoting statistics to show that the allowable annual cut in almost all the provinces exceeds the actual cut, these people argue that the "pinch of scarcity" has not touched Canada as yet, so full priority must be given to more pressing problems facing the community as a whole. There are yet still others who contend that Canada should devote some funds to basic research, and problem-oriented research, but the real need for a greater allocation of funds lies in reforestation, the building of access roads to exploit the mature timber, and in forest fire protection. Who then should attempt to determine these priorities, especially when both federal and provincial governments derive such lucrative revenues from the resource? Why should more money

⁵¹Ibid., p. 10.

⁵²Ibid., p. 12.

go into research? Can it be justified based on long term economic prognostications? How will the federal government research organization meet this new challenge if research is to be expanded? The creation of the Scientific Secretariat and the Science Council of Canada is an attempt by the federal government to seek some answers to these questions.

Today, knowledgeable and progressive forestry experts, including natural resource economists, are turning their attention to intensive forest management.⁵³ To do this means greater expenditures in research in such fields as silviculture, entomology, and pathology, and to ensure that all good accessible sites are fully utilized. Statistics show that Canada has upwards of ten billion cubic feet per year of allowable cut from the forests of which just about one-third is currently utilized.⁵⁴ This measure is misleading, for it tells nothing about the share which is inoperable by economic standards dictated by the export market. For this basic reason, forest policies based on a sustained yield basis⁵⁵ have come under serious indictment, particularly by economists interested in the management of natural resources. This is

⁵³ For a brilliant paper on this new focus see D. V. Love, "Potentialities of the Forest Resource Base," *Resources for Tomorrow*, Vol. II, Proceedings, pp. 641-660.

⁵⁴ Ian Mahood and F. Leslie C. Reed, "Lumber and Plywood -- Canada's Place in World Markets for Lumber and Plywood in 1975 and 2000," (unpublished background paper given at the National Forestry Conference, February 21-24, 1966, Montebello, Quebec.)

⁵⁵ Sustained yield means regulating the forest harvest in such a way as to yield equal annual harvests in perpetuity. The allowable cut for the forests is calculated to approximate the annual increment or growth of the forested area. The whole conservation philosophy of forests comes under a critical analysis in Chapter IV of this thesis.

why, in the apparent midst of plenty, R. M. Fowler warned of the dangers facing Canadians:

You can go on as you are -- live on in the happy assumption of the past that we have unlimited forest assets to draw on and close your eyes to the fact that that assumption is no longer or will no longer be valid -- continue with a lot of individual and rather half-hearted efforts to improve silviculture, and do a bit of research and train a few scientists, and build some roads, and tinker with forestry laws, and so on. If this is done, most of the people in this room will probably get by -- they can work on and take their pensions (though it may become a little doubtful if their pensions will be as valuable as they now think). But sometime, your sons or successors -- perhaps 15 or 25 years from now will feel the bite of wood shortages -- and they may wonder why we were so blind and inefficient and unimaginative today.⁵⁶

Again, this is why natural resources economist Dr. P. H. Pearse, himself a forester, questioned the economic virtue of extracting every branch and twig from the forest. Foresters, he argued, spurn the economic argument that maximizing wood production cannot maximize the value of the resource:

Government policies relating to forest management consistently include two related objectives -- to grow forests in such a way as to produce the maximum volume of wood, and to regulate exploitation on management units in such a way as to yield equal annual harvests in perpetuity.

These principles are a carry-over from classical European forest practice and are still advocated in most of our textbooks on forest management. Yet neither principle can possibly maximize the value of our forest resources. Growing timber to an age that will maximize volume is very different from growing it over the period that will maximize the value it

⁵⁶ R. M. Fowler, op. cit., p. 10.

generates. ... And a fixed allowable harvest year after year not only ignores the certainty of changing economies of production and the cost of tying up capital, but it also reduces the gains to be derived by altering rates of production as markets and costs fluctuate. Maximum sustained yield is accepted as the essence of "good forestry", but it involves the pursuit of biological and administrative neatness instead of social and economic efficiency.

The forest industry has, on the whole, been prosperous in recent years, and private profits and public revenues reflect a considerable net economic benefit from exploitation of this resource. But because of the exceptional importance of this resource to the Canadian economy, policies that impose economic inefficiency in its exploitation are particularly costly, and the economic waste resulting from public forest policies in many parts of Canada is alarming.⁵⁷

In the past few months, Canadians have witnessed the spectacle of one of the largest forest companies in Canada declining cutting rights on half a million acres of forest land on the north coast of British Columbia in favour of moving into the plantation pine areas of the southern United States, where, incidentally, intensive forest management is practiced. The reason given for this move was the company's need "to obtain more timber and easier access to some important markets".⁵⁸ Mahood and Reed made the observation that in British Columbia, a province reputed to contain half of Canada's commercial forests and producing around sixty percent of Canada's total annual lumber production,⁵⁹ "forest management units in the south half of the province have been cutting the maximum permitted under Forest Service regulation".⁶⁰

⁵⁷ P. H. Pearse, op. cit., p. 91.

⁵⁸ The Financial Post. January 1, 1966.

⁵⁹ The Financial Post. January 1, 1966.

⁶⁰ Mahood and Reed, op. cit., p. 2.

Mahood and Reed concluded:

The spectre of forfeited markets is already on the horizon. In spite of the tightening supply of softwood saw timber in northern Europe, the world will not necessarily turn to Canada. On the contrary, it is just as likely that consumers will turn to untapped tropical forests, to accelerated plantation forestry, to Russian suppliers, to non-wood substitutes, or simply to a lesser standard of housing and more of other consumer goods.⁶¹

The conclusion, therefore, is straightforward. The era of intensive management of Canada's forest resource is here, according to the experts. There is a need for land classification systems as a guide to effective land use. Already, the wheels of administrative motion have begun to turn to effect this.⁶² There is also a need for effective and less costly methods of ensuring regeneration on the best sites, for the choice of species adapted to the soil and capable of producing high yields in shorter rotations; for research on silvicultural practices which hold out promise for increased yields from the forest crop; for more research to reduce the heavy losses caused by insects, fire and diseases; for more programmes in products research; and for research into the problems which are encountered when genuine efforts are made to integrate timber production with the use of forest land for the production of fish, game, water recreation and forage for domestic animals.

Because of the vastness and general similarity of Canadian

⁶¹ Ibid., p. 53. (underlining for emphasis).

⁶² L. Z. Rousseau, Rational Land Use, an address to the Northern Alberta Development Council, Peace River, Alberta on October 5, 1965. Also A. W. Blyth, The Forestry Implications of A.R.D.A., a paper presented at the 46th Annual Meeting of the Woodlands Section, Canadian Pulp and Paper Association, March 17-19, 1964.

forests, there is a good case for centralized research work, provided its results are effectively communicated to the forest industries and other local bodies with interest in the proper management of Canadian forests. The federal forestry department is the only organization which could hope to marshall the personnel and the major part of the necessary funds needed to begin the important work of solving the problems enumerated above. As shown earlier in the chapter, this need has been recognized, and tentative plans for expansion have been approved, subject to Parliamentary approval. The provincial governments as well as the universities and industry must now shoulder their responsibilities in this research effort. Only basic and applied research could supply the answers to the problems which must be solved to ensure successful intensive management and multiple use of our accessible forest land.

CHAPTER III

THE REORGANIZATION OF THE FEDERAL FORESTRY SERVICE

CHANGES: 1936 - 1964

Over the past thirty years, the federal forestry service has undergone numerous reorganizations. On December 1, 1936, when the Department of Mines and Resources was created to replace the Department of the Interior, of Mines, of Indian Affairs, and of Immigration, the Forest Service became one of four units comprising the Lands, Parks and Forests Branch of the new department.¹ Later in the decade it continued as the Dominion Forest Service, Mines, Forests and Scientific Services Branch, of the Department of Mines and Resources. In 1950, the Dominion Service became the Forestry Branch of the newly created Department of Resources and Development. In 1953, the Department of Resources and Development became the Department of Northern Affairs and National Resources, the functions of the forestry branch remaining essentially the same as they were before reorganization. Finally, in October 1960, the Department of Forestry was created, due in large measure to the recommendations made by the Standing Committee on Mines, Forests and Waters. The most important recommendation made by the Committee urged the federal government to consider:

. . . steps which would widen the scope of the Forestry Branch, increasing its status in such a way that a Deputy Minister would be in direct charge. The fact that such a status, comparable to that of a

¹ A full account of these reorganizations is given by L. Sayn-Wittgenstein, op. cit., pp. 58-68.

department, does not exist now reflects a lack of appreciation of the importance of the forest industries to Canada in the past, now, and in the future. Other departments of government are considered essential to serve industries or aspects of our national economy, which are of much less economic consequence.²

In the creation of the new organization, the Department of Northern Affairs and National Resources contributed its entire Forestry Branch which included the Forest Research division, the Forest Products Research division, the Operations division, an Economics section, and a branch administration unit. The Forest Research and Forest Products Research divisions became branches in the new department. The Research branch of the Department of Agriculture contributed its Forest Biology division and also the Insect Pathology Research Institute. The Forest Biology division's title was changed to Forest Entomology and Pathology, and became a branch of the department with the Research Institute operating under its jurisdiction. The Operations division and the branch administration unit formed the nucleus of the new department's administration branch which included a Forest Management section, a Federal-Provincial Agreements section, and divisions for Personnel, Administration, Information and Technical Services. The Economics section was accorded the status of a division with a Director reporting directly to the Deputy Minister.³ (See Figure 1.)

Senior departmental officials claim that the initial organization was considered transitory, at the time, to be superseded

² Canada, Parliament, House of Commons, Votes and Proceedings, July 6, 1959, p. 668.

³ Canada. The Department of Forestry. Brochure prepared for the Eight British Commonwealth Forestry Conference, East Africa, 1962. (Ottawa: The Queen's Printer, 1962), pp. 3-6.

Figure 1

PRESENT ORGANIZATION CHART - 1963

at a later date by an organizational structure which would be much more in accordance with the scientific mission of the department.⁴ However, during the first two years of the new organization's existence, the Royal Commission on Government Organization, (Glassco), made a most searching analysis of the departmental structure. Because of the Glassco Commission's impact on the vicissitudes of the organization, it becomes necessary to deal in length with the critical observations recorded in the official report.

The Commission made some serious indictments of the organizational structure and the quality of research conducted in certain branches of the department: There was little co-ordination of research effort among the three research branches; and a real danger that research scientists within the organization could become isolated because of the remoteness of many federal laboratories from other research or academic institutions. Glassco also noted that within the Forest Entomology and Pathology Branch there was "undesirable fragmentation;" heads of sections reported individually to the Director of the Branch, even when they were located in the same general area. It was also observed that the separation of Forest Entomology and Pathology from the Research Branch of the Department of Agriculture "undoubtedly removed it from access to many of the basic disciplines. If these are not developed with the Branch, the quality of its research may be seriously affected."⁵ In addition to this critical analysis of the organization, Glassco made the following observations:

⁴ Interviews with Dr. B. M. McGugan, Director of Programme Co-ordination, on November 3, 1965, and Mr. C. C. Tuck, former Chief of the Personnel Division, Department of Forestry, on October 27, 1965.

⁵ Canada. The Royal Commission on Government Organization Report. Vol. IV (Ottawa: The Queen's Printer 1962), pp. 243, 244.

The department has been so recently formed that it may be premature to comment upon current problems, but it is observed that its establishment represents further fragmentation of a phase of biological research that is common to scientific research and development programmes in the renewable natural resources -- agriculture, fisheries and forestry.

There is a lack of balance and consistency in the present organization, largely due to the different origins of the several divisions. The annual budget is divided approximately 58 per cent to forest entomology and pathology, in which the healthier and more stimulating atmosphere is found; 35 per cent covers expenditures of the forest research branch and 15 per cent the forest products research branch. In the latter branches, with insufficient competent scientists to sustain a serious programme, many of the programmes are of an ad hoc nature, with particular stress on industrial programmes.⁶

One would presume from the wording of the first paragraph of this quotation that, to the Glassco commissioners, fragmentation in biological research was highly undesirable. The criticisms of the administrative organization of research activities in the renewable natural resources mentioned earlier in this thesis appear to be strengthened by this expert opinion: insofar as forestry is concerned, alternative uses and combinations of uses of forest resources will never be given the proper attention they deserve so long as wildlife, forest recreational facilities, and timber exploitation are rigidly classified by use and placed under the jurisdiction of departments and agencies with single-minded interests.

The imbalance noted in the budgetary allocation within the organization has been accounted for by the fact that when the Forest Biology division joined the other divisions from the Depart-

⁶

Ibid., p. 202.

ment of Northern Affairs to form the department in 1960, there were many important research projects underway which could not have been promptly terminated.⁷ Also, research within the other divisions appeared to have been hampered by inadequate competent staff and a consequent inability to move forward into a balanced programme of pure and applied research. When, in 1963, it was therefore decided to move ahead with plans to rectify and thus alleviate the problems of the organization, the terms of reference to the study group were clear as to the objectives of the organizational survey:

To examine the organization of the Department of Forestry, recognizing the necessity of an integrated departmental program with a headquarters organization based on the principle of program integration and unified management of field activities on a regional basis;

and

To recommend any changes that would improve the department's ability to achieve its objectives.⁸

The first public pronouncement clearly outlining organizational changes which were to be made in accordance with government policy came in a speech delivered by the Minister of Forestry, Dr. Maurice Sauvé, at the British Columbia Loggers Association Convention in January, 1965. At that time the minister announced the federal government's intention of doubling the federal forest research staff and facilities over the next five to seven years; the establishment of closer liaison between the federal forestry

⁷ V. J. Nordin, "Is Forestry Research in Canada Adequate?" The Forestry Chronicle, March 1964, pp. 27-32.

⁸ Canada, Civil Service Commission, Organization Division Advisory Services Branch. Organization Survey of the Department of Forestry. (Ottawa: The Queen's Printer, 1964), p. 2.

organization on the one hand, and industry, universities, associations and provincial forestry departments on the other; the reorganization of the department at Ottawa, and the establishment of seven new regional research centres across Canada.⁹ In addition, the minister announced the government's intention of convening a national conference of forestry, adding that:

The decisions that will soon have to be made about the orientation of forest management policies over the next generation must not be made unilaterally. These decisions must involve the best and most original thinking of all elements of the forest community together. For it must be fully realized that we are now entering on a truly revolutionary phase in the evolution of the forest economy -- revolutionary because of the magnitude, the quality and the rate of the changes that are taking place. British Columbia, for example, is entering the final stage of transition from Canada's greatest sawlog economy to a pulp economy of major proportions -- and you are going to do it in 10 years instead of 100.

It is obvious today that this next decade is going to present problems of a complexity and dimension inconceivable only a year or so ago. Only by means of sound and comprehensive planning will we be able to meet these problems satisfactorily . . .¹⁰

A few months later, in October 1965, the minister further amplified the basic philosophy behind the reorganization plans in an address to the Canadian Institute of Forestry:

Essentially, the whole is based on the firm belief that forestry in Canada has a pressing requirement to evolve carefully and responsibly, and as rapidly

⁹ Canada. Department of Forestry. The Future of the Federal Forestry Department. An address given by the Hon. Maurice Sauve to the B. C. Truck Loggers Association, Vancouver, B. C. Wednesday January 13, 1965.

¹⁰ Ibid., p. 6. (underlining for emphasis).

as feasible, so as to be able to hold its own in the new world of technology and science with which it finds itself inexorably enmeshed.

In the years ahead, Canadian forestry must not only have the strength in program and facilities to make the best possible uses of our resources, but it must also remain competitive, economically and scientifically, in a World environment. If forestry is to live, breathe, and keep pace with the general World momentum, we badly need more advances in research, ranging from increasing our fundamental knowledge of the biological systems within which we work, to providing direct research answers to immediate problems.¹¹

These quotations were given at length, for they are the most forthright enunciation of federal government policy towards forestry research in Canada. In view of a shaping government policy towards scientific growth as discussed in Chapter I, it is a clear indication that the federal government regards forestry research in Canada as one priority area, and the intention is to create a research organization in response to real problems and defined needs. If, as the experts claim, more research needs are to be expected in the dawning era of intensive forest management, then it could be presumed that the federal government's reorganizational plans are also in anticipation of the many problems envisaged in this new technological age.

On the completion of its study, the departmental committee recommended an impressive blueprint for a new organization. Basically this reorganization was intended to expedite two major policy decisions. The original organizational division of the department into five branches was abolished, all of them unified

¹¹ Maurice Sauvé, "Forestry -- A Look in the Future," The Forestry Chronicle, Vol. 41. December 1965, p. 391. (underlining for emphasis).

into a single, centrally-directed department of forestry research. The main advantage of this integration was to achieve or encourage greater lateral communication between researchers themselves, and reduce the channelling of information up to the branch head, over to another branch, and back down to the corresponding level in another laboratory. A second major decision facilitated was to decentralize the services of the department on a regional basis; this was done to meet the needs of each particular region with overall co-ordination coming from Ottawa where the department maintained a staff of senior advisers.

The committee recommended the following changes:¹²

1. The major elements of the Department to consist of:
 - (a) a staff of senior advisers to --
 - (i) develop departmental policy and long-range plans,
 - (ii) review the activities of national and international agencies which have a direct or indirect effect on forestry;
 - (b) a group of departmental administrative support activities;
 - (c) one comprehensive organization to conduct the research and related functions of the Department.
2. The policy and planning staff to include three senior officers, namely, an Economic Adviser, a Scientific Adviser, and a Forest Management Adviser.
3. The Economic Adviser to be provided with a small professional staff to carry out economic studies of major factors affecting the forest economy.
4. The Forest Management Adviser to conduct special studies for the Deputy Minister and act as a clearing agency for enquiries from Members of Parliament, representatives of industry, and other interested parties.

¹² Compare Figure 1 with Figure 2. These recommendations were taken in part from the report of the organizational survey. Lengthy descriptions of duties were omitted as unnecessary for this thesis.

Figure 2

DEPARTMENT OF FORESTRY

ORGANIZATION CHART 1964

5. The administrative support activities to consist of three divisions (Information, Personnel, and Administrative Services) reporting to the Deputy Minister.
6. A position of Assistant Deputy Minister to be established to consolidate the research and related functions of the Department and to be responsible for their operation at all establishments including headquarters.

REGIONS

7. Six regions to be established, namely:

Newfoundland	(St. John's)
Maritime	(Fredericton)
Quebec	(Quebec)
Ontario	(Maple)
Prairie	(an appropriate site)
British Columbia	(Victoria)

(See Figure 3.)

8. Each region to have a Research Director responsible for the entire regional program of research and related activities with appropriate authority and means of accountability clearly defined.
9. A small number of discipline or activity-oriented groups to be recognized with the number ranging from region to region depending upon program requirements and available leadership, but preferably not to exceed seven.
10. Each group to be provided with a discipline or activity leader, with major projects involving more than one discipline requiring the designation of special project leaders.
11. A Forest Management Liaison group to be established to encompass provincial and industrial liaison and forest management advisory services, and to be responsible for experimental stations and departmental forest surveys.

Figure 3

DEPARTMENT OF FOR

REGIONAL ORGANIZATION CHART - 1964

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OR

12. A position of Associate Research Director to be established to co-ordinate the research services, assist the Director in program planning and co-ordination, and, on occasion, act as a special project leader.
13. The appointments of an Administrative Officer and an Information Officer in each region.
14. Full advantage to be taken of the statutory provisions of the Department of Forestry Act to enter into agreements and/or contracts with provinces or other agencies for:
 - (a) conducting joint research investigations;
 - (b) testing of research hypotheses;
 - (c) demonstrating and promoting the application of research findings.
15. Periodic conferences to be held in each region under the Chairmanship of the Regional Research Director with representatives of the Provinces, Industry, and Universities attending, as appropriate, to:
 - (a) Review the departmental program in the region;
 - (b) Examine proposed plans and programs;
 - (c) Discuss means of testing research hypotheses and of demonstrating research findings;
 - (d) Discuss items proposed for inclusion in agreements and contracts.

INSTITUTES

16. In order to complement and support regional programs, early action to be taken to plan for a Forest Research Centre in the Ottawa area to include the following research institutes:
 - (a) Forest Botany
 - (b) Forest Soils
 - (c) Forest Zoology
 - (d) Forest Protection

- (e) Forest Fire
- (f) Forest Products (except Vancouver Forest Products Laboratory).

17. Practical considerations prevent immediate implementation of the above recommendation. However, the nuclei of these institutes exist in various forms within the Department and could be reconstituted as an initial stage toward the ultimate goal, as follows:

- (a) the existing Tree Breeding and Genetics, Taxonomy, Tree Physiology and Autecology, and Forest Soils Sections now at Petawawa be considered a combined Forest Botany and Soils Research Institute to be transferred eventually to the Centre as the Forest Botany Research Institute and the Forest Soils Research Institute;
- (b) the present Forest Fire Section at Petawawa remains intact under the local Director until it can be transferred to the Centre and integrated with the Forest Fire Section, now existing in Ottawa, as the Forest Fire Research Institute;
- (c) the Insect Pathology Research Institute, Insect Cytology and Genetics Section, and other specialized investigations at Sault Ste. Marie be considered as a combined Forest Zoology and Protection Research Institute until such time as they can be transferred to the Centre and developed with the existing Chemical Control Section as the Forest Zoology Research Institute and the Forest Protection Research Institute;
- (d) the Mensuration and Photogrammetry Sections at Headquarters become one Section at Ottawa to be incorporated ultimately into the Forest Botany Research Institute;
- (e) the Forest Products Research Laboratories become Institutes with the one in Ottawa eventually becoming a part of the Centre while the Vancouver establishment will, of necessity, remain in its present location.

HEADQUARTERS

18. A position of Director of Program Co-ordination to be established within departmental headquarters, reporting to the Assistant Deputy Minister and responsible for the Program Co-ordinators and the Research Services.
19. The group of Program Co-ordinators to consist of specialists to co-ordinate departmental programs and national projects. It is proposed that the disciplines and activities represented be:
- (a) Forest Entomology
 - (b) Forest Pathology
 - (c) Forest Insect and Disease Survey
 - (d) Silviculture and Fire
 - (e) Forest Botany
 - (f) Forest Soils and Site Classification
 - (g) Forest Products
 - (h) Forest Management Liaison
20. The Research Services to consist of the following Sections:
- (a) Biometrics
 - (b) Economics
 - (c) Editorial
 - (d) Engineering
 - (e) Library
21. Interlocking participative decision-making committees to be established as follows:
Committee	Members
Departmental Planning and Policy Committee	-Deputy Minister (Chairman)
Assistant Deputy Minister
Economic Adviser
Scientific Adviser
Forest Management Adviser

Departmental Program Committee	-Assistant Deputy Minister (Chairman) Director of Program Co- ordination Regional Research Directors Research Institute Directors
Regional Program Committees	-Regional Research Director (Chairman) Associate Research Director Discipline and Activity Leaders
Program Co-ordination Committee	-Director of Program Co- ordination (Chairman) Program Co-ordinators Heads of Research Services

PRINCIPLES OF RESEARCH ADMINISTRATION

Underlying this reorganization of the Department are some basic principles of research administration which guided those who recommended the changes. In the first place, the study group came to the conclusion that the Department of Forestry was basically a research organization with no major regulatory or administrative activities. The Department was therefore a unipurpose organization, its objectives being best met:

. . . if the entire staff were conjoined, and if lines of communication were established laterally, between research and so-called non-research activities, at all levels throughout the organization. In this way an integrated departmental program might be achieved through the conduct of research and the application of findings in co-operation with the provinces and industry.¹³

¹³

Civil Service Commission. Organizational Survey, op. cit., p. 8.

This concept of a unipurpose organization has not been wholeheartedly accepted by many interested parties, for, as they point out by quoting the recommendations of the 1959 Standing Committee on Mines, Forests and Waters, ". . . full advantage has not been taken of responsibilities and opportunities opened up to the Forestry Branch by the Canada Forestry Act."¹⁴ If authority was exercised to its fullest, the department would definitely have many more administrative responsibilities than it presently performs. However, it is suffice here to point out the fact that the study committee's conclusion as to the department's basic function bears striking resemblance to the Liberal Opposition's point of view expressed when the department was being formed by the Conservative government in 1960. At that time the member for Laurier, Mr. Lionel Chevrier, and the leader of the Opposition, the Honourable Lester B. Pearson, expressed grave reservations as to the desirability of a new portfolio for Forestry, the main argument being that the department had no heavy responsibilities with respect to administration and policy.¹⁵

¹⁴ K. W. Hearnden, "Report of the Past President," 57th Annual Report of the Canadian Institute of Forestry. December 1965, p. 13.

¹⁵ Canada, Parliament, House of Commons, Official Report of Debates, 28 June, 1960, pp. 5484-5504, and July 1960 pp. 6039-6076. On July 11, 1960, the leader of the Opposition made the following statement:

But while research in this field as in other fields is of extreme importance, it does not in itself imply heavy and complicated responsibilities with respect to administration and policy. That is why, Mr. Speaker, we on this side felt . . . that while a case can easily be made out for a separate department of government, perhaps it is not so necessary to have a separate minister, The Standing Committee on Mines, forests and waters (sic) in its report last year recommended that a deputy minister "be in direct charge of the new department," but it did not suggest that a minister should preside over that department as his sole and exclusive responsibility.

p. 6041. (underlining for emphasis).

In 1964 when the Department of Forestry became the Department of Forestry and Rural Development, this same argument was used by the Prime Minister as the justification for the addition of feed grain administration and rural development administration (A.R.D.A.), to the federal forestry portfolio.¹⁶

The concepts of communication and participative decision-making have both been used as the rationale for the administrative blueprint recommended by the study committee. The latter found that in the initial organization of the department no provisions were made for the overall policy and planning function. As a result, all planning was done on a branch basis, policies for the department on a whole were sadly lacking, and an integrated departmental programme was non-existent. In addition, no serious attempts were made to join the various components of the branches in a region into one effective co-ordinated organization.¹⁷

To rectify this situation reforms were advocated which, it was hoped, would develop within the scientific employees "a sense of participation." Rensis Likert's Interaction-Influence system was recommended to bring about the co-ordination among the various inter-locking committees which were established. In his book, New Patterns of Management, Likert spells out, in detail, the Interaction-Influence system.¹⁸ Likert sees the organization as a human enterprise whose success depends upon the co-ordinated efforts of its members. The important characteristics of this organization are its structure, information channels, communication

¹⁶ Letter dated February 20, 1964, from the Prime Minister to Mr. R. G. McKee, President of the Canadian Institute of Forestry, 1963-64, The Forestry Chronicle, March, 1964.

¹⁷ Organization Survey, op. cit., p. 35.

¹⁸ Rensis Likert, New Patterns of Management, (New York: McGraw-Hill Inc., 1960), pp. 178, 179. See particularly Chapter 2.

processes, decision-making processes, action resources to carry out decisions, influence processes -- a whole series of inter-related and interdependent factors. These factors, in turn, form the overall system of organization to use fully and in a co-ordinated manner, the skills, abilities, and resources of the persons in the organization.

Likert conceives this system as a series of linkages as in a chain. Groups are always formed around the work milieu (for example, a group of scientists in a particular laboratory working on a project). These groups, in turn, have access to a particular individual or individuals whose positions are known in the hierarchical set-up, and who have ready access to the councils of higher levels of management. These persons must have the ability and the status to successfully communicate the ideas and suggestions from the lower levels on the departmental totem-pole. This type of linkage continues throughout the organization. In this "Interaction-Influence System", Likert has attempted to illustrate that recognition could be given to the group as well as the individual; group ideas and suggestions are recognized just as much as individual contributions.¹⁹

The reason for this acceptance of Likert's system revolves around a basic premise of research management: good research is self-orientating and self-disciplined. Departmental management is well aware that in the final analysis, the effectiveness of the department depends on the skill and judgement with which the various programmes undertaken are selected and pursued. Basically, the only really important policies are those that control these operations. To do this, management would need the strong support of every research worker in the department. To try another way

¹⁹Ibid., pp. 189, 190.

of integrating the organization would only involve management in a futile attempt to impose research from the top.

A second basic principle of research administration is that departmental officials must create a well-balanced programme geared to achieving successful results and properly orientated towards the problems facing the forest industries. This principle is quite broad, for the problems of the forest industries are numerous, and departmental officials recognize that it would be foolhardy to attempt to deal adequately with all of them. They are thus involved in establishing priorities; concentrating on the more important areas and also choosing those problems which need to be handled by long term research.²⁰ If the department is to make significant contributions to forestry research in Canada, and the world, some of its research must of necessity be basic research. This type of research will be carried out in the proposed institutes, and must withstand the most critical examination of its origins, objectives, merits and future.

The result of this integration and co-ordination is to achieve success in problem solutions by bringing to bear on the problems a multiplicity of disciplines. Problems that in themselves are multidisciplinary interact increasingly, so that there is a definite need for a unified multidisciplinary approach to the management of the environment. This is one reason why many biologists have always argued for a unified approach to all biological research, for the majority of problems to be solved are common to all the disciplines. Even if a certain amount of specialization is necessary, a coming together or interaction of the disciplines pursuing such research is highly desirable. In this approach, social and economic considerations must be integrated with the natural sciences to form a general basis for

²⁰ Interview with Mr. R. W. Peterson, Director of the Forest Products Laboratory, July 28, 1966.

decisions that fundamentally affect progress. To achieve this happy medium, departmental officials have a heavy task of achieving a suitable balance of scientific ability in appropriate disciplines, and they must encourage effective co-operation and interchange of ideas among the specialists in different fields. The cross-fertilization of ideas that arises when this is well-organized is of immense importance to the success of the department's mission.²¹

Departmental officials hope to promote a continuing number of conferences on a disciplinary basis. At these conferences research workers will inevitably talk of their techniques and methods, trade ideas, and, in general, learn from each other, thus preventing balkanization within the department. In effect, communication on this basis is one means of cross-fertilization. These conferences are not sponsored to ensure future uniformity of projects in the department. As far as it is economically feasible, it is healthy for research workers to differ in their approaches to the solution of a common problem, for diversity in approach encourages original and novel thought among scientists. It is also hoped that out of these work conferences will come many ideas and suggestions which will have a bearing on overall departmental planning. Senior departmental officials also envisage at least two meetings of establishment heads each year at Ottawa. One of these conferences most likely will occur during the budgetary phases to discuss the broad problems of overall development.²²

Cross fertilization has also been encouraged by promoting contacts with other federal departments and universities conducting biological research. Prior to 1960, plans were worked out

²¹ The Research Branch of the Department of Agriculture has had a long and successful experience with the multidisciplinary approach to Canadian agricultural problems. Interview with Dr. J. A. Woodward, Associate Director General of Research, Dept. of Agriculture. January 6, 1966.

²² Interview with Dr. B. M. McGugan, Director of Programme Coordination, Dept. of Forestry. November 3, 1965.

for the Departments of Agriculture and Forestry to be jointly accommodated in one regional building at Laval University in Quebec City. Also there has been a certain amount of liaison between the two departments in Winnipeg, Manitoba, and Victoria, British Columbia. Professional contacts between the organizations have also been maintained; this is effected by an inter-departmental Advisory Committee which meets regularly to discuss common problems to both departments. Forestry officials draw upon much of the work which has already been accomplished by agricultural scientists in the classification of insects and disease problems, and look towards Agriculture to maintain the National Insect Collection, and the National Herbarium Collection. However, there are special areas such as forest soils and certain biological control methods which, although they appear to be common to both agriculture and forestry, nevertheless forest scientists must work out specific methods applicable to the magnitude of forestry problems and practices.

Departmental officials' plans for building an impressive, first-rate research department have been aided substantially by the classification and pay standard established by the Civil Service Commission in February of 1966.²³ One of the major problems in the past which led to the initiation and development of the standard was the government's inability to recognize and retain outstanding researchers in the biological or physical sciences, or in mathematics. These people could only be promoted to certain grade levels as individual research scientists, and beyond this point, promotions could normally be gained only through the assumption of programme administrative functions. Hence, the government was forced to encumber outstanding researchers

²³

Interviews with Mr. R. H. Dowdell, Chief of Personnel, Department of Forestry, and correspondence with Mr. J. B. Hartley, Assistant Director (Planning), Bureau of Classification Revision, Civil Service Commission, Ottawa. March 1, 1966.

with administrative duties in order to retain their services. In most instances this proved highly unsatisfactory, both to the disgruntled scientists and the government; dissatisfaction on the part of the research workers and the consequent inability of government to keep these scientists on the job where their scientific skills could be best utilized.

The new standard was issued by the Civil Service Commission to rectify these anomalies.²⁴ The plan provides for the consideration of the researcher as an individual professional scientist on the basis of an evaluation of his specific scientific contributions. This evaluation is made by a committee of his "peers" who are familiar with the area of work involved. The scientist's advancement depends primarily upon his own accomplishments, and there is nothing automatic or periodic about these promotions. This type of classification gives an outstanding scientist the opportunity to "stay at the bench", while at the same time being placed in the same grade, or in some instances, in a higher grade than his supervisor. The man's outstanding ability and creativity are the qualities which should be noted in promotion. In essence, the scientist involved in the conduct of mathematical, biological or physical science research has been removed from the normal administrative grade ladder.

It is hoped that this pay determination would encourage outstanding researchers, who may have otherwise worked at universities and other research agencies, to consider scientific careers in the government service. The Civil Service Commission has plans to conduct campaigns of visitations to the United States to encourage graduate students and faculty members to return or to

²⁴ When issued, the standard was designated as an "Interim Standard" to indicate that the final section on the "Determination of in-grade pay", has yet to be completed.

come to Canada for employment. Forestry officials also have plans to employ a good technical base for the department. Technicians will be recruited from such institutions as the newly created community colleges across the nation and from the technical schools at the Lakehead region of Ontario and Burnaby, British Columbia.

This plan for a co-ordinated research department has already received approval and praises from middle management. Whereas, in the past, management of one branch could remain completely unaware of the activities of the other branches, this has now been rectified, enabling management of the various sections to understand the goals of the organization. This co-ordination by regular meetings enables members of middle management to clearly appreciate their positions in the overall activity of conducting federal forestry research in Canada.²⁵ The original plan proposed by the study group has not been changed to any significant degree. A comparison of Figure 2 with Figure 4 indicates that, apart from the fact that there are seven regions established as compared to the six recommended, and ten specialists to co-ordinate departmental programmes instead of the eight as proposed, the department has adopted the model which was recommended in 1964. The blueprint for the creation of the Forest Research Centre is still in the planning stage, proposals for its construction being included in the long term plans which have recently received the approval of the Treasury Board.

²⁵ Interview with Mr. R. W. Peterson, Director of the Forest Products Laboratory, July 28, 1966.

Figure 4

DEPARTMENT OF FOREST

OF FORESTRY AND RURAL DEVELOPMENT

June 2, 1966

CRITICISMS OF THE REORGANIZATION

Many leading members of the forestry profession have been highly critical of the reorganizational plans.²⁶ Some regard the department as "the source of an interminable flow of so-called research reports which have been, with few exceptions, totally irrelevant to our problems and to current Canadian forestry".²⁷

However, despite this claim of irrelevance, the vicissitudes of the federal forestry organization have been closely watched by the professionals outside the department. In February 1964 there was much concern when the Liberal government announced its decision to include in the portfolio of the Minister of Forestry the responsibility for the Agricultural Rehabilitation and Development Act, the Maritime Marshland Rehabilitation Act and assistance to eastern farmers in feed grain transportation. The first two of these functions are now combined in a rural development element of the department under an Assistant Deputy Minister. Fears were expressed, at the time, that forestry was once more taking a secondary position to other endeavours which do not have as much import as the forest industries to the Canadian economy. Foresters pointed to the 1959 recommendations of the Standing Committee on Mines, Forests and Waters which criticized past federal governments for a "lack of appreciation of the importance of the forest industries to Canada."²⁸

Thus, many foresters were not convinced with Prime Minister Pearson's argument that "the result of the reorganization will be

²⁶ This statement has been based on the correspondence the author of this thesis has had with at least seven leading forestry professionals outside the federal organization.

²⁷ Quoted from one letter received.

²⁸ Canada, Parliament, House of Commons, Votes and Proceedings, 6 July, 1959, p. 668.

merely to continue the progress which was being made to strengthen still further federal action of value to the industry."²⁹ The hypercritical attitude of some of these professionals is exemplified by a resolution put forward at the 1965 Canadian Institute of Forestry Annual Meeting held at Fort William, Ontario:

And Whereas in his letter of February 20th, 1964, the Prime Minister stated that 'the change in status of the Forestry Department to that of Forestry and Rural Development does not mean that forestry will take a lesser place in Government interest.'

Which statement is contradicted by the fact that 64% of the Forestry Department's 1965-1966 budget of 59 million dollars is being spent on A.R.D.A. or other agricultural projects, while at the same time there is an entire agricultural department in Ottawa with a budget of 122 million dollars.³⁰

Foresters have always claimed responsibility for forest land management as well as being the husbandrymen of the nation's forest resources. Yet, the above statement, albeit coming from a minority, but supported by leading members of the profession, mostly from Western Canada, attest to a lack of foresight on the part of these professionals to the significance of A.R.D.A. to the practice of forestry. Forestry is basically land management -- management which encompasses more than the production of wood fibre. In today's society there is an increasing demand for forest land for uses such as parks, water conservation, recreation and wildlife. The forester, to be truly a land manager, must be aware of these competing values and cannot afford to ignore them in his planning processes.

²⁹ Letter dated February 20, 1964, from the Prime Minister to Mr. R. G. McKee, President of the Canadian Institute of Forestry, 1963-64. The Forestry Chronicle, March 1964.

³⁰ R. G. McKee, "A Western Opinion," The Forestry Chronicle, Vol. 41, December 1965, p. 401. This resolution was not approved at the 1965 meeting.

It has been the federal government's policy to place top priority on A.R.D.A. projects to encourage proper land use, and on providing the technical assistance necessary to achieve it. Are these plans in part not aiding the realization of the much brandied about shibboleths of intensive land management and multiple use of Canada's forest resources? The scientists and technological experts needed to achieve this aim have not been forthcoming from the forestry schools of this nation. Not one of the four university faculties of forestry offer an undergraduate course in land management as such, despite the lip service given in these faculties to multiple use management and the growing awareness of the pressing needs placed on forest land for water yield, recreation and living space. Except in the Forestry Management and Industrial Production options at the University of New Brunswick and an alternative course in Soil Conservation in the Silvics option at the University of British Columbia, there are no other courses offered in Hydrology in the forestry faculties. Courses on Animal Ecology are apparently given only at Laval and in the Wildlife Management option at the University of British Columbia.

Professor Hugh Raup made a strong indictment of foresters when he argued that these professionals seldom look at the forest landscape as it actually is, but think instinctively in terms of wood production regardless of the relative value of the land for other uses.³¹ This criticism seems to be borne out by the fact that with the growth of A.R.D.A., particularly as it pertains to the systematic approach to land inventory and evaluation for use, foresters appear to have missed their opportunity to assert their claims to be multiple use exponents. Dean J. W. Ker's observation

³¹ Hugh M. Raup, Introductory Remarks to the Harvard Conference on Forest Production, 1962. Harvard Forest Papers, (1962), 9 pages.

that non-forestry graduates are assuming important positions within the forestry branch of the department, and that "geographers and economists, in particular, are becoming more and more influential in planning the management of the nation's natural resources,"³² is an indication of the extent to which the forestry profession has been bypassed in this important role.

Foresters have come under severe criticisms from economists challenging the concept of sustained yield.³³ Many of the enlightened members of the profession are recognizing the fact that the forester's role in society is in danger of being usurped by other scientific groups.³⁴ One thinks, for example, of the significance of the appointment of an organic chemist to the office of Dean of the Forestry Faculty of the University of British Columbia. Within the federal organization highly-trained specialists coming originally from the Forest Biology section of

³² Letter from Dean J. W. Ker of the Faculty of Forestry, University of New Brunswick, May 31, 1966.

³³ P. H. Pearse, op. cit. See also Anthony Scott, "Conservation Policy and Capital Theory," Canadian Journal of Economics and Political Science Vol. XX (Toronto: University of Toronto Press, November 1954), pp. 504-13.

³⁴ Correspondence with Dean J. W. Ker, May 31, 1966, and Dr. J. H. G. Smith, Professor of Forestry, University of British Columbia, May 1, 1966. In an editorial in The Forestry Chronicle, December 1965, Dr. J. H. G. Smith made the following statement:

With scientific knowledge doubling every 8 years we must work hard just to keep up. Soon it may be too late. Other groups may gain responsibility for land management earned by their hard work and ability.

We hear it said too often that we already know all that is needed in order to practice forestry in Canada, that what we need is less research and more reforestation. I think the best answer must be that we need much more of both. We can only improve forestry and forest science by fighting for a larger share of support rather than by carving up a fixed amount of funds. (p. 383) (underlining for emphasis).

the Department of Agriculture, have assumed a large proportion of important positions of responsibility. The Assistant Deputy Minister, the Director of Programme Co-ordination, and five of the seven regional directors came from the Forest Biology section of the Department³⁵ in which the Glassco Commission concluded there was "a healthy and stimulating research atmosphere which is absent in the other two branches."³⁶

Why has this been so? In an age of mushrooming scientific knowledge, and an approaching era of intensive land and forest management, foresters, who should be taking an active leadership role in the management of the nation's renewable natural resources, have found themselves in danger of taking a secondary position to other more highly trained groups within the scientific and social science communities. Because of his personal experiences and training in forestry the author of this thesis is conversant with certain value orientations which are held by most members of the forestry profession. These orientations have been largely instrumental in shaping foresters' attitudes concerning resource economics, multiple use, wildlife management, and forestry research.

The brief analysis which follows attempts to describe these orientations, and to explain the reasons why foresters could be in grave danger of being deprived of their role as the managers of the nation's forest resources. The implications of Professor Smith's warning cited earlier,³⁷ are ominous; forestry, as a profession of research workers and resource managers, may

³⁵ The Forestry Chronicle, Vol. 41, December 1965, p. 506.

³⁶ Glassco, Vol. 4, op. cit., pp. 243, 244.

³⁷ Dr. J. H. G. Smith's editorial in The Forestry Chronicle, December 1965. (See footnote #34).

have outlived its usefulness. In this new era of technological expansion, the principles of conventional forest management are seriously being questioned and found wanting. In relegating these principles to the ragbag of historical curiosities society may very well do the same to the profession, leaving foresters little more than hewers of wood and measurers of sample plots.

CHAPTER IV

THE INFLUENCE OF CERTAIN VALUE ORIENTATIONS ON THE PROFESSIONAL IDEOLOGY AND ADMINISTRATIVE OUTLOOK OF FORESTERS¹

ORGANIZATION THEORY

The empirical study of behaviour in organizations has tended to take three separate paths; sociological theories, social-psychological approaches to organizational phenomena, and theories concentrating on centralization, decentralization, and co-ordination within the organization. The sociological approach draws much from Max Weber and Émile Durkheim, stressing such concepts as the rationality of bureaucratic organizations and organizational life-cycles.² The social-psychological

¹ This chapter is based primarily on the author's experience in forestry from 1958 to 1964, and on the critical observations made by some distinguished foresters in the United States, and to a lesser extent by natural resource economists in Canada. Harvard University has produced such critics as Dr. Hugh Raup, ecologist, and Dr. Ernest M. Gould Jr., forest economist, both on the staff of the Harvard Forest at Petersham, Massachusetts. In addition, Dr. Ashley L. Schiff, Associate Professor of Political Science at the State University of New York, Stony Brook, Long Island, has done some research on this topic, but oriented, of course, to analyses of the American Forest Service. No such studies have been undertaken as yet in Canada. At the Public Archives of Canada, close to three hundred feet of files dating back to 1898, and belonging to the federal forestry service, remain in selective retention. The wealth of information these files could reveal concerning problems of organizational innovation remains to be researched and possibly published.

² See P. Blau, Dynamics of Bureaucracy (Chicago: University of Chicago Press, 1955).

theories have tended to emphasize the efficiency of the organization, thus focusing attention on such innovations as small problem-solving groups, interaction-influence systems, and detailed studies on informal organization, morale and productivity.³ The third group of organizational theorists has been exponents of the works of Chester Barnard in particular, by concentrating on the decision-making process and emphasizing the concept of incentive management and the processes of changing subjective attitudes. Barnard has described these concepts respectively as "the method of incentives", and "the method of persuasion."⁴

Recent studies by some organizational theorists have maintained that while the latter approach has been the most fruitful of the three divisions, its exponents have as yet not applied the theory of decision-making to the specific environmental conditions in which a particular organization operates.⁵ Cyert and March have therefore concentrated on using the business firm as a simulation model to predict firm behaviour with respect to such decisions as price, output, and resource allocation.⁶

All of the approaches mentioned above have taken for granted one basic premise: a belief in the efficacy of purposeful activity in organizational adaptation. Professor Ashley Schiff, however, has recently shown that this premise has been questioned by other administrative theorists.⁷ Herbert Kaufman, for example,

³R. Likert, New Patterns of Management (New York: McGraw-Hill, 1961).

⁴See Chester I. Barnard, The Functions of the Executive (Cambridge: Harvard University Press, 1964), pp. 139-184.

⁵Richard M. Cyert and James G. March, A Behavioral Theory of the Firm (New Jersey: Prentice-Hall Inc., 1963).

⁶Ibid., pp. 128-325.

⁷Ashley L. Schiff, "Innovation and Administrative Decision-Making: The Conservation of Land Resources," Administrative Science Quarterly, (June 1966), pp. 1-30.

has argued that even during the early days in the development of organization theory, there were a few questioning voices concerning the premise that central direction is the primary method of achieving co-ordination. Kaufman pointed out that Mary Parker Follett advocated "power with rather than power over" and she criticized the concept of "the illusion of final responsibility."⁸ In his turn Kaufman advocated a new approach to the study of organizational theory: the treatment of human organizations as a form of life rather than as an artifact designed, created, and directed exclusively by the human intellect.⁹ Kaufman elaborated on his basic premise:

When conditions prove fatal to some members of a population while other members survive and even flourish, biologists tend to ascribe the good fortune of the survivors to chance variations in their make-up that protect or even favor them under prevailing conditions. May we not also postulate that in the world population of organizations -- those comparatively poorly integrated sluggish fragile entities -- random variations occur which may make no difference under one set of circumstances, but which may favor or impede some organizations when circumstances change?¹⁰

The quest for knowledge in the understanding of organizational behaviour continues. One area which, as Professor Ashley Schiff has pointed out, has not received adequate attention in the literature of organization theory, is the role of fundamental administrative outlooks or professional ideologies on organizational behaviour.¹¹ The purpose of this chapter is to show how the

⁸ Herbert Kaufman, "Organizational Theory and Political Theory," American Political Science Review, 58 (1964), pp. 7-10.

⁹ Ibid., p. 11.

¹⁰ Ibid., p. 13.

¹¹ Ashley L. Schiff, op. cit., p. 2.

professional ideology of foresters has influenced their organizational behaviour and their capacity to adapt to circumstances in a rapidly changing technological age.

CONSERVATION IDEOLOGY

At the beginning of this century, American ecological thought was virtually dominated by the studies of vegetational dynamics conducted by the celebrated plant ecologist, E. F. Clements of the University of Nebraska. In his studies Clements emphasized the community of plants as the basic unit for the study of vegetation. By using this unit the theory was built up that over long time intervals, communities of plants succeeded each other until a "climax community" was reached. This slow process involved a series of interrelated geomorphic and biological changes, but with time intervals of physical habitat stability, during which these long-term successions among communities of plants could develop.

As the ecologist Hugh Raup has shown, this theory led to the assumption that nearly every stand of vegetation was in the process of development -- from something that it had been to something that it was becoming.¹² The result was that this theory allowed ecologists to make long-term predictions of what each stand would become in time. When the last succession was reached, the species had to be, first of all, capable of regeneration, and the forest itself be, by definition, a very old one, all-aged (because of its capacity to regenerate), and in the north temperate regions have a very heavy ground cover of humus due to the slow decaying of vegetation from previous plant

¹² Hugh Raup, "Some Problems in Ecological Theory and Their Relation to Conservation," Journal of Ecology, 52 (suppl.) (March, 1964), p. 22.

communities.¹³ Clements believed that forestry and grazing on forest lands were best served by the maintenance of this natural climax, for to have destroyed this natural equilibrium could cause untold damage to the soil and the plant community for countless generations to come.¹⁴

But Clements was wrong, as the later generation of ecologists were to prove. There is no such concept as a highly integrated plant community as expounded by Clements. Ecological relationships are, in fact, much more "loose-jointed". Raup's ecological studies dating back to 1938 at the Harvard Forest showed that, despite Clements' thesis, most of these "climax" or "virgin" forests were even-aged or have one or more well-defined age classes in them, instead of being all-aged according to Clements' theory. Raup, and the majority of plant ecologists today, have come to the conclusion that the only way to explain this fact is that in pre-settlement time there have been disturbances which have destroyed or decimated whole forest stands.¹⁵ Indeed, catastrophe may properly be regarded as an integral part of the natural environment, there being no such overall concept as the pervasiveness of stability as an ecological fact.

Clements' ideology had a profound effect on ecological thought for many decades. But it was found wanting of scientific substance, and as Frank Egler of the American Museum of Natural History asserted:

Much of traditional ecology is pretty well on the skids -- going out -- and it would be rather hard to find a strong and powerfully convinced,

¹³ Ibid., p. 22.

¹⁴ Ibid., pp. 19-21.

¹⁵ Raup, op. cit., pp. 22-23.

evangelistic ecologist, even though there are some who are thoroughly grounded in the old "plant succession to climax".¹⁶

At about the same period when this theory was being publicized by the ecologists, the conservation movement was in its heyday in North America. Indeed, as Professor Anthony Scott so poignantly pointed out, the forestry profession was born to the conservation movement.¹⁷ Basically the movement was a scientific one, its role in history arising from the implications of science and technology in modern society. The movement's advocates expressed certain fears for the diminishing natural resources of North America, and foresaw critical shortages in the future.

But apart from making these ominous predictions the movement's adherents also emphasized expansion and possibilities in the wise utilization of the natural resources of the continent. Conservationists felt that it was their duty to determine the course of resource development and the goals and methods of resource programmes. As a result, foresters should determine the desirable annual cut and the plans for the implementation of multiple use of the forests. As Hays concluded, conservationists hoped to realize a political system guided by the "gospel of efficiency," and dominated by the technicians who could best determine how to achieve this goal of efficiency.¹⁸

The man, above all others, who was basically responsible for this "revolution" and who stood in the forefront of the movement for many years was Gifford Pinchot, considered the first native American forester. Pinchot received his early inspiration for forestry from his father whom he dubbed, the

¹⁶ Quoted by Ashley L. Schiff, op. cit., p. 9.

¹⁷ Anthony Scott, "Conservation Policy and Capital Theory," C.J.E.P.S. Vol. XX, (1954), p. 504.

¹⁸ Samuel P. Hays, Conservation and the Gospel of Efficiency (Cambridge: Harvard University Press 1959), p. 3.

"Father of Forestry in America."¹⁹ After receiving his forestry education in France, Pinchot returned to the United States and practiced his profession, eventually becoming Chief of the Forestry Division of the federal government in 1898. He was finally fired by President Taft in 1910 during the famous Pinchot-Ballinger controversy. Pinchot's evangelistic spirit, and his ideas have so dominated the profession that it is necessary to discuss some of his convictions.

The conservation movement focused public attention upon the devastation of the virgin forests just as ecologists led by Clements were expounding their theories of long-term successions and climaxes. These theories allowed the forester and conservationists to assemble precise images of what was believed to be lost. As Raup contended, these images were "of great value to the conservation movement, for they not only set scientifically determined goals for the foresters, but also they were filled with aesthetic values and nostalgic overtones."²⁰ Thus was born the ideas of a primeval forest, and the concepts of sustained yield and multiple use of the forests for timber production, wildlife management, and recreation.

The extent of Pinchot's influence on forestry has been so profound that even today the principles he publicized are still adhered to by foresters all over the North American continent. These ideas were imported from classical European forestry and summarized by Gifford Pinchot:

. . . a forest may yield its best return in protection, in wood, grass, or other forest products, in money, or in interest on the capital it represents.

¹⁹ Gifford Pinchot, Breaking New Ground (New York: Harcourt, Brace and Company, 1949). (Frontispiece on p. 110).

²⁰ Raup, op. cit., p. 25.

But which ever of these ways of using the forest may be chosen in any given case, the fundamental idea in forestry is that of perpetuation by wise use; that is, of making the forest yield the best service possible at the present in such a way that its usefulness in the future will not be diminished but rather increased.²¹

This concept of perpetuating the values of the forest by wise use was translated into the plan of action that focused attention exclusively on the production of timber by sustained yield, to the detriment of all other values. Sustained yield up to the present day has completely dominated the core of forestry thought. Implicit in this concept of sustained yield were some four basic assumptions taken for granted in Europe at the time when Pinchot stated his philosophy. The first concept stated that forest products in the economy are so scarce that land can most profitably be used intensively to produce them. The second stressed continuity and stability by asserting that the economy would require a regular, stable flow of wood products. The third emphasized certainty by asserting that knowledge of production and consumption patterns is adequate for the planning of forest production eight to ten decades ahead. The fourth stipulated that the forest operating unit, region or nation, is operating in a closed economy so that foresters could equate internal production and consumption, disregarding opportunities for supply from outside, or for alternative uses of its own capital resources.²²

These concepts of scarcity, stability, certainty and a closed economy dominated the forestry conservation movement. As

²¹ Quoted in Ernest M. Gould Jr., "Fifty Years of Management at the Harvard Forest," Harvard Forest Bulletin No. 29. Petersham, Massachusetts, 1960.

²² Ibid., pp. 8-29.

Dr. Raup showed, three of these assumptions resembled the ecological concepts elaborated on earlier in this thesis, and which were found wanting in actual application:

One was the idea of habitat stability over long periods of time, giving rise to a degree of certainty as to the course of development over time. The closed economy has its counterpart in the concept of the self-sufficient climax.²³

At the time when Pinchot strongly advocated this first principle of forest management there were a few who expressed grave reservations as to its suitability. Dr. Bernhard E. Fernow, who was Chief of the Division of Forestry from 1886 to 1898, and later Dean of Forestry at Cornell University and the University of Toronto, expressed some doubts on the matter. He felt that at the time economic, social, and forest conditions in the United States would not justify sustained yield management:

Before, however, we may apply the finer methods of forestry management as practiced abroad, it will be well enough to begin with common-sense management, which consists in avoiding unnecessary waste, in protecting against fire, in keeping out cattle where young growth is to be fostered, and in not preventing by malpractice the natural reproduction.²⁴

But Gifford Pinchot's influence was all-pervasive. He seriously questioned Dr. Fernow's competence as a practical forester,²⁵ and as to the efficiency of the Forestry Division when it was under Fernow he commented:

The Old Division saw too many lions in the path. It held that before it could manage a forest growth intelligently it must know first of all the biology,

²³ Raup, op. cit., p. 23.

²⁴ Quoted in E. Gould Jr., op. cit., p. 8.

²⁵ Gifford Pinchot, op. cit., p. 135.

or life history, of all the kinds of trees which compose it Forestry in the land of the ingenious Yankee could be built on a whole lot less information than that. I was born in Connecticut myself.²⁶

This basic assumption that forestry could be practised without what is labelled as "high-brow research," has continued to dominate forestry thought in North America. Witness, for example, the scathing criticisms of federal forestry research made by Mr. R. G. McKee, a former Deputy Minister of Forestry in British Columbia and past president of the Canadian Institute of Forestry, at the Institute's 1965 annual convention.²⁷ Another past president of the Canadian Institute of Forestry, Mr. K. W. Hearnden, made the following statement when commenting on the expansion plans of the Department of Forestry and Rural Development:

Certainly, it should be apparent that an expansion of basic forest research activity, at this stage in Canadian forestry, is uncalled-for and unneeded and could be regarded only as "research for the sake of research".²⁸

²⁶ Ibid., p. 134. Ashley Schiff, in his book, makes a further comment on Pinchot's attitude:

For activists like Pinchot, resolutions of policy problems were more pressing than advancement of knowledge through research. Once applied to the woods, forest management made little provision for continued scientific effort. Ironically, after science had inspired action, it was then sorely neglected.

Ashley L. Schiff, Fire and Water: Scientific Heresy in the Forest Service (Cambridge: Harvard University Press, 1962).

²⁷ R. G. McKee, "A Western Opinion," The Forestry Chronicle, Vol. 41 (December, 1965), pp. 400-401.

²⁸ K. W. Hearnden, "Report of the Past President," 57th Annual Report of the Canadian Institute of Forestry, (December 1965), p. 14.

Another view expressed by a correspondent to the author of this thesis was that:

. . . it is highly undesirable that doctors of entomology and pathology, and even agronomy, should hold the principal positions in the hierarchy when these should be filled by "generalists", that is, by foresters.²⁹

One correspondent to The Forestry Chronicle, terming himself and other field foresters as "dirty foresters",³⁰ goes on to assert that:

We are not against forestry research, but having the sense of moral and professional responsibility for the future of our forests, we believe that keeping our forest land in continuous productivity must have an unconditional priority.³¹

Another arguing for the desirability of having foresters as trained forest researchers stated:

Unless he has originally been trained as a professional forester, maintained a strong interest in the profession, and has a genuine concern with practical forest problems, he may have little motive to go to a lot of trouble to rewrite and talk about his work in terms of practical implications.³²

The author of this thesis has at least two letters from leading foresters attesting to the fact that, when the department

²⁹ Personal correspondence to the author of this thesis.

³⁰ As opposed to federal forest research scientists in this case.

³¹ Letter to The Forestry Chronicle, Vol. 42 (March 1966), p. 102.

³² G. F. Weetman, "Problems in Research Communication," The Forestry Chronicle, Vol. 42 (March 1966), p. 112.

was being re-organized, strong representations were made to the Minister of Forestry and to the McGugan study group³³ requesting that senior positions in the re-organized department be held only by professional foresters. One other correspondent stated that he was not interested in researchers oriented "toward a sterile academic or research laboratory environment".³⁴ He continued:

. . . if you look closely, I think that you will find that the reshaping of the department was done at a time when influential forestry voices were on leave. The department now has become almost wholly scientific in its perspective and must re-open lines of communication to the profession I think that it would be much better to expand application of what we know now than to expand scientific research without consideration of its practical utility or potential for application.³⁵

Another correspondent, epitomizing Gifford Pinchot's approach to scientific research, stated that:

To many of us on the outside it is disturbing to be confronted by these obvious needs,³⁶ and particularly by the need for more public funds for forestry, and at the same time to hear of the plans for more research centres and proliferating, high-priced research organizations I suppose

³³ The study group responsible for the blueprint of the departmental re-organization outlined in Chapter III.

³⁴ Personal correspondence to the author of this thesis.

³⁵ Personal correspondence to the author of this thesis.

³⁶ The need for reforestation, forest access roads and adequate fire protection.

the federal people could find adequate scope in their search for projects within these areas of fire protection and reforestation, but we can't afford to sit around waiting for them to complete their studies and analysis before we marshal available knowledge and resources in the attack on these problems.³⁷

The fact of the matter is that foresters have been talking about marshalling facts and information about the forests for close to seven or eight decades. This almost anti-research attitude, or when it is not so overt, the emphasis on "foresters should be the researchers of forest problems, or the heads of forest research organizations", has led to inherent parochialism on the part of these professionals. Unlike agricultural science where agronomists with specialized training work alongside microbiologists, entomologists, geneticists, taxonomists and other scientists trained in many disciplines other than agriculture, forestry professionals have appeared to harbour an inherent distrust of other groups working in the area of forest land management. Some have realized, however, that: "Perhaps times are changing and foresters simply must become more scientific. We must learn to live with effective professionals and scientists from all fields".³⁸

Some prominent members of the profession have, in the past, pointed out that foresters have failed to provide the scientific and economic information needed to manage Canada's

³⁷ Personal correspondence to the author of this thesis. Note the distinction made in this letter between "public funds for forestry" as opposed to plans for "proliferating, high-priced research organizations".

³⁸ Correspondence with Dr. J. H. G. Smith, Professor of Forestry, University of British Columbia, May 1, 1966.

forest lands.³⁹ As far back as 1935, Mr. E. Koroleff, a forester with the Canadian Pulp and Paper Association, noted that forest science was lagging due to the lack of basic scientific knowledge of soils and of the "inner life" of the forests. Canadian foresters, he asserted, had failed to provide leadership in forest management. As a result there had been a lack of funds for research, and a failure on the part of foresters to impress on government and industry the importance of research in forest management.⁴⁰

Over the years the federal forestry service and the provincial forestry research branches have recruited personnel almost exclusively from schools of forestry, and therefore they have failed to exploit the insights of other disciplines relevant to the overall problems of resource management. As a result, foresters have seldom questioned the concept of sustained yield, or have never publicly proposed ways and means to implement plans for recreation management, and most generally have failed to give any leadership in the pursuit of the elusive concept called multiple use.

Since the Depression years, resource economists have continuously criticized the concept of sustained yield as expounded by Pinchot and adhered to by foresters up to the present day. As noted earlier in this thesis, the Royal Commission on Dominion-Provincial Relations considered the development of the primary industries of Canada in relation to all industrial development. Although the Commission's report did not contain any overt indictments of the concept of sustained yield, the implications

³⁹ Lowell Besley, Past President of the Canadian Institute of Forestry, in a talk entitled, "Tomorrow's Challenge". The Forestry Chronicle, (December, 1962), pp. 514-527.

⁴⁰ A. E. Koroleff, The Woodland Review, Vol. 6. No. 7. (Montreal: Canadian Pulp and Paper Association publication, 1936).

of such criticisms were made in the report. The Commission questioned the replacement of certain forest species as "uneconomic".⁴¹ A further comment made was that "far too little attention has been paid to developing the most economic methods of exploiting Canadian resources".⁴² At least one federal forestry official, senior silviculturalist George A. Mulloy, was not too happy with these critical observations. In a memorandum to a Mr. Harrison,⁴³ Mulloy called his attention to such, as he called it, "odd references" by asserting:

It looks as if the Sirois Commission was either ill-advised on forestry matters or did not read the submissions.

Douglas fir can be replaced over a long rotation 150-200 years -- but minerals -- never!! Black walnut is scarce but even it can be grown in plantation. White pine -- certainly will reproduce itself in time -- !! Black spruce is like a weed and we will always have it with us!

The parties responsible for these sentiments certainly are making odious comparisons! -- and take a short term view of forestry requirements. A forest policy in Canada -- which is as national in aspect as agriculture or any other features of this Report -- seems to have been overlooked -- in spite of our own submissions!!⁴⁴

⁴¹ Canada. Report of The Royal Commission on Dominion-Provincial Relations. Book II. (Ottawa: The King's Printer, 1940), p. 114.

⁴² Ibid., p. 130.

⁴³ It is believed that this was Mr. G. Harrison who later became Canada's first Deputy Minister of Forestry in the federal civil service.

⁴⁴ Public Archives of Canada. Records of the Forest Service, Lands, Parks and Forest Branch, Department of Mines and Resources. Policy File 39766. R. G. 39.

Resource economists, however, have continued to question this concept of rotation periods of "150-200 years." Professor G. K. Goundrey, in an article entitled, "Forest Management and the Theory of Capital," questioned the concept of maximum sustained yield as an economic one. Using a federal government's study of a forested area in Quebec, Goundrey, by using the economic concepts of capital theory, reduced the rotation period from the previously calculated eighty years to forty-two years. He concluded his analysis by stating:

We may conclude, then, that the owner of a forest will maximize his rate of growth capital, and that the rate of interest is significant only in determining whether the operation will be undertaken at all. The solution to our problem of when to cut the trees, as given by capital theory, is 42 years.

The conclusions of the above analysis may now be set out. Under a freely functioning price system, trees will be cut at a date much short of the "maximum sustained yield age". The period of production will be that which maximizes the (average) internal rate of growth of capital or the rate of return on investment rather than the present value of the enterprise, and the rotation age will be shorter than if the present value of the enterprise had been maximized.⁴⁵

Thus resource economists have continued to question the basic premises behind the concept of sustained yield: scarcity of land, stability in the economy, certainty for the future, and

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G. K. Goundrey, "Forest Management and the Theory of Capital," C.J.E.P.S. Vol. XXVI (1960), p. 448.

a closed economy.⁴⁶

However, no great forestry debates have been sparked among foresters concerning the merits or demerits of sustained yield. The theory continues to be accepted without serious questioning, and it is still faithfully taught in forestry faculties across the nation. Occasionally an editorial appears in The Forestry Chronicle⁴⁷ advocating a second look at the concept, but no arguments are stirred or no new concepts are advocated in its stead. The rueful argument continues to dominate forestry publications that "the people have insisted that roads, schools, social services, etc., are more important for the present than costly intensive forestry for the future."⁴⁸

⁴⁶ Although the author of this thesis does not profess to be anything but a novice in economic theory, he can point to a significant number of economic articles which have been highly critical of the concept of maximum sustained yield. The reader is referred to the following publications: Ernest M. Gould, "Fifty Years of Management at the Harvard Forest," Harvard Forest Bulletin No. 29; P. H. Pearse, "Public Management and Mismanagement of Natural Resources in Canada," Queen's Quarterly, Vol. LXXIII (Spring 1966), pp. 86-99; Pearse, "Distortions in the Market for Forest Land," The Forestry Chronicle, Vol. 41 (December 1965), pp. 406-418; Anthony Scott, "Conservation Policy and Capital Theory," C.J.E.P.S. Vol. XX (1954), pp. 504-513; Scott, "The Development of the Extractive Industries," C.J.E.P.S. Vol. XXVIII (1962), pp. 70-87. (particularly p. 81); Scott, Natural Resources: The Economics of Conservation (Toronto: University of Toronto Press, 1955).

⁴⁷ J. H. G. Smith, "Sustained Yield is Not Ideal," The Forestry Chronicle (editorial) Vol. 40 (June 1964).

⁴⁸ R. G. McKee, "Canadian Forestry and the Shared-Cost Program." An address to the Interior Lumber Manufacturers' Association, Penticton, B. C. March 20, 1964. The Forestry Chronicle Vol. 40 (June 1964), pp. 262-268.

This intensive forestry to which Mr. McKee refers is a far cry from the intensive forestry advocated by the experts at the Montebello Conference and already mentioned in Chapter III. Rather than placing a total emphasis on reforestation, costly access roads into inaccessible sites, and planning operations on the basis of maximum sustained yield, progressive industrialists in the pulp and paper industry are concerned about intensifying Canada's efforts in forest genetics, wood-chemistry, studies in soil science, economics, and even sociology, so that the industry could continue to hold its own in a highly competitive and innovative era. The pulp and paper industry is already well aware of the potentialities of producing suitable substances from grass, cane, and other plants.⁴⁹ Just as the industry proved highly flexible in the nineteenth century by switching from the utilization of rags to wood,⁵⁰ so too it could be just as highly adaptable today by turning to some other raw material base if the procurement of wood becomes uneconomic. Research is needed, more than ever, to keep forest products competitive with other materials.

The author of this thesis is certainly not stating that the resource economists, refuting the concept of sustained yield, have advocated clear cut solutions which would be panaceas for Canada's forestry ills. Indeed, economists criticizing the concept have indicated that where there are extra social costs in the use of natural resources, or where the government of a region believes that the survival of that region depends upon replacing a particular resource, there is nothing in economic theory which would disapprove the efforts of the community to make the best

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Anthony Scott, "The Development of the Extractive Industries," C.J.E.P.S. Vol. XXVIII (1962), p. 81.

⁵⁰

See Chapter II, pp. 26-27.

of the situation by "conserving" the resource. The choice of butter or guns remains the prerogative of the powers that be. Indeed, Professor Scott/ argued that his purpose is "to go beyond these manifestations of common sense to what I believe is the core of conservationist sentiment: the economic rationality of preserving capital in a natural or original state for future users."⁵¹ What is required then is a full-scale debate of what economists would call "unorthodox interpretations" of resource economics.

The area of forest land management needs a multiplicity of disciplines to help in the solution of Canada's problems in forestry research: entomologists, pathologists, geneticists, ecologists and economists, among others. The forestry schools of the nation have not been able to provide these personnel for the task ahead. The plea that ". . . the expansion of the Department of Forestry should be slowed, if necessary, to permit education of a substantial portion of foresters and forest scientists needed in Canadian forestry schools",⁵² or the horns of the dilemma posed by the fact that "we have mixed feelings with regard to intensification of our efforts in conventional forest management theory and practice, on the one hand, and expansion to cover other areas of specialization lateral to forestry, on the other",⁵³ clearly reveal one significant fact: forestry faculties are concerned that their past inadequacies are now having telling consequences for forest science in Canada. Technological developments in the use of wood and wood substitutes,

⁵¹Anthony Scott, "Conservation and Capital Theory: Rejoinder," C.J.E.P.S. Vol. XXII (1956), p. 98.

⁵²Correspondence with Dr. J. H. G. Smith, Professor of Forestry, University of British Columbia, May 1, 1966.

⁵³Correspondence with Dr. J. W. Ker, Dean of The Faculty of Forestry, University of New Brunswick, May 31, 1966.

and pressures for the use of forest land for the purpose of recreation and other uses, have been unprecedented in the past few decades. This has brought about a break-down of clear-cut divisions of responsibility and the interweaving of disciplines other than forestry in the pattern of resource management. If the forestry profession is to hold its own in this technological era, then it must come to terms with some of the value orientations outlined in this chapter. The author, although seeing some indications of a concern for such a self-analysis is not convinced that this is altogether a whole-hearted effort. As a result, he has reached the conclusion that foresters, in this new era of scientific advancement, may find that their assumed role as forest land managers is in danger of being usurped by other highly-trained and competent groups within the scientific and social sciences communities.

CONCLUSIONS

The information presented in this thesis concerning the Science Council and Science Secretariat has been done so because of one primary aim: it is this author's conviction, arrived at after conducting interviews and corresponding with some informed people, that the Science Secretariat will be playing a decisive role in the allocation of financial resources to forestry research, under government auspices.

Many political scientists maintain that the speeches of politicians should never be given serious attention, for most invariably these utterings turn out to be "wasteful words and blithe propaganda". But the evidence presented in this work shows a consistency of policy on the part of the federal government which, in this instance, would contradict the political theorists. Witness the consistency of the speeches of the Minister of Forestry

presented in this thesis, that:

if forestry is to live, breathe, and keep pace with the general World momentum, we badly need more advances in research, ranging from increasing our fundamental knowledge of the biological systems within which we work, to providing direct research answers to immediate problems.⁵⁴

Witness the almost unbelievable growth of A.R.D.A. and its implications for forest land management in Canada; and witness, as one correspondent puts it, the "prospects held forth for the burgeoning forest research establishment in Ottawa".

Although the author of this thesis makes no pretence to being a crystal-ball gazer, it is safe to predict that the future vicissitudes of the department will not always be as regular as federal forestry department officials would prefer. Besides conducting forestry research, the department must attempt to work with a hypercritical group of professional foresters in effecting solutions to Canada's forestry research problems. One prominent executive member of the Canadian Institute of Forestry has admitted that, although communications could always be improved, "honest attempts to maintain a sound dialogue have been made by the department."⁵⁵

The constitutional problems posed by trying to effect a national forest policy have been excluded almost entirely from this thesis. The author of this thesis agrees with Dean Lederman's argument, expounded at the Resources for Tomorrow Conference in 1961, that as far as he could determine no major constitutional difficulties lie ahead to prevent the federal and provincial

⁵⁴ See footnote 11, Chapter III.

⁵⁵ Correspondence with Dr. J. H. G. Smith, editor of The Forestry Chronicle, May 1, 1966.

governments getting together to work out and develop "rational policies" for Canada's natural resources.

Finally, this thesis has also attempted to show how certain value orientations held by foresters have influenced professional outlook and constrained innovative capability. Foresters in the past have been unwilling to exploit the insights of other disciplines relevant to the problems of resource management. This obdurate attitude must change if the profession hopes to continue to maintain its assumed role of being guardian of the forest resources of the nation. Forest science is in no danger of being neglected; indeed, the arguments and evidence presented in this work attest to the exact opposite. Forestry professionals, however, are in grave danger of being left behind in the backwater of today's tidal wave of technological progress and scientific innovation.

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In addition some of my correspondents wish to remain anonymous.

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CANADA
PRIVY COUNCIL

AT THE GOVERNMENT HOUSE AT OTTAWA

MONDAY, the 22nd day of APRIL, 1963.

PRESENT:

HIS EXCELLENCY

THE GOVERNOR GENERAL IN COUNCIL.

His Excellency the Governor General in Council, pursuant to Section 4 of the Research Council Act, is pleased hereby to amend Order in Council of 4th December, 1962, P.C. 1962-1722, reconstituting the Committee of the Privy Council on Scientific and Industrial Research by deleting section 2 thereof and substituting therefor the following:

2. The Committee of the Privy Council on Scientific and Industrial Research shall consist of the following Ministers:

The Honourable Charles Mills Drury, who shall be Chairman
The Minister of Agriculture
The Secretary of State for External Affairs
The Minister of Finance
The Minister of Fisheries
The Minister of Forestry
The Minister of Mines and Technical Surveys
The Minister of National Defence
The Minister of National Health and Welfare.

CERTIFIED TO BE A TRUE COPY

CLERK OF THE PRIVY COUNCIL

C-149.

First Session, Twenty-Seventh Parliament, 14-15 Elizabeth II, 1966.

THE HOUSE OF COMMONS OF CANADA.

BILL C-149.

An Act to provide for the establishment of a
Science Council of Canada.

AS PASSED BY THE HOUSE OF COMMONS,
26th APRIL, 1966.

ROGER DUHAMEL, F.R.S.C.
QUEEN'S PRINTER AND CONTROLLER OF STATIONERY
OTTAWA, 1966

1st Session, 27th Parliament, 14-15 Elizabeth II, 1966.

THE HOUSE OF COMMONS OF CANADA.

BILL C-149.

An Act to provide for the establishment of a
Science Council of Canada.

HER Majesty, by and with the advice and consent of
the Senate and House of Commons of Canada, enacts
as follows:

SHORT TITLE.

Short title. **1.** This Act may be cited as the *Science Council
of Canada Act.* 5

INTERPRETATION.

Definitions. **2.** In this Act,
"Council." (a) "Council" means the Science Council of Canada
established pursuant to section 3; and
"Minister." (b) "Minister" means such member of the Queen's
Privy Council for Canada as may be designated 10
by the Governor in Council to act as the
Minister for the purposes of this Act.

SCIENCE COUNCIL.

Establish-
ment and
constitution. **3.** There shall be a Science Council of Canada
consisting of not more than
 (a) twenty-five members chosen from among per- 15
sons having a specialized interest in science or
technology; and
 (b) four associate members chosen from among
officers or employees of Her Majesty employed
in departments or agencies of the Government 20
of Canada,
to be appointed by the Governor in Council as provided in
section 4.

- Tenure of members.** **4.** (1) Each of the members of the Council shall be appointed to hold office for a term of not more than three years, except that of those first appointed not less than one-third shall be appointed for a term of two years and not less than one-third shall be appointed for a term of four 5 years.
- Tenure of associate members.** (2) Each of the associate members of the Council shall be appointed to hold office during pleasure.
- Chairman and vice-chairman of Council.** **5.** (1) The Governor in Council shall appoint one of the members to be chairman of the Council and one of 10 the members to be vice-chairman of the Council for such term, not exceeding three years, as is fixed by the Governor in Council.
- Absence of chairman.** (2) In the event of the absence or incapacity of the chairman, or if the office of chairman is vacant, the 15 vice-chairman shall act as chairman.
- Reappointment.** **6.** A retiring chairman, vice-chairman or other member is eligible for reappointment to the Council in the same or another capacity.
- Remuneration of chairman.** **7.** (1) The chairman of the Council shall be paid 20 such remuneration and expenses as are authorized by the Governor in Council.
- Travelling and living expenses.** (2) The members and associate members of the Council, other than the chairman, shall serve without remuneration but are entitled to be paid reasonable travelling 25 and other expenses while absent from their ordinary place of residence in the course of their duties.
- Remuneration of members for additional duties.** (3) Notwithstanding subsection (2), a member of the Council other than the chairman may, for any period during which he performs with the approval of the Council 30 any duties on behalf of the Council in addition to his ordinary duties as a member thereof, be paid such remuneration therefor as may be authorized by the Governor in Council.
- Quorum.** **8.** A majority of the members constitutes a 35 quorum of the Council.
- Meetings.** **9.** The Council shall meet at least twice a year at the City of Ottawa and may meet at such other places at such times as it deems necessary.
- Procedure and establishment of committees.** **10.** The Council may make rules for the regulation 40 of its proceedings and the performance of its functions and may establish special or standing committees of its members and advisory committees consisting of members of the Council and persons other than members.

DUTIES.

Duties of the
Council.

11. It shall be the duty of the Council to assess in a comprehensive manner Canada's scientific and technological resources, requirements and potentialities and to make recommendations thereon to the Minister; and in particular it shall be the duty of the Council to give consideration to, and make reports and recommendations to the Minister on, 5

- (a) the adequacy of the scientific and technological research and development being carried on in Canada; 10
- (b) the priorities that should be assigned in Canada to specific areas of scientific and technological research;
- (c) the effective development and utilization of scientific and technological manpower in Canada; 15
- (d) long term planning for scientific and technological research and development in Canada;
- (e) the factors involved in Canada's participation in international scientific or technological affairs; 20
- (f) the responsibilities of departments and agencies of the Government of Canada, in relation to those of universities, private companies and other organizations, in furthering science and technology in Canada; 25
- (g) the statistical and other information on scientific and technological research and development that should be obtained in order to provide a proper basis for the formulation of government policy in relation to science and technology in Canada; and 30
- (h) the best means of developing and maintaining cooperation and the exchange of information between the Council and other public or private organizations concerned with the scientific, technological, economic or social aspects of life in Canada. 35

Reference to
the Council.

12. (1) The Minister may refer to the Council for its consideration and advice such matters relating to science and technology in Canada or otherwise relating to the operation of this Act as he thinks fit. 40

Council to
investigate
and report.

(2) The Council shall investigate and report to the Minister on all matters referred to it pursuant to subsection (1) and shall make such recommendations to the Minister in respect thereof as it deems appropriate. 45

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Initiation
of studies,
etc.

13. The Council shall on its own initiative, or if directed to do so by the Minister, conduct such studies, inquiries and other undertakings as may be necessary with respect to any matter coming within sections 11 and 12 or with respect to any other matter relating to the carrying 5 out of its duties under those sections, and shall report to, advise or make recommendations to the Minister with respect thereto as the circumstances require.

GENERAL.

Council may
utilize
services of
employees
of other
Departments.
Advisors.

14. (1) In carrying out its duties the Council may utilize the services of such officers and employees of Her 10 Majesty employed in departments of the Government of Canada as the Governor in Council may designate for the purpose.

(2) The Minister may, at the request of the Council, engage for temporary periods or for specific projects 15 persons having a technical or specialized knowledge of any matter relating to the work of the Council, to advise and assist the Council in the performance of its duties under this Act and such persons shall receive such remuneration for their services as the Treasury Board may authorize. 20

Not agent
of Her
Majesty.

15. The Council is not an agent of Her Majesty and the members of the Council as such are not part of the public service of Canada.

Financial.

16. All expenditures for the purposes of this Act shall be paid out of moneys appropriated by Parliament 25 therefor.

Annual
report.

17. The chairman of the Council shall, within three months after the termination of each fiscal year, transmit to the Minister a report of the operations of the Council for that fiscal year and the Minister shall cause such report to 30 be laid before Parliament within fifteen days after the receipt thereof, or, if Parliament is not then sitting, on any of the first fifteen days next thereafter that Parliament is sitting.