The political dynamics and social organization of Australian Antarctic Science: 1947-1987

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THE POLITICAL DYNAMICS AND SOCIAL ORGANIZATION
OF AUSTRALIAN ANTARCTIC SCIENCE: 1947-1987

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This thesis is my own work and has not been submitted for a degree to any other university or institution.

Helen Mitchell
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ABSTRACT

This examination of the evolution of postwar policies for Australian Antarctic science argues that an implicit science policy, administered and controlled by a scientific elite, preceded the explicit Antarctic science policies of the last decade. This scientific elite managed the direction and content of Antarctic science by emphasizing Antarctic research goals in terms of professional autonomy and independence from political objectives. It is revealed that changes in the Australian government's political perception of Antarctic issues parallel changes in the elite's strategies for and ideology of Antarctic science.

The nature of Antarctic science and its relation to policy is analysed on two levels. The first level examines the social organization of Antarctic research with reference to professional and peer relations of Antarctic scientists and the internal organizational structure of the Antarctic Division. The second level places Antarctic science policy within its political environment and discusses the extent to which scientists should control decision-making regarding scientific activity undertaken in the Australian Antarctic Territory. The conclusion suggests an alternative model for the formation of Antarctic science policy based on utilizing more non-scientific representatives in the regulatory and policy-making process.
1. **INTRODUCTION**

Scientific research organised and controlled by the Australian government has been undertaken in the Australian Antarctic Territory since the end of the Second World War. Although the motives for Australian involvement in Antarctic science are complex, the myth of an apolitical Antarctic science has been nurtured by politicians and scientists alike to achieve political and scientific advantages over nation states excluded from claimant or consultative status under the Antarctic Treaty. Science policy has played a crucial role in safeguarding and furthering the interests of scientists, politicians and bureaucrats involved in the political processes determining Antarctic policy.

Science policy analyst Jean Jacques Salomon\(^1\) points to the Antarctic Treaty as one of the few spheres where international scientific co-operation transcends competition between states. Salomon describes the Treaty as

\[\ldots\text{ an example of diplomatic and political action based on purely scientific motives.}\]

While Salomon does concede that the spirit of co-operation can only exist so long as the Antarctic continent provides no ground for competition between states, his views reflect and contribute to the myth that the activities of the Antarctic scientific community are politically neutral. Salomon's views are typical of a gamut of Antarctic writers\(^3\) who have portrayed the Antarctic scientific community as a unique phenomenon: one in which the anomaly of a "pure" science untainted by political demands is also the basis for a new political order. In fact, this is far from true. The Antarctic scientific community is not unique. It is a disparate collection of national science organizations. It can be analysed
National science policies can be viewed as the linchpin between a society's political processes and the internal characteristics of the scientific community. Australian Antarctic science policy reflects both the external influences on and the internal dynamics of the Australian Antarctic scientific establishment.

The analysis of science policy as a subject of academic research is an area of recent interest. In 1977, Joseph Haberer described science policy literature in the following terms:

There has been little evidence that an intellectual effort was under way to create a more rigorous, comprehensive, comparative theory - or even a unifying framework. To a considerable degree, we still have a body of literature in search of a field. 6

While much of the literature accepts that factors external to the scientific community determine the type of science policy created, little work has been done within the sociology of science to explain how the internal dynamics of scientific communities, for example, their patterns of communication and work organization, might also affect the type of science policy formulated. 7

This thesis examines the processes which have created Australian Antarctic science policy. The study seeks to relate externalist perspectives of science policy to the internal dynamics of the Australian Antarctic scientific community with special emphasis on the history and development of the Australian government's
The aims of the thesis are as follows:

1. To examine postwar management of Antarctic science from a national and international perspective. This identifies the major institutions and legal instruments which determine the direction of Antarctic science (Chapter 2).

2. To analyse the social organization of Australian Antarctic research. A scientific elite in Australian Antarctic science is identified. It is argued that this elite formulated and managed an "unofficial" science policy which reflected the elite's interests for more than two decades. The work organization of the Antarctic Division is examined in order to support the argument that a restricted research institution, restricted in both the political and scientific sense, suited the interests of past Australian governments and the scientific elite. An ineffective and restricted Antarctic Division preserved the status quo, that is, it did not challenge the science-government partnership in the formulation of Antarctic science policy and science programs (Chapter 3).

3. To review and analyse the contribution that the political environment has had on the evolution of Antarctic science policy. This details government and public responses to the "politicization" of Antarctic science. It details the results of parliamentary reviews and examines current Antarctic science advisory policy machinery (Chapter 4).

4. To identify the weaknesses in the current Antarctic science advisory system and propose improvements to existing
procedures and arrangements (Chapter 5).

There are few published studies of the development and implementation of Australia's science policy in the Australian Antarctic Territory.¹² No accounts are known to exist written from a sociology of science perspective which link Australia's Antarctic science policy to the maintenance of political power. The theoretical framework of this thesis is primarily based on an "externalist"⁹ approach to the sociology of science. An externalist approach to science concerns itself with explaining scientific practices in terms of social structures and processes making this an appropriate framework in which to examine the evolution of specific science policies such as Australia's Antarctic science policy. The work however, of writers such as Richard Whitley¹⁰ and Peter Weingart¹¹ who are concerned with the cognitive aspects of a sociology of science are also acknowledged with regard to the role of scientific elites and the changing content of Antarctic science.
References to the Introduction


7. An exception to this is the work of a group in the University of Bielefeld who have used case studies to trace the impact of science policy programs on scientific fields. See W. van den Daele & Peter Weingart, "Resistance and Receptivity of Science to External Direction: The Emergence of New Disciplines under the Impact of Science Policy" in G. Lemaine, R. MacLeod, M. Mulkay & P. Weingart (Eds.), *Perspectives on the Emergence of Scientific Disciplines*. The Hague, 1976; W. van den Daele, W. Krohn & P. Weingart, "The Political


11. P. Weingart, *op. cit.*, note 7
2. POSTWAR MANAGEMENT OF ANTARCTIC SCIENCE

Antarctic scientific research is performed against a complex background of international foreign relations and national politics. Styles of management and control of Antarctic science programs have their origins in the delicate political negotiations undertaken by the superpowers during the Cold War of the 1950's. An examination of the historical context of Antarctic science is necessary because all the major international institutions and government departments involved in the management and organization of research programs have exerted a dominant and continuous influence on the character of Antarctic science since the Second World War. The legal obligations of the Antarctic Treaty determine the conditions and limits of research activity carried out in Antarctic regions.

This chapter identifies and describes the major institutions and mechanisms involved in postwar management of Antarctic research and provides an historical perspective in which to assess the structural characteristics of Antarctic science.

2.1 NATIONAL ANTARCTIC SCIENCE

The Second World War had a decisive impact on the organization and control of Australian scientific activity in the Antarctic. Private sponsorship and control of Antarctic expeditions gave way to government financed and managed expeditions based on continuing programs of polar science. Australia already had a rich history of expeditionary science to the Antarctic continent beginning with the activities of the Australian Antarctic Exploration Committee set up by the Royal Society of Victoria in 1866, continuing with Sir Douglas Mawson's 1911-13 Australasian Antarctic Expedition.
and culminating in the British-Australian-New Zealand Antarctic Expedition (BANZARE) of 1929-31. Australians, many of them scientists, also took part in the expeditions of other nations. Sir Douglas Mawson, a trained physicist but also experienced as a geologist, Professor T.W. Edgeworth David of the University of Sydney and geologist Leo Cotton (later to become Professor of Geology at the same University), all took part in Sir Ernest Shackleton's expedition of 1907-1909. Shackleton's subsequent British Trans-Antarctic Expedition of 1914-17 included Australian physicists R.W. Richards and A.K. Jack.

When Australian scientific activity resumed after the Second World War it had undergone significant changes. Expeditions were no longer privately organised and sponsored with short term objectives. After 1945 expeditions were financed by the Australian government and resulted in permanently based and institutionalized scientific activity. Government committees planned and controlled research programs and a new government agency, the Antarctic Division, was established to develop and execute Antarctic policy.

Until the International Geophysical Year in 1957-58 which established and promoted an international co-operative approach to Antarctic scientific activity, and the signing of the Antarctic Treaty in 1959 which provided a legal framework for the incorporation of national Antarctic science into international science, scientific activity in the Australian Antarctic Territory was clearly based on national political objectives and priorities. In 1951, William Wentworth, M.H.R. for Mackellar, listed the following advantages in establishing permanent stations in Antarctica: whaling; long-range weather forecasting; geological exploration...
9.
for mineral resources; the use of the continent's isolation for the development of atomic research; the establishment of airline bases; tourism; military considerations and scientific research. In 1953, the Minister for External Affairs, the Rt Hon. R.G. Casey, stated:

The Australian antarctic sector is of vital importance to Australia. For strategic reasons it is important that this area, lying as it does so close to Australia's back door, shall remain under Australian control.

The relationship between Antarctic science and politics had already been well established before the Antarctic Treaty of 1959 "de-politicised" the objectives of Antarctic scientific activity. In 1953, Dr Herbert Evatt, Leader of the Federal Labor Party, defined the political role of Antarctic science in the following terms:

It is well known that mere exploration or discovery of territory such as this which is not followed by something more tangible, by something of the nature of settlement, usually does not give the country concerned a title to the territory ... It is essential that what has already been done by exploration should be followed up for meteorological purposes, scientific development, and also for the development of minerals, if that is possible.

While political objectives have arguably always underpinned Australian scientific activity in the Antarctic, the way in which scientific objectives, priorities and policies have been formulated and expressed has substantially changed since the Second World War.

The postwar development of a policy for Antarctic science can be divided into three phases. Each phase reflects the changing involvement of the State in Antarctic affairs. Political interest in Antarctic matters reached a peak in the 1950's with the establishment of two permanent continental stations, Mawson and
Davis. Political interest and concomitant financial commitment to a vigorous Antarctic policy had diminished by the latter half of the 1960's. Much of the initiative for progress in Antarctic matters between 1947 and 1962 can be attributed to the influence of a powerful Ministerial committee which controlled every aspect of Antarctic affairs. Initially named the Executive Committee on Exploration and Exploitation in 1947, it later became known as the Executive Planning Committee and finally as the ANARE Planning Committee. By 1966, this Committee had ceased to meet and was "allowed to wither on the vine" by the Australian government.

The early vigorous phase of post-war Antarctic science was replaced by a decade of political inaction which was largely reflected in the disorganised nature of government programs of Antarctic science. The absence of a formal Antarctic policy and planning group or an appropriate science advisory body coupled with the absence of a coherent and comprehensive government policy for national Antarctic activities left a political vacuum. As a consequence, the government department meant to manage Antarctic activities, the Antarctic Division, stagnated. The Division began to be influenced by external professional vested interests, largely forfeiting control over the government's Antarctic research program. A select group of individuals drawn from certain universities and other government departments who were involved in pursuing their own programs of Antarctic research took over the management and control of Antarctic science in the absence of Division leadership.

The policies of the Whitlam government and renewed
international interest in the possibilities for exploitation of the Antarctic's mineral and living resources, provided the impetus for change in Australia's policy towards Antarctic science after 1975. By the late 1970's the Australian government had turned its interest back on Antarctic matters, in particular, the management of government programs of research. The period between 1975 and 1987 has been characterised by the gradual consolidation of government control over the direction of Antarctic science; a move from pure science to a greater emphasis on applied or "mission" oriented research and to the increased application of scientific data and models in the policy making process.

2.1.1 ANTARCTIC DIVISION

In 1933 Australia confirmed the transfer of Antarctic territory from the British government in the Australian Antarctic Territory Acceptance Act. However it was not till after the Second World War that the Australian government committed itself in a financial and practical way to the Australian Antarctic Territory (AAT). Dr Herbert Evatt, Minister for External Affairs, convened an inter-departmental committee on 2 December 1946 to plan the first government expedition to the AAT in 1947. This and later expeditions were named the Australian National Antarctic Research Expeditions (ANARE).

In 1948, more than fifteen years after accepting formal responsibility for 42% or approximately 6 million square kilometres of Antarctic territory, the Australian government established a permanent Antarctic Division under the Department of External Affairs. Acting on the recommendations of the Executive Planning Committee, formed in 1947, the Department of External Affairs
proposed that a Commonwealth Antarctic Service be set up along the lines of the British Discovery Committee and the U.S. Antarctic Service. On the 6th April 1948, Cabinet approved the following:

That some permanent machinery be set up for handling all arrangements for Antarctic expeditions many aspects of which are not strictly within the scope of the Department of External Affairs. To this end a Committee consisting of representatives of the Departments of the Treasury, Public Service Board, External Affairs and CSIRO shall be set up to consider an appropriate organisation.

One of the earliest proposals for an Antarctic Section within the Department of External Affairs anticipated a total headquarters staff of fourteen people. Positions included that of Chief Executive Officer, Assistant Executive Officer, Technical Assistant, Scientific Assistant, Meteorological Assistant, Supply Assistant, Secretary, Marine Assistant, three typists, a Filing Clerk, a Stores Clerk and Storeman.

The Antarctic Division's first Director, Melbourne physicist, Mr P.G. Law, was appointed in January 1949. Mr Law had been previously employed by the Department of External Affairs as the Senior Scientific Officer to the 1947-48 Antarctic expedition. The appointment of scientists as the early Directors of the Division reflected the view of past Australian Governments that the primary focus of Divisional activity should be scientific research. Directors were appointed on the basis of their scientific qualifications and their knowledge of and experience in logistics.

Since 1980, a scientific background has not been an essential requirement for appointment as Director to the Antarctic Division. The Australian government's view of the role of the Division has changed resulting in an extensive restructuring of administrative and staffing arrangements. Dr Phillip Law, former Director of the
Antarctic Division, recently commented on the appointment of non-scientists to the Directorship of the Division in the following terms:

My big criticism of the Antarctic Division over the last twenty years has been the gradual rejection of people with science and Antarctic experience as candidates for the top-echelon jobs. They keep searching for the administrator with a capital "A" and it's more or less assumed that if you're a scientist you can't possibly be an administrator. I believe that the head of any scientific organisation should be a scientist and have a good administrator as Number Two. I still believe that the head of the Antarctic Division should be a scientist.

The officially stated functions of the Antarctic Division have also undergone subtle changes during the last fifteen years. In 1972, the functions of the Division were described as "the general administration of, and logistic support for" ANARE and "carrying out approved programs in various fields of scientific research". In accordance with this clearly defined twofold function, the Division had only one Assistant Director position. This was the Assistant Director (Scientific) position. In 1985, the addition of an overall "program objective" for Antarctic activities illustrates the way in which the contextual framework of Divisional activities has changed. In the 1980's Antarctic research has been given an explicit political purpose:

To enhance Australia's sovereignty, political, scientific, environmental and economic interests in Antarctica through the conduct of Antarctic research, maintenance of a presence and involvement in international Antarctic organizations.

Environmentalist, Keith Suter, correctly observes that the government's recent emphasis on "Australian sovereignty" means that,

This creates the impression that research exists for the AAT rather than the AAT for Australian research.

Not surprisingly, the organizational structure of the Antarctic
Division has been broadened to cover all aspects of its expanded functions. In 1985 there were five Assistant Directors covering Branches for Projects and Policy, Medicine, Operations, Resource Management and Science.

The bureaucratic history of the Antarctic Division reflects the difficulty Australian politicians have traditionally experienced when faced with managing national scientific activity. Confusion over the functions of the Division has resulted in numerous transfers between various government departments. Between 1948 and 1968, the Division was responsible to the Department of External Affairs indicating that the international relations aspect of Antarctic activities was considered paramount. On the 1st May, 1968, the Division was transferred to the Department of Supply because it was argued that the Division's activities would,

...more naturally fit in with those of a department other than the Department of External Affairs, since those activities consist mainly of scientific research and the organising of expeditions to Antarctica ... because of its extensive experience in both the scientific and logistic fields, the Department of Supply would be best suited to assume responsibility for the work performed by the Antarctic Division. 11

Presumably, at this time, the logistical nature of the Division's activities outweighed its foreign relations aspect.

After four and a half years, the Division was transferred on the 20th December 1972 to the newly established Department of Science where it stayed (despite the Department's various name changes) until its most recent transfer in 1987. The Division is presently responsible to the new Federal Minister for Environment and Arts, Senator Graham Richardson. This latest transfer indicates another swing in the political perception of Antarctic affairs as
a question of environmental policy rather than science or foreign relations.

The central question of who should be responsible for the scientific organization of Antarctic research has proved to be problematic for the Antarctic Division. Many scientists both within and outside the Division have ambiguous views about the Division's capacity and right to conduct and control the direction of scientific research in the AAT. For many years the Antarctic Division fell victim to an "scientific cringe" regarding government science. This view was based on the Division's real lack of resources to conduct extensive research as well as the vested interests of non-government groups who competed for a "slice" of government grants for Antarctic science.

Between 1948 and the late 1960's, the Antarctic Division followed a policy of using the organisational structure and scientific expertise of other government departments and non-government bodies. While it can be argued that this approach was the logical result of the Division's lack of specialised research staff and resources, an argument can also be made that this approach fitted in with an earlier liberal vision of science as the natural province of academic and non-government institutions. During the first two decades of the Antarctic Division's existence the principles of scientific autonomy and external peer group authority remained the guiding forces for the organisation of science within the Division.

Prior to 1966, the ANARE Planning Committee exercised complete control over the planning and execution of Antarctic scientific programs. The Chairman of this Committee was the
Minister of External Affairs and included both government and non-government representatives. Bodies represented were the Australian Academy of Science; Department of External Affairs; the Departments of the Treasury, Navy, Army and the Air; the Bureau of Meteorology of the Department of Interior; the Bureau of Mineral Resources, Geology and Geophysics of the Department of National Development; the Division of Fisheries; the Department of Primary Industries; the Division of National Mapping of the Department of National Development; the Adelaide Mawson Institute for Antarctic Research and the University of Adelaide. During these early years, non-government bodies had direct input into policy-making for Antarctic science. After 1966 the influence of these groups diminished to a purely advisory or consultancy level. Non-government bodies were no longer formally represented in the planning and policy processes of the ANARE.

During the early period of its existence, the Division tended to develop an internal capacity for research in areas not serviced by existing government and non-government bodies. The Division transferred responsibility for meteorological work to the Commonwealth Meteorological Bureau; the Commonwealth Bureau of Mineral Resources controlled research in geology, seismology, gravitation and magnetism; cartography and survey work were carried out by the National Mapping Office; the cosmic rays research was the responsibility of the University of Tasmania and, ionospheric soundings were carried out by the Commonwealth Ionospheric Prediction Service. However, in areas like glaciology, the Division was forced to create its own level of expertise in this research field in order to compensate for lack of trained glaciologists in Australia during the early years of the Antarctic
Division. Phillip Law states that,

There were no glaciologists in Australia. The Antarctic Division had to "create" glaciology by picking up physicists and mathematicians and actually training them in glaciology to go and do their work. 12

Staffing arrangements for the Antarctic Division are based on a long-term permanent establishment of personnel as well as short-term appointments which usually last for three years. Short-term staff generally spend one year each for preparation, expeditionary observation and analysis of data. Field work is organised on a year-round or "wintering" basis as well as short summer programs. Total Antarctic Division staff numbers fluctuate according to the time of year and type of appointment.

The ratio of permanent Antarctic Division personnel to short-term and expeditionary scientific staff became an area of concern within the Antarctic Division between the mid 1960's and 1974. Both an internal committee report to the Director of the Division in 1974 and various submissions to the Federal government's Advisory Committee on Antarctic Programs of 1974 refer to this issue. In 1964 and 1965, the Antarctic Division had only two scientists for expedition positions; William Budd employed as a glaciologist in 1964 and D.J. Hasick employed as a physicist to the 1965 expedition party. By 1966, Divisional staff employed as scientists to expedition parties had increased to four physicists, two glaciologists and two biologists. In 1967, the number of permanent scientific positions to the Division's headquarters consisted of only two positions while the number of temporary scientific positions to headquarters totalled seven. Of this total number of nine scientific positions, six positions were
vacant at 10th July, 1967. During the 1960's and early 1970's the Division acquired a history of long-term scientific vacancies. During this period, the absence of permanent research staff meant that the continuity of research programs was broken and the analysis of observational data took second place to data collection. Many of the submissions to the Advisory Committee on Antarctic Programs in 1974 consisted of the views of disgruntled Antarctic Division scientific staff who were highly critical of the effect of long term staff vacancies on the Division.

Total Antarctic Division staff has increased gradually over the years. During 1972 the Division had a long-term establishment of 82 positions which more than doubled in November 1972 to 192 personnel when short-term scientists and support personnel were employed and briefed for the 1973 expedition. Of 25 scientific positions listed during this period, 20 positions were temporary appointments for expeditions. By 1980 the Division's headquarters establishment had grown to 101 positions covering administration, research and logistics support. By 1983-84 total Division staff numbered 208 and of these Science Branch staff accounted for 49 fulltime positions, 22 of which consisted of headquarters research staff engaged in full time research projects. In other words, only ten per cent of total Division staff were actually engaged in full time scientific research.

The Federal government's financial commitment to Antarctica has also increased. Separate figures for the Antarctic Division's annual expenditure are only listed after 1967. Expenditure increased gradually from $2 million in 1967 to $8.6 million in
1977-78. In 1977, Minister for Science, Senator Webster announced plans for a major build-up in Australia's operations in Antarctica. Additional funds were to be made available for design and feasibility studies for an Australian Antarctic ship; for a major rebuilding program at Australia's four stations at Mawson, Casey, Davis and at sub-Antarctic Macquarie Island, and, funds would also be made available for an increase in staff in the Division. While the Division's annual expenditure had increased to $22.9 million by 1983-84, actual expenditure on the entire range of governmental activities in Antarctica totalled $35.4 million. In 1985-86, the Division's expenditure had grown to $36.9 million while total government expenditure on Antarctica had increased to $42.2 million. The estimated cost of Australia's Antarctic operations for 1986-87 is $46.3 million.

Despite the increase in funding to the Antarctic Division, the proportion of funding allocated to scientific research is much smaller than the appropriation for logistics and has remained relatively static over the years. In 1974-75, $3,008,000 or 65% of the Antarctic Division's total appropriation was devoted to logistics, while $1,594,000 or 35% was available for research. In its 1979 report to the Australian government, the Antarctic Research Policy Advisory Committee (ARPAC) reported that less than 14% of the total expenditure on the Antarctic program could be attributed to research while 76% went to logistic costs and 10% for administration. In 1986-87, the proportion of the Division's budget allocated to scientific research has increased to 26.9% or $11,034,400 while logistical support for expeditions still accounts for more than 60% of the Division's total budget.
2.1.2 AUSTRALIAN NATIONAL COMMITTEE FOR ANTARCTIC RESEARCH

The Australian National Committee for Antarctic Research (ANCAR) grew out of the international scientific activities undertaken during the International Geophysical Year (I.G.Y) of 1957-58. In the expectation that Antarctic science would continue after the end of the I.G.Y., the International Council of Scientific Unions decided to establish a Special Committee on Antarctic Research (SCAR) to co-ordinate Antarctic science after 1958. National committees were set up in order to liaise with SCAR.

The Australian Academy of Science formed ANCAR in 1957. In 1959 it consisted of seventeen members many of whom were to continue to exert an influence on Antarctic affairs for the next 15 years. This influence was exerted through membership on ANCAR or the ANARE Planning Committee and by participation in reviews of Antarctic science undertaken upon Government request. In 1959 ANCAR's members consisted of Dr. D.F. Martyn (Chief Officer-in-Charge, Radio Research Laboratories, CSIRO) as Chairman, Professor K.E. Bullen (Professor of Applied Mathematics, University of Sydney) as Convenor, Dr. R. Carrick (ANARE biologist), DR. W. Dawbin, Mr L.J. Dwyer, Dr. N.H. Fisher, Mr W.J. Gibbs (Director, Meteorology Bureau), Dr. G.F. Humphrey, Dr. F.J. Jacka (Scientist, Antarctic Division later Director, Mawson Institute), Mr. B.P. Lambert (Director of National Mapping), Dr. P.G. Law (Director, Antarctic Division), Dr. C.H.B. Priestley (Chief, Division of Meteorological Physics, CSIRO), Dr. F. Loewe, Mr J.M. Rayner (later Director, Bureau of Mineral Resources, Geology and Geophysics), Commander S.R. Schoefield, R.A.N., Dr. F. Stillwell, Dr. F.W.G. White (later Sir Frederick White, Chairman of CSIRO).
ANCAR acts as Australia's formal means of communication between the international research organisation, SCAR, and the Antarctic Treaty Consultative Parties. ANCAR advises the Australian Academy of Science Council on matters relating to Australian Antarctic research. The Academy Council is responsible for advising Government on Antarctic scientific programs. In 1986, ANCAR had ten sub-committees to discuss and advise on work in various disciplines.

The political role of ANCAR is understated in keeping with the Academy's role as an "independent" advisor to Government. While ANCAR does not formally participate in meetings with the Government's delegation to Consultative Meetings of the Antarctic Treaty, Directors of the Antarctic Division have traditionally been members of ANCAR as well as members of Australia's Antarctic Treaty delegation. In 1986, membership of many of ANCAR's sub-committees consisted of Antarctic Division scientific staff. It is difficult to see how ANCAR could provide neutral, independent scientific advice to the Academy Council which, in turn, is supposed to provide Government with independent scientific advice when so many of its members have been, and still are, employees of the Antarctic Division.

In 1966, the Deputy Secretary of the Department of External Affairs requested that the President of the Australian Academy of Science establish an "independent committee of scientists" to assess the scientific programs of ANARE and provide the Government with a report on their "scientific value". Two of the eight members of the Review Committee, Dr. D.F. Martyn and Dr. C.H.B. Priestley, were also members of ANCAR. In its summary of
conclusions the report listed seven major conclusions. While the Committee maintained that the majority of scientific programs had been well-conceived and successfully carried out, it also highlighted the absence of programs in physical and biological oceanography and referred to the limited research undertaken in geological studies. The report also concluded that Australia's Antarctic scientific activities were biased towards physics programs of research. In the 1980's the reverse has become true, that is, the government now emphasizes the importance of the environmental sciences, particularly marine biology, as a scientific priority and geological studies have gained a higher profile as a result of the Antarctic Treaty partners' attempts to draw up a minerals regime.

Not surprisingly, the 1967 report opposed the professionalisation of scientists within the Antarctic Division stating:

The Committee is not however, of the opinion that the Antarctic Division needs to recruit a staff of scientists, for it believes that the scientific work could be directed adequately by scientists in Commonwealth Government instrumentalities and in the universities. 29

Membership of the Review Committee serves as an indicator of the institutional interests which determined the Report's biases. Four of the eight member Committee were representatives of universities with another three drawn from the CSIRO. Two of the latter represented CSIRO sections actively involved in Antarctic research.

In his interview with the Review Committee, Dr F. Jacka, Director of the Mawson Institute in Adelaide vigorously opposed
an increase to Antarctic Division scientific staff. Dr Jacka argued that responsibility for most of the Division's scientific work should be placed in the hands of university groups who would ensure that work be undertaken by Ph.D. candidates rather than the lesser qualified staff appointed by the Division. Dr Jacka argued that the Division was unable to recruit individuals of the highest scientific calibre because of Public Service Board insistence on a list of accepted scientific projects which forced the Division to recruit personnel to these projects rather than vary the program according to the qualifications of the people available. Dr Jacka further used the opportunity of the interview to inform the Committee about the work of his Institute in polar studies.

Ten years later, Dr Jacka, still a member of ANCAR and Director of the Mawson Institute, continued to oppose the upgrading of the scientific section within the Antarctic Division to Department of Science personnel. He wrote:

I have claimed before and I still hold the view that the requirements for a creative, vigorous and productive research organisation have never subsisted within the Antarctic Division and I believe it is unrealistic to expect that they can be achieved... I am very sceptical about the possibility of the Antarctic Division establishing and sustaining "centres of excellence" in any scientific discipline without a very strong dependence on universities or other research organisations. 31

Dr Jacka suggested that the Division's Upper Atmosphere Physics group move to Adelaide and join the Mawson Institute and offered to,

...take responsibility for the overall direction of the ANARE program of work in the field of upper atmosphere physics, including aeronomy and magnetospheric physics. 32
For many years the direction and development of the Antarctic Division's science program was unduly influenced by Antarctic scientists like Dr Jacka and others represented in ANCAR and in various universities.

The impact of the Australian Academy of Science report in 1967 on government policy was minimal. By 1974, the Advisory Committee on Antarctic Programs (ACAP) chaired by the former ANCAR member, Sir Frederick White, reported that university participation had lessened since 1967 and that no Planning Committee had been set up to review programs or determine research priorities for Antarctic science.

Two reasons for the Academy reports' low impact on policy-making with regard to scientific research in the Antarctic are that Antarctic issues had a low political profile and the purpose of the report was to consolidate the science-government monopoly on Antarctic policy-making. Antarctic science only became politicized by the government ten years after the initial Academy of Science report. In 1967, the Australian Government defined the objectives of the advice sought from the Academy in purely scientific-technical terms. The Academy responded by providing scientific-technical information and certain research and development strategies which could never emerge into the political arena. However, once the government perceived Antarctic research as a problem which extended into other areas of policy-making which could affect other interests, Antarctic science became politicized and scientists were no longer the only "experts" called upon to assess Antarctic science.
In 1979, ANCAR prepared a report, *Australian Antarctic Research: Guidelines for Future Scientific Programs.* Like its 1967 report, ANCAR recommended that research programs in marine biology and marine geoscience be strengthened. In keeping with its responsibilities to SCAR, ANCAR also recommended greater involvement by Australia in the international Biological Investigation of Marine Antarctic Systems and Stocks (BIOMASS) project. By this time ANCAR's influence had been further diminished by the establishment of a new science advisory body, the Antarctic Research Policy Advisory Committee (ARPAC) and by years of government indifference to ANCAR's advice. Some indication of the government's disinterest in acting on external advice can be ascertained from the report's Introduction which states:

> There is little point in ANCAR, or ARPAC, determining scientific priorities for programs if these priorities are later distorted because of decisions made within the Department of Science and Environment as a result of logistic and other considerations. 34

As a national committee of the Australian Academy of Science, ANCAR has attempted, if not always successfully, to keep politics and science separate. The difficulty, if not impossibility, of achieving this objective lies in the unique organization of Antarctic science. While most of the Academy's national committees are organized according to specific disciplines, ANCAR is organized on the basis of a geopolitical region and consists of cross disciplinary groups of specialists. Antarctic science depends on the logistical resources of national governments for its existence. The resources allocated to Antarctic science depend on political decisions. The ambiguous nature of Antarctic science has meant that ANCAR has, inevitably, come into conflict with the Council of the Academy of Science.
2.2 INTERNATIONAL ANTARCTIC SCIENCE: A POLITICAL SOLUTION

International science in Antarctica was achieved on a large scale during the International Geophysical Year (IGY) of 1957-58. The IGY was planned in order to make a comprehensive study of the physics of the Earth and its atmosphere. Eleven nations established stations on the Antarctic continent and undertook research programs in various branches of geophysics including aurora and airglow research, glaciology, meteorology, cosmic rays, ionosphere, geology, geomagnetism, seismology, gravity and some oceanography. In 1959 the total cost of the operation was said to exceed £100,000,000 and over 5,000 men worked on the continent during this time. 35

Many of the co-operative activities initiated during the IGY served as a later model for the legal Articles of the Antarctic Treaty. The establishment of World Data Centres facilitated the deposit and circulation of scientific results of Antarctic research; observers were exchanged between different national expeditions; and, all stations co-operated in the exchange of meteorological information and its radio despatch to Weather Central, a meteorological analysis centre at the U.S. station, Little America. While the IGY fostered a spirit of co-operation in the logistics area, there is little evidence that scientific projects were actually organized and carried out on a transnational basis. Nations still preferred to organize and perform their research programs separately.

The end of the IGY seemed to indicate that a return to the potential dangers and controversies which had marked the post-World War II period might occur. Prior to the IGY seven nations made
claims of sovereignty to parts of the Antarctic continent. Those nations claiming sovereignty are Great Britain, Australia, New Zealand, France, Norway, Argentina and Chile. National claims account for five sixths of the continent while one sixth of the continent remains unclaimed. The claims were controversial because they were, and still are, based on a fifteenth century edict which was developed in the nineteenth century to legitimise colonialist expansion in Africa. This doctrine is based on the assumption of *terra nullius*, or land owned by no-one which may be appropriated by effective occupation. There is no clear definition of what constitutes "effective occupation". Few of the seven original claims could argue "effective occupation" prior to and directly after the IGY. Some of the claims overlapped and the contradictory nature of these claims had already resulted in a number of violent incidents in the early 1950's. Perhaps more importantly, the two major world powers, the United States and the U.S.S.R. each had a basis for claims of sovereignty but had not made direct formal claims and did not recognise the validity of other national claims. During this period of the Cold War it would have been impossible for both powers to turn their backs on the Antarctic continent, leaving it to the competing claims of minor powers and potential destabilisation of the region.

As a result of the unacceptable political situation which existed after the IGY, the U.S. government called a meeting in May 1958 of all the claimants plus non-claimants who had participated in the IGY. The U.S. Government used scientific research as a reason for seeking a more permanent political arrangement for the region. A note from the U.S. Government delivered to the Australian
Government in Canberra, 2nd May, 1958 states:

The International Geophysical Year comes to a close at the end of 1958. The need for co-ordinated scientific research in Antarctica, however, will continue for many years into the future. Accordingly, it would appear desirable to assure the continuation of the fruitful scientific co-operation referred to above. Such an arrangement could have the additional advantage of preventing unnecessary and undesirable political rivalries in that continent, the uneconomic expenditure of funds to defend individual national interests and the recurrent possibility of international misunderstanding. 37

During this time the relationship between science and politics was established which continues to this day and permeates every decision made about science undertaken on the Antarctic continent. Science on the Antarctic continent has always had a dual function. First, to expand knowledge about the polar environment. Second, that the activities involved in the pursuit of scientific objectives also serve foreign policy aims.

2.2.1 SCIENCE AND THE ANTARCTIC TREATY

The Antarctic Treaty was signed by twelve nations in 1959. These twelve original signatories have been joined in later years by six additional nations and are referred to as Antarctic Treaty Consultative Parties (ATCP). 38 ATCP's have full voting rights at the biennial consultative meetings that take place under the Antarctic Treaty System. Acquiring "consultative" status or decision-making rights depends on a nation's demonstrated capacity to conduct substantial scientific research programs in Antarctica. An additional fourteen nations are known as Non-Consultative Parties (NCP) to the Treaty and have no voting rights.

The Antarctic Treaty came into force in 1961. There have been thirteen Consultative Meetings between 1961 and 1986 which
have adopted 154 recommendations for resolutions covering areas such as: the facilitation of scientific research; exchange of information; interchange of scientific personnel; the establishment of specially protected areas and sites of special scientific interest (SPA, SSSI); guidelines for tourist and private expeditions; telecommunications; meteorology and the conservation of flora and fauna.

The place which science occupies within the Antarctic Treaty is unique in international law. One writer describes scientific research, the major activity and product of the region as, "the glue binding the Antarctic Treaty system together". The Treaty consists of fourteen legal Articles. Of these, two deal specifically with science (Articles II and III) while three of the remaining Articles mention conditions relating to scientific investigation and scientific personnel (Articles I, VIII, IX). Article II provides for freedom of scientific investigation as follows:

Article II
Freedom of scientific investigation in Antarctica and co-operation toward that end, as applied during the International Geophysical Year, shall continue, subject to the provisions of the present Treaty.

Article III provides for the exchange of scientific information and scientific personnel between Treaty Parties as well as the promotion of working arrangements with agencies of the United Nations and other international organizations having a "scientific or technical interest in Antarctica".

Other Articles of the Treaty have the effect of "freezing" territorial claims during the thirty year term of the Treaty;
establish Antarctica as a demilitarised zone prohibiting the use of nuclear weapons and, provide suggestions for working arrangements in order to establish conservation measures for Antarctica's living resources.

While the Treaty refers extensively to the conditions and conduct of scientific research, the Treaty does not provide a forum for decision-making by scientists. Political power in Antarctica is held by sixteen political representatives of the ATCP's. The consultative process has not been open to scientific representatives and there is no formal direct link between the Scientific Committee for Antarctic Research (SCAR), the international organization charged with promoting and co-ordinating scientific activity in the Antarctic, and the consultative parties to the Antarctic Treaty. While scientific research has the effect of legitimizing the objectives of the Antarctic Treaty, decision-making regarding the pursuit of science in Antarctica is not available to the scientist. Any planning undertaken by scientists to develop a policy for science in Antarctica must remain an example of what Cynthia Hay refers to as "authority without power" and Peter Weingart calls the "politicization of science".

At a recent international conference on Future Directions for the Management of Antarctic Science sponsored by the International Institute for Environment and Development, some scientists and policymakers argued that the Antarctic Treaty mandate to promote international co-operation in scientific investigation set out in Article III might be too narrow to cover interdisciplinary international programs. Scientists and policy
makers at this conference argued that Article III of the Treaty was originally designed to establish co-operative links "only when necessary" amongst individual national expeditions rather than establish a permanent form of co-ordinated activity. Dr Bruce Davis has recently concluded that the present framework for co-operation in Antarctica is inadequate to meet increasing demands to improve the existing management regime and uses the omissions and ambiguities of the Antarctic Treaty to support his argument.

2.2.2 SCIENTIFIC COMMITTEE ON ANTARCTIC RESEARCH (SCAR)

The Scientific Committee on Antarctic Research was established in 1958 to extend and continue the IGY program in Antarctica. SCAR is a non-governmental organization and sub-committee of the International Council of Scientific Unions. The SCAR Constitution charges it with the,

...initiation, promotion, and co-ordination of scientific activity in the Antarctic, with a view to framing and reviewing scientific programs of circumpolar scope and significance.

SCAR has neither the authority nor the financial resources to conduct its own programs of scientific research.

Representation on SCAR consists of one permanent and one alternative delegate nominated by each national committee. General meetings are held every second year and precede Antarctic Treaty biennial meetings. In 1984 SCAR consisted of nine permanent discipline-oriented working groups. Each national committee, in Australia's case it is ANCAR, appoints a member to each of these groups. The scientific programs developed by SCAR are based upon the recommendations of these working groups. In addition, SCAR may appoint ad hoc groups of specialists to examine special problems. In 1984 there were five such groups covering the
following issues: Antarctic Climate Research; Antarctic Environmental Implications of Possible Mineral Exploration and Exploitation; Seals; Southern Ocean Ecosystems and their Living Resources; and, Antarctic Sea Ice.

Without giving reasons why it is necessary to do so, SCAR carefully divests itself of any political interests in its Constitution which states:

SCAR will abstain from involvement in political and juridical matters, including the formulation of management measures for exploitable resources, except where SCAR accepts an invitation to advise on a problem. However, in formulating its specific programs SCAR will take note of the need for the acquisition of the scientific knowledge necessary for the judicious development and management of the resources of the region. 47

Despite its Constitution which precludes SCAR from providing unsolicited scientific and technological advice directly to the ATCPs, there have been a number of occasions when SCAR has provided the impetus for Antarctic Treaty Parties to consider specific questions and place them on the agenda of the next Treaty meeting. SCAR can request its national committees to relay information to their respective governments.

During the early years of the Treaty, scientists were not reticent about entering political arenas and played an important part in developing national Antarctic policy. At the first Antarctic Treaty Consultative Meeting held in Canberra between 10th and 24th July, 1961, six of the twelve Australian Delegation were scientists or scientific administrators. They included P.G. Law, Director of the Antarctic Division; L.J. Dwyer, Director of the Bureau of Meteorology; D.F. Martyn, Chief Scientist to the Upper Atmosphere Section, CSIRO; R. Carrick, Senior Principal
Research Officer, Wildlife Section, CSIRO; D.F. Styles, Assistant Director, Antarctic Division; F.J. Jacka, Chief Scientist, Antarctic Division. In the 1980's scientific representation on Australia's Treaty Delegations is, with the exception of Antarctic Division representation, non-existent.

In 1960 the initiative to create legally binding conservation measures came from a report which SCAR submitted through its national committees to Treaty Parties. The report was discussed at the 1961 Consultative Meeting and resulted in the 1964 Agreed Measures for the Conservation of Antarctic Fauna and Flora. As early as 1964, SCAR suggested that the Ross Seal and the Fur Seal be designated as protected species. It wasn't till 1966 that Treaty parties called for scientific advice from SCAR on this matter and it took another six years before Treaty Parties signed the 1972 Convention for the Conservation of Antarctic Seals.

The most recent resource problem considered by SCAR prior to any formal discussion of the matter by Treaty parties concerned the exploration and exploitation of Antarctic mineral resources. In 1973 Antarctic scientists held an informal conference on the issue of mineral exploitation in Oslo and SCAR requested its working group on geology to research the question. It wasn't till 1975 that Treaty parties requested SCAR to conduct an environmental impact assessment of any potential mineral exploitation in the Antarctic and to advise on the ways in which scientific programs might be adapted to changing needs.

It is obvious from the preceding examples that SCAR does not merely provide scientific advice upon request. In many cases
it is upon SCAR's initiative that certain resource questions have been placed on the agenda of Treaty meetings. SCAR has also exerted pressure on governments, through its national committees, to draft appropriate conservation regulations. It seems surprising then to read the comments of a past President of SCAR, Dr J.H. Zumberge, who writes:

...we have managed to keep SCAR clear of involvement in the international politics of Antarctica. We accomplished this mainly by concentrating on science and leaving the politics to the Consultative Parties ...we have assiduously avoided making recommendations of a political nature. 48

These comments illustrate how narrowly Antarctic scientists define "politics". By assisting the operation of the Antarctic Treaty system, and most recently, by making judgements on the differences between exploration and exploitation of mineral resources and the viability of extraction, SCAR has become involved in questions which require an economic and legal analysis in addition to a purely scientific assessment.

In recent years questions have been raised regarding SCAR's capacity to manage large scale interdisciplinary programs. Peter Keage has recently argued for an expanded SCAR Secretariat in order that the increasing number of requests for scientific advice may be satisfied and to improve communications among SCAR Working Groups. In 1985, SCAR operated on a budget of $US 125,000 derived from ATCP's. This sum is inadequate for SCAR's responsibilities to provide ATCP's with extensively researched scientific information as a basis for policy decisions.

There is a need for SCAR to review its organization and practices. There is some evidence to indicate that this may soon
occur. At a meeting of the SCAR Executive Committee at Grenoble, France in July 1987 the President of SCAR, Dr C. Lorius, commented that the time was coming when SCAR would need to make a conscious decision about,

...whether it preferred to restrict itself to a relatively low profile by concentrating on the limited task defined in the introduction to the Constitution, or whether it wanted to play a significant role in all aspects of the growing discussions on the future of activities in the Antarctic and in world science. 51

Another indicator of SCAR's changing relationship with the ATCPs is the suggestion that, for the first time, SCAR will be represented and invited to attend the XIV biennial consultative meeting in 1987.

These latest developments do not necessarily mean that SCAR has acquired a political voice in the Antarctic Treaty system. What it does indicate is that the relationship between science and policy with respect to determining the scientific research agenda in Antarctica is being closely integrated into the political objectives of the Antarctic Treaty system. As the Antarctic Treaty system comes under greater international scrutiny, it seems inevitable that some division between the priorities of the scientific community and the management objectives of the program managers is likely to occur. After decades of dealing with the question of whether to develop research agendas to anticipate the policy demands of the ATCPs, SCAR must now face the question of how to integrate science with policy.
REFERENCES TO CHAPTER 2

1. Commonwealth, Parliamentary Debates, House of Representatives, 6 November, 1951, pp. 1570-1571
2. Ibid., 20 March, 1953, p.1460
3. Ibid., p.1462
4. Phillip Law, Antarctic Odyssey, Melbourne, 1983, p.197
7. Personal Interview. Dr Phillip Law. 6 October, 1987
12. Personal Interview. Dr Phillip Law. 6 October, 1987
14. Department of Science, op.cit. note 8, p.3

17. ANCAR, op.cit. note 13


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26. ANARE News, September 1986, p.11


29. Ibid., p.2

31. ANCAR, Correspondence, 1977. Letter from F. Jacka to J. Lonergan, (Department of Science), 24 June, 1977. Adolph Basser Library of the Australian Academy of Science. (MS /23/1 ANCAR (g)).

32. Ibid.


34. Ibid., See Introduction (no pagination)


38. The twelve original signatories are Argentina, Australia, Chile, France, New Zealand, Norway, United Kingdom, United States, Japan, U.S.S.R., South Africa and Belgium. The six later signatories are Poland (in 1977), the Federal Republic of Germany (in 1981), Brazil and India (in 1983) and China and Uruguay (in 1985).


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41. Ibid., p.41

43. Peter Weingart, "The Scientific Power Elite - A Chimera: The De-Institutionalization and Politicization of Science" in *Scientific Establishments and Hierarchies* Ibid., pp. 71-77


47. Ibid.


49. Peter L. Keage, *Antarctic Protected Areas: Future Options.* University of Tasmania, 1986, p.82

50. Ibid., p.37

51. *SCAR Newsletter of SCAR Executive Committee Meeting of 1-3 July 1987.*
3. THE SOCIAL ORGANIZATION OF ANTARCTIC RESEARCH

The subject and content of Antarctic science produced by Australian scientists in the 1980's differs significantly from the research undertaken between 1950 and 1970. The 1970's marked a turning point in the content of Antarctic science as government policies directed research aims towards political objectives. Changes in research practices and procedures, training and employment structures have affected the type of research undertaken in the Australian Antarctic Territory. The reasons why these changes have occurred can be located in specific historical and social circumstances as much as in an examination of individual scientists' behaviour within an institutional framework. The way in which Antarctic scientific production systems have been organized has affected the type and content of scientific knowledge produced.

The postwar development of government policies for Antarctic science involved the expert advice of a relatively small group of elite scientists. For more than two decades this scientific elite exercised authority and control over the development of Antarctic science in the absence of cohesive government control or public interest and participation. It exerted considerable influence over the development of a policy for Antarctic science and on the organizational structure of the Antarctic Division through their determination of research strategies and their influence in professional science associations and on government review committees. While this elite succeeded in retaining a high degree of scientific autonomy for Antarctic science for many years, it never managed to translate this influence into general policy-making for the Australian Antarctic Territory despite the fact that scientific
The gradual "politicization" of the Antarctic question has meant that scientists are losing some control over the development of scientific research priorities, objectives and programs. Peter Weingart argues that the influence of scientists on policy formulation will depend on the nature of the issue involved so that,

... the impact of scientific knowledge correlates inversely with the political scope of the issue at hand... the wider the policy implications of a particular issue and the further away from being limited to the science policy arena, the less influential is scientific knowledge in shaping the definition of the problem. 1

Today, the performance of Antarctic science encroaches upon questions of environmental management; international legal issues such as the ramifications of Law of the Sea conventions for the Antarctic area; resource development and international relations. The autonomy that members of the Antarctic scientific elite enjoyed in the first two decades after the Second World War with regard to setting Antarctic research objectives was largely due to the way in which Antarctica was politically defined. Control over this area of national science policy defaulted to Australian scientists until Australian politicians, ecologists and environmentalists redefined Antarctic issues in the 1970's in other than scientific-technical terms.

3.1 THE ROLE OF SCIENTIFIC ELITES

Many political theorists have produced arguments on the role and importance of political and social elites. 2 While these
theorists and their works canvas many issues of a theoretical nature regarding the development and presence of elites they make little or no reference to the role of technical elites in scientific communities.

Contributions from sociologists of science to elite theory include the work of writers like Michael Mulkay, Richard D. Whitley, Norbert Elias and Peter Weingart. Michael Mulkay argues that scientific communities generate their own elites which operate as mediators between the demands of government and the development of scientific knowledge. For Mulkay, the examination of elites provides a mechanism for the combination of the internal and external relationships of science. Richard Whitley's objective in the study of scientific elites differs from Mulkay in so far as he sees the processes of elite formation as essential to the study of the institutional framework which structures scientific activity. Both writers agree that elites mediate between the economic and political demands of the State and the scientific objectives of the research community.

Despite their valuable contributions to an analysis of scientific elites neither Mulkay nor Whitley apply their theories to empirical material like the role of elites in the formulation and evolution of specialized science policy programs. Only the work of Wolfgang van den Daele, W. Krohn and Peter Weingart attempts to link the formation of technical elites to the political regulation and direction of policy guided scientific research.

This section supports the work of W. van den Daele, Krohn and Weingart by attempting to analyse Antarctic science policy
in relation to both the political processes which have contributed to the elite's formation as well as the internal dynamics of the Antarctic scientific establishment.

The question of whether a scientific elite exists in Australian Antarctic science must precede any discussion of the role of that elite. An argument can be sustained that a core group of scientists did exist in Antarctic science in the earlier years of postwar Antarctic science. Some of this group are still active in the development of Australian Antarctic science policy. Evidence for this position is gained from an examination and analysis of the membership of Antarctic science committees, both governmental committees like ARPAC and ASAC and non-governmental bodies like ANCAR, submissions to government committee reviews, the public statements of key figures within this group and the pattern of funding to specific individuals and institutions over a period of almost three decades.

A core group of scientific researchers and scientific administrators can be identified in postwar Australian Antarctic science. Members of this group share more than one of the following list of governing characteristics. These characteristics include:

* Lengthy membership of the Australian National Committee for Antarctic Research (ANCAR)
* Former employment as researchers/scientists to ANARE or as Antarctic Division permanent staff
* Membership of non-governmental review committees into Antarctic science
* Membership of governmental review or advisory committees into Antarctic science
* The presentation of written submissions or the appearance as witnesses to either non-governmental Committees investigating Antarctic science or governmental Committees into the same

* Overlapping membership between non-governmental Antarctic science organizations, governmental Antarctic policy making bodies and internal government departmental committees dealing with Antarctic science

* Serving as members of the Antarctic Research Policy Advisory Committee (ARPAC) to evaluate and recommend research proposals for government funding while at the same time successfully submitting their own research proposals to the same Committee

While there may not be anything contentious about sharing many of these characteristics, their commonality amongst a specific group of Antarctic scientists indicates that a network of relationships exists which has affected the development of programs of Antarctic research.

The development of an Antarctic scientific elite can be divided into an earlier period covering the years between 1947 to 1975 and a modern period between 1975 and 1987. Certain key individuals have exerted a continuing influence on the formulation of Antarctic science policy during both periods. The group consists of twenty-one male members with a professional or disciplinary bias to the physical and earth sciences. Only three of the group are involved in the environmental or biological sciences. It is no accident that the biological and environmental sciences were poorly represented in the early years of postwar Antarctic science. It is only recently that social scientists, lawyers and international relations experts have submitted and acquired government funding for projects on Antarctic issues. A central feature of the Antarctic scientific elite is that all have been and in some cases continue
to be members of either ANCAR or an ANCAR sub-committee.

According to the definition given earlier, the Antarctic scientific elite is composed of the following group of individuals some of whom have ceased to be active in the 1980's.

Professor W.F. Budd
Chairman
Department of Meteorology
University of Melbourne

Dr. R.G. Chittleborough
Chief
Division of Resources Management
W.A. Department of Conservation and Environment

Professor K.D. Cole
Chairman
Department of Physics
La Trobe University

Dr. W.J. Gibbs
Director
Bureau of Meteorology (1962-78)

Professor D.H. Green
Department of Geology
University of Tasmania

Dr. F.J. Jacka
Director
Mawson Institute for Antarctic Research
University of Adelaide

Dr. K.R. Kerry
Research Scientist
Antarctic Division

B.P. Lambert
Director (Former)
Division of National Mapping (1951-1977)

Dr. P.G. Law
Director (Former)
Antarctic Division (1949-1966)
Vice-President (1966-1977)
Victorian Institute of Colleges

Professor J.F. Lovering
Chairman
School of Earth Sciences and
Deputy Vice-Chancellor (Research)
University of Melbourne

Dr. D.J. Lugg
Assistant Director (Polar Medicine)
Antarctic Division

Dr. H.R. Phillpot
Department of Meteorology
University of Melbourne
<table>
<thead>
<tr>
<th>Name</th>
<th>Position and Organization</th>
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<tbody>
<tr>
<td>Prof. C.H.B. Priestley</td>
<td>Chief&lt;br&gt;Meteorological Physics Division&lt;br&gt;CSIRO (1946-1973)&lt;br&gt;Chairman&lt;br&gt;CSIRO Environmental Physics Research Laboratories (1972-1978)&lt;br&gt;Prof. of Meteorology, Monash University (1978-1980)</td>
</tr>
<tr>
<td>Dr. P.G. Quilty</td>
<td>Assistant Director (Science)&lt;br&gt;Antarctic Division</td>
</tr>
<tr>
<td>Dr. U. Radok</td>
<td>Department of Meteorology&lt;br&gt;University of Melbourne</td>
</tr>
<tr>
<td>J.M. Rayner</td>
<td>Director (Former)&lt;br&gt;Bureau of Mineral Resources, Geology and Geophysics (1958-1969)</td>
</tr>
<tr>
<td>Prof. P. Schwerdtfeger</td>
<td>Director&lt;br&gt;Flinders Institute of Atmospheric and Marine Science&lt;br&gt;Flinders University of S.A.</td>
</tr>
<tr>
<td>Dr. N.A. Streten</td>
<td>Assistant Director&lt;br&gt;Bureau of Meteorology</td>
</tr>
<tr>
<td>D.F. Styles</td>
<td>Deputy Director&lt;br&gt;Antarctic Division (1957-1976)</td>
</tr>
<tr>
<td>Dr. R.J. Tingey</td>
<td>Senior Research Scientist (Former)&lt;br&gt;Bureau of Mineral Resources&lt;br&gt;Geology and Geology&lt;br&gt;Now, Department of Geology&lt;br&gt;University of Tasmania</td>
</tr>
<tr>
<td>Sir F.W.G. White</td>
<td>Chairman&lt;br&gt;CSIRO (1959-1970)</td>
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Even the most cursory analysis of the above list of names and organisations reveals certain insights. All members of this elite are male; an overriding majority are academically qualified as scientists; at least a third of the group specialise in meteorology or upper atmosphere physics; university representation is dominated by the University of Melbourne; New South Wales, Western Australia and Queensland universities have no representation; and, government departments like the Bureau of Meteorology and the Bureau of Mineral Resources, Geology and Geophysics have had a continuing institutional influence on the development of an Antarctic science policy since
the Second World War. These points are expanded in detail in Appendix 1 which utilises previously described characteristics of the elite as criteria for analysis.

The scientific elite has played an important role in Antarctic issues. This role has two main aspects. First, by their representation on and to the major government committees of review into Antarctic science and related matters, they have contributed to the impression that Antarctic issues are inexorably tied to scientific-technical processes and solutions. For almost three decades this elite succeeded in creating and maintaining boundaries between Antarctic science and any other type of non-scientific research by defining Antarctica to political observers as a strictly "science" issue. For many years it has suited politicians to accept this definition. A recent example of this attitude can be seen in Dr Fred Jacka's public opposition to the creation of an interdisciplinary Institute for Antarctic and Southern Ocean Studies planned for the University of Tasmania. Dr Jacka questioned whether students would be attracted to legal, economic or political aspects of Antarctic studies, describing these fields as "window dressing" which should be given a low priority where research funding was involved. As a result of years of collusion between scientists and politicians over the public image of the Australian Antarctic Territory, any critical discussion of how, and to what end, Australia should manage its Antarctic resources has never reached a wider public or intellectual forum.

A second aspect of the role of the scientific elite is the way in which it functions as a mediator with the State so that
economic and political demands are translated into scientific objectives and strategies. The most obvious examples of this process can be seen in the recently published series of occasional papers commissioned by ASAC. The Fourth Occasional Paper, *Australia's National Interests in Antarctica and International Considerations Affecting Australia's Antarctic Policy: Implications for Australia's Antarctic Scientific Research Program* (1986) prepared by the Department of Foreign Affairs, provides a framework of political demands which are answered and translated into suitable scientific strategies in ASAC's second occasional paper, *Overall Priorities in Australian Antarctic Science* (1986) and in the third occasional paper, *The Role of Australian Antarctic Scientific Activities and Priorities for the Scientific Program* (1986). The second paper is co-ordinated by one member of the scientific elite, Professor J.F. Lovering, and contains sections written by another member of the elite, Professor W. Budd. The third paper is also written by another member of the elite, Dr P.G. Quilty, in consultation with Professor W. Budd.

The fourth paper by the Department of Foreign Affairs suggests that Australia's Antarctic research program should aim to serve Australia's national interests which are defined as the maintenance of sovereignty; environmental protection; continuing scientific research necessary to pursue possible economic benefits and, increasing Australia's diplomatic standing within the Antarctic Treaty system. The second occasional paper translates these political demands into specific research objectives. These include marine biological and oceanographical research directed in support of Australia's role in CCAMLR; research in support of minerals exploitation possibilities; research based on the environmental effects of human activity; research into global weather and climate;
unique Antarctic science and research into polar support technology.

Daryl E. Chubin and Terence Connolly have examined the way in which scientific elites influence the development of "research trails" so that scientists select projects under the influence of organizational, cultural, political, and intellectual factors. Chubin and Connolly argue that scientists employed as government advisors,

...play a collusive role in defining 'scientific merit', encouraging certain research trails and creating 'hot' specialties ... And scientists - not all, but the advising-consulting-reviewing elite-mediate those policies and the funding decisions they warrant.

The elite ... is in the advantageous position of helping both to dispense and to receive extra-local resources. The elite legitimates and funds. 10

There seems little doubt that advisory bodies like ARPAC and ASAC have and do operate to direct resources into specific areas of research and to translate political demands into scientific objectives. However, the direction of Antarctic research is not exclusively the result of government policy demands. The program of Australian Antarctic science which exists today is the negotiated outcome of a dialogue between scientists and politicians. Public interest groups have been excluded from participating in the processes determining Australia's Antarctic science policy at higher administrative levels. While representatives of environmental groups are invited to attend public forums on Antarctic science policy they have yet to be invited to sit on policy making bodies.

While government policy may direct Antarctic science projects into specific areas like "research into the environmental effects of increased human activity", the way in which this is interpreted by Antarctic scientists allows them some latitude in
the definition and selection of projects. For example, the third ASAC occasional paper co-authored by Dr P.G. Quilty and Professor W. Budd, refers to the following environmental research programs as ones which should have a high priority: programs to establish the hydrocarbon content of Antarctic water masses; programs which study the content of the "greenhouse" gases of $CO_2$, $CH_4$, and nitrogen oxides in the atmosphere; and monitoring the effects of atmospheric nuclear tests in snow strata. In some contrast, the second ASAC occasional paper contains a section on environmental research written by ASAC member, Professor Alistair J. Gilmour, which recommends that environmental research programs should concentrate on developing environmental management plans and guidelines which could be based on surveying or mapping areas in which Antarctic stations, colonies of animals and plant associations are located; preparing environmental plans and audits for such areas; preparing reviews of Australian Antarctic environmental practices; and monitoring critical or potential pollutants. The definition of what constitutes "environmental research" differs markedly between the two occasional papers.

An important feature of the Antarctic scientific elite is the fact that only a minority of the group have held some degree of political influence. Only three individuals, Professor C.H.B. Priestley, Sir Frederick White and Professor P. Schwerdtfeger have served as members of government appointed review committees into Antarctic science programs. Of these, the first two names belong to scientists who had been or were employees of the primary government science organization in Australia, the C.S.I.R.O., at the time of their appointment to the 1974 Advisory Committee on Antarctic Programs. Even the scientist with the most prestige in
Australian Antarctic science circles, Dr P.G. Law, never managed to sit as a member of either a non-governmental review committee like the 1967 Australian Academy of Science committee into Antarctic science or the 1974 governmental Advisory Committee on Antarctic Programs. It is interesting to note that Dr Law sat on the earliest Antarctic advisory committee, the Scientific Advisory Committee to the 1947 Executive Planning Committee, with both F.W.G. White and C.H.B. Priestley. Dr Law's exclusion from membership of later review and advisory committees is not surprising considering the Antarctic scientific elite's internal divisions. In the past, these divisions were centred on the Australian Academy of Sciences' close affinity with the policies of the Australian government. Members of the elite who had served on government advisory committees regarding Antarctica did not always support the views expressed by other members of the elite who had not enjoyed similar political favour.

The first threat to the scientific elite's influence over work programs and procedures occurred in 1973 with the announcement that the government had decided to transfer the Antarctic Division to Hobart. This constituted a threat to the elite as it removed the Division and its resources from local spheres of control like the University of Melbourne and the Bureau of Meteorology. The next threat to elite control occurred in 1974 when the Minister for Science, Mr. W.L. Morrison, appointed the Advisory Committee on Antarctic Programs to review Antarctic scientific programs and stated,

> It is important that research in Antarctica should be directed towards goals that will benefit the Australian people. 13

For the first time in its history, Antarctic science was asked to account for its activities and results according to
non-scientific criteria.

In 1974, the leader of the Antarctic scientific elite, Dr Phillip Law, then Chairman of ANCAR, sent Sir Rutherford Robertson, President of the Australian Academy of Science, a copy of an article he expected to be published in the Melbourne Herald. In his article Dr Law challenged the Minister for Science, W.L. Morrison's call for beneficial Antarctic science stating,

This whole approach is based upon a false premise. Australia is not primarily in Antarctica for scientific reasons ... it is there to maintain a political presence in the last undeveloped continent, to maintain a position of vantage in an area in which national sovereignties have been for many years disputed ... If, for political reasons, $2\frac{1}{2}$ million is to be spent in occupying Antarctic bases, it would be stupid not to spend a little more and carry out some useful work in what is the world's greatest natural scientific laboratory.

The Minister is asking the wrong questions. It is not a matter of trying to assess what practical value to Australia the Antarctic researches achieve. (Most Antarctic researches have no immediate practical value!) It is a matter of answering the fundamental, simple question: "Should Australia maintain a physical presence in Antarctic for political purposes at a cost of about $3$ million a year?" If the answer to this is "No", then we should think seriously of pulling out and saving our money. 14

Dr Law's views in 1974 are extremely important as they herald a significant change in the tactics of Antarctic scientists and their future dealings with Australian politicians. Scientists began to "politicize" Antarctic science by shifting the emphasis for Australia's involvement in Antarctica from scientific reasons to political reasons. In his article Dr Law points out that,

To maintain a presence on the Antarctic Continent will cost about $2\frac{1}{2}$ million dollars a year even if no scientific work at all is attempted. 15
Despite the fact that only a small proportion of the elite have exercised some degree of political power, an informal network of communications has existed between those scientists with direct political connections and those without them. An important example of what researchers like Diane Crane\textsuperscript{16} have identified as the operation of "invisible colleges" of scientists, can be seen in the events following publication of the Federal Government's 1975 Green Paper, \textit{Towards New Perspectives for Australian Scientific Research in Antarctica}. In the Foreword to the Green Paper, the Minister for Science, W.L. Morrison, referred to the ACAP report of 1974 chaired by retired C.S.I.R.O. Chairman, Sir Frederick White. The Green Paper also invited comments on the future relationship between ANCAR and the establishment of a new Antarctic Planning Committee. ANCAR considered the Green Paper in July 1975 and in September 1975, the Academy Council received ANCAR's comments in Document NC 19/75. At this time, Sir Frederick White was a member of the Academy Council and ANCAR's comments were referred to him and the Executive Secretary for the preparation of an Academy submission to go to Government. On the advice of Sir Frederick White, the Academy Council refused to transmit ANCAR's comments to Government on the grounds that,

\begin{quote}
... the comments lack weight, are in many cases trivial, and in some cases are liable to misinterpretation or incorrect. 17
\end{quote}

In his Memorandum to Officers on the 12th September 1975, the Executive Secretary announced the establishment of an ad hoc group to examine both the Green Paper and ANCAR's comments in order to prepare a position paper for the next meeting of the Academy Council. The Memorandum concluded with the following words:
How far can ANCAR with its present constitution discharge the role required of an Academy Committee in such matters, namely to prepare comments on proposals for national research activities which can be endorsed by Council as representing an independent and objective judgement of the Academy in the interests of Australian science. 18

Why did ANCAR's comments engender such internal division and conflict of interest amongst Academy and Antarctic scientists?

The reason for the apparent split between the Academy Council and its National Committee lies in ANCAR's explicit, and therefore unacceptable, exposition of the relationship between Antarctic science and politics. After 1975 members of the Antarctic scientific elite and Academy officials abandoned the Academy's earlier policy of not mixing science with politics. Until 1975, most of the members of the elite were involved in promoting the idea that Antarctic science was an activity untainted by national political aspirations and was carried out in an international spirit of scientific co-operation. However, as soon as the scientific community's internal priorities and work organization were challenged and disrupted by the proposed transfer of the Division the elite modified its political philosophy which, in turn, influenced the Australian Academy of Science to change its policy on Antarctic science.

The similarities between Dr Law's 1974 article which expressed his private views and ANCAR's comments on the Green Paper in September 1975 are striking:

ANCAR points out that scientific research has never been the primary reason for Australian occupation of Antarctic Territory. Australian expeditions are despatched for political reasons concerned with the necessity to preserve an Australian presence in Antarctica...This being the case, it is submitted that the usual Treasury methods of costing scientific
research in other spheres of Australian activity are not applicable to Australia's Antarctic research. A large part of the total cost of maintaining Australian stations in Antarctica would be incurred even if no scientific research were carried out. It would be a worthwhile exercise for a study to be made of the costs of maintaining national activity in Antarctica at the minimum level needed to attain the political objectives. It would then be possible to obtain a more realistic figure of the total extra cost of the scientific programs. 19

Despite the fact that the Academy Council refused to accept ANCAR's comments on the Green Paper as a valid submission for transmission to the Federal Government, the views of the elite represented in ANCAR's membership still reached the Government. In his reply to Academy President, Professor G.M. Badger, contained in a letter of 23 October 1975, Dr Law indicated that the comments of ANCAR would still reach the Minister for Science over the names of a number of people acting as private individuals. 20

ANCAR's comments on the Green Paper were rejected by the Academy Council not only because they covered issues other than purely scientific matters. ANCAR's comments were also critical of the summary of the 1974 ACAP Report included in the Green Paper. More importantly, ANCAR attempted to establish an alternative planning and policy-making structure for Antarctic science which displaced the potential powers of the Planning Committee recommended for establishment by the 1974 ACAP Report. ANCAR's suggestions included an expanded role for itself in the planning of Australian scientific work in Antarctica. Whereas the ACAP Report assigned prominence to the new Planning Committee, ANCAR, in its comments on the Green Paper, placed itself at the top of a pyramid of power. The committee's comments suggested that ANCAR would establish the broad, medium to long term objectives and priorities of Antarctic science and be the source of "integrated scientific advice on
Antarctic scientific matters". The new Planning Committee, in the context ANCAR's suggested objectives and priorities would,

...define and give priorities to specific broad scientific projects aimed at objectives selected from those established by ANCAR. 22

An operations Committee would define and allocate the logistic and other resources required annually for scientific projects.

While it is difficult to pinpoint exactly when and why the relationship between Antarctic science and Australian politicians changed, by 1975 the scientific elite active in ANCAR between 1974 and 1977 had contributed to changing the raison d'etre of Antarctic science. Scientists began to argue that the Australian Academy of Science acknowledged the political motivation for Antarctic activity after raising the issue in Council.

While the Planning Committee as outlined by the 1974 ACAP Report never materialised, by 1979 the Government had established the Antarctic Research Policy Advisory Committee (ARPAC). It is important to note that the members of the elite who had been active between 1974 and 1977 in redefining the purpose of Antarctic science, continued to exert an influence over Antarctic science policy by their membership and activity in ARPAC. Nine members of the elite active in ANCAR during 1974 to 1977 became members of ARPAC or one of its committees after 1979. By doing so they exerted a continuing influence on the political face of Antarctic science until the establishment of the Antarctic Science Advisory Committee (ASAC) in 1985.

The years between 1972 and 1975 constituted one of the most turbulent periods in Australia's political history since the Second
World War. The Whitlam Labor Government followed two decades of conservative political power and thought which had been dominated by the former Liberal Prime Minister, Sir Robert Menzies. The Labor Government's early attempts to make Australian Antarctic science accountable to both the electorate and the government spurred the scientific elite towards a reassessment of their traditional philosophy regarding Antarctic science. The Liberal Fraser Government of 1976 to 1983 did not return Antarctic science to the state of minimal government interference enjoyed prior to 1972. The transfer of the Antarctic Division to Kingston, Tasmania was completed in 1981 and the establishment of ARPAC in 1979 provided the first formal means of communication between Antarctic scientists, policy makers and politicians. However ARPAC was hamstrung by the continuing reluctance of the conservative Liberal Government to make a detailed statement of its long term policy commitment to the Antarctic.

Members of the scientific elite active in ARPAC did not campaign in the political arena for Antarctic science. The reason for this political inactivity lies in ARPAC's powers and terms of reference. Unlike ASAC, ARPAC was not empowered to direct scientific research into specific areas. Its role was purely advisory which meant that the internal priorities and objectives of Antarctic scientists were not controlled by external policy considerations. There is a distinct correlation between the amount of political campaigning and lobbying undertaken by Antarctic scientists and the extent of external political control applied to Antarctic scientific objectives. Australian Antarctic scientists only speak, write and act in a political way in periods of crisis. Since the Second World War there have been only two periods of crisis which coincide
with the election of Labor Governments who have attempted to direct Antarctic science into specific areas of research dictated by Government policy.

The argument developed in this section can be summarized as follows. Analysis of the Antarctic scientific research community indicates the existence of a select group of scientists who have exercised influence and control over the development of Antarctic science policy since the Second World War. The elite acts in a way which defines the boundaries and content of Antarctic research and mediates with the State in order to translate political demands into scientific objectives. Members of the elite only directly engage in political activities when the internal priorities of Antarctic science are challenged or if the elite's control over scientific resources is appropriated by groups external to the scientific community. Until the establishment of ASAC in 1985, the scientific elite successfully resisted challenges to its control by external groups. The elite is overwhelmingly a politically conservative group. Its members support the Antarctic Treaty system and none of the group has been involved in supporting the campaigns of conservation and environmental groups active in Antarctic issues. Despite the fact that Antarctic research is geared to political rather than practical or economic objectives, the elite is still exerting considerable influence over the selection and endorsement of scientific projects.
3.2 THE ORGANIZATION OF SCIENCE IN THE ANTARCTIC DIVISION

The Antarctic Division's organizational structure has undergone considerable change since the Division's establishment. The development of new organizational forms has followed changes in the social environment of Antarctic science. These changes include the late professionalization of science within the Division; the enactment of legislative and administrative controls since 1974 which cover the administration of the Australian Antarctic Territory with respect to natural resources, environment protection and conservation; and, the replacement of informal, decentralized planning structures for Antarctic science with a planned, centralized science advisory system geared to the needs of government bureaucracy.

While organizational theorists like Arthur Stinchcombe have analysed the relations between social structure and the development of new organizational forms, few sociologists of science have considered or fully analysed the way in which the social framework is related to the organization and control of work in the sciences. The organization of scientific production systems, in particular, their relevance to broader theories in the sociology of work, remains largely ignored by sociologists of science. The work of Richard A. Whitley is an exception. Whitley argues that the organization and control of scientific work is, itself, a major structuring framework for knowledge production and validation so that scientific knowledge becomes "the product of the social organization". A major weakness of Whitley's approach must lie in its theoretical nature. Whitley does not attempt to relate his arguments to case studies, thus leaving much of his work untested.
Unlike Whitley, Peter Weingart's work does attempt to relate the theory of interacting social and intellectual factors in the development of science to observed cases of research activity. However, Weingart's work concentrates on the impact of external societal forces like governmental policies rather than on the internal dynamics of work organization.

Both Whitley and Weingart's work have relevance for an analysis of the social organization of Antarctic science. This section attempts to relate the theoretical basis of their work to changes in the organization and control of scientific work in the Antarctic Division. The organizational structure of the Antarctic Division is examined in order to determine what impact internal administrative procedures and staffing practices have had on the performance of scientific research. The publications record of the Division is assessed and provides an indicator of Divisional research strengths and weaknesses. The 1983 Joint Management Review is the only comprehensive examination of the Antarctic Division's working procedures carried out since the Division's creation. The findings of the Review are discussed in relation to the Division's new role within the Antarctic science advisory structure.

3.2.1 ORGANIZATIONAL STRUCTURE

Between 1948 and 1987, the Antarctic Division changed its system of work administration from what Stinchcombe and Whitley refer to as a "craft" system of work administration to a "bureaucratic" mode of work organization and control. Craft systems of work administration are characterized by small clerical staffs, a small number of permanent posts, informal communication systems, work that is planned and controlled by shop floor workers or foremen,
authority systems which are split between the employer and the extra-local certifying agencies which produce and control the skills required to do the work and, finally, work goals and procedures that are not controlled by a single hierarchy in the employment organization. In contrast, bureaucratic systems of work administration require large clerical staffs, a greater number of permanent positions, a formalized communication system, work planned in advance by administrative staff and centralized authority systems so that work goals and procedures are controlled by a single hierarchy in the employment organization.

If the preceding description of work administration is applied to the Antarctic Division it is easy to distinguish a distinct transition. The Division employed a craft system of work organization for scientific research which was replaced in the late 1970's with a bureaucratic style of work administration. In June 1973, permanent Antarctic Division staff numbered 82 positions of which 5 were employed as permanent scientists with another 20 scientific positions designated as temporary appointments or "acting in" positions. By 1983 the Scientific Branch had a total staff of 49 full time positions of which 22 were classed as research staff.

In 1974 the ACAP report commented on the Antarctic Division's small number of permanent senior scientists and pointed out that the planning and supervision of Australian Antarctic programs could be compromised by inadequate professional support. Authority over many of these early research programs was not vested in the Division. For example, the Physics Department of the University of Tasmania supervised the cosmic rays program and the University
of Melbourne controlled all glaciological research. While government departments like the Bureau of Meteorology and certain universities continue to participate in the scientific activities of ANARE in the 1980's, the Antarctic Division is now responsible for planning, implementing and supervising its own scientific programs in fields like geology, cosmic rays and meteorology. The planning and policy area has also undergone changes towards a bureaucratic mode of work administration. Whereas ANCAR previously exerted considerable influence over the planning of scientific programs by setting priorities and objectives for research, authority for setting work goals and procedures is now vested in the Division.

In 1986 the Division described its administration as "a corporate style of management" and had expanded its organization into five Branches with five Assistant Directors and a Deputy Director. Between 1955 and 1975, the Division had operated with a basic organizational structure divided between a Scientific and an Operations or Logistics Section. In 1974 there were two Assistant Director positions to cover these areas which also acted, in a token way, as Deputy Directors.

During 1974, the Director of the Antarctic Division, Dr Raymond Garrod, called for an in-house working party to consider and present a report on a restructuring of the Division. The report's committee consisted of seven staff members which included: Chairman Major F. Bond (Senior Physicist, Class 3); Dr W. Budd (Senior Glaciologist, Class 3); Mr I. Bird (Senior Engineer, Class 3); Mr A. Humphreys (Senior Engineer, Class 3); Mr G. McKinnon (Geographic Officer); Mr B. Horton (Engineer, Class 2) and Mr D. Twigg (Senior Technical Officer).
The Committee exhibited a professional bias towards the logistics and engineering side of Antarctic operations with only two members of the committee classed as scientists. One member of the committee, scientist Dr William Budd (previously described as a member of the Antarctic scientific elite), did not approve of the working party's final report and submitted his own minority report which, in turn, was not approved by the working party. In the light of subsequent events in Antarctic science, Dr Budd's comments are insightful and have proved to be of greater relevance than the recommendations of the Committee.

The Committee's report concentrated on putting forward two major recommendations. First, that the Division should establish a permanent Planning Committee in order to plan proposals up to four years ahead. Second, that in keeping with the Department of Science policy of working within present staff establishment figures, a reorganization be facilitated by transferring existing expeditionary positions to permanent headquarters positions.

In his report Dr Budd pointed to the increasing imbalance between scientific research staff and logistic and administrative staff, claiming that since 1960 the permanent scientific staff had diminished by half whereas support staff had increased by almost 400 per cent. Dr Budd suggested that Division scientists should be responsible for all scientific work undertaken in their respective disciplines regardless of input from outside agencies or other government departments. Dr Budd stated,

The integrated planning of all science disciplines for the ANARE is unnecessarily difficult at present ...It would be most useful to have at least one research scientist in each discipline responsible for the work. This would also allow considerable research in disciplines currently lacking in
research activities, eg. geology, geophysics, meteorology and oceanography. The complete absence of oceanography is deplorable. The tremendous cost of the meteorology programs contrasts to the lack of research in that area. 33

Dr Budd anticipated the need to increase the number of scientists within each of the Division disciplines in order to get a balanced representation within the overall science program. Dr Budd estimated that,

The minimum is about 5 including several research scientists with T.A., T.O. or C.A. (Technical Assistant, Technical Officer, Clerical Assistant) support. If this were to be provided for all disciplines involved in Antarctic research some forty people at least would be required. 34

Dr Budd's report also drew attention to the low morale of headquarters staff and contrasted this with the enthusiasm of Division staff working at the University. The organizational structure of the Division is given as a reason for the Division's low morale. Dr Budd's report supported greater integration with universities if the number of scientific positions remained limited to 1974 levels. Dr Budd argued that professionalization of scientists could be achieved if the equivalent of University professorships or CSIRO classifications like Senior Principal Research Scientist were adopted within the Division. Dr Budd observed that the Division had become,

...a post graduate institute with many theses produced and scientists developed who then work elsewhere. There has been little opportunity available to hold these good scientists for Antarctic work. 35

An interesting postscript to Dr Budd's comments is that the classifications of Senior Principal Research Scientist and Principal Research Scientist and their scientific salary levels were only approved in the Division after 1981.
The late professionalization of science within the Antarctic Division has meant that, for most of its existence, the Division has relied on outside scientific expertise for the content of Antarctic science. The lack of employment opportunities for scientists interested in pursuing Antarctic research areas on a long term basis has resulted in an Antarctic science program which has lacked continuity and, in some cases like oceanography, has simply stagnated. By not recognizing or encouraging the Division's right to conduct high quality research, successive governments have effectively short-circuited their control over the direction of Antarctic science. Control over the content and conduct of Antarctic science has been fragmented between the reigning scientific elite and vested interests found in universities and other government departments. Belated attempts to restructure the organization of the Antarctic Division to provide it with an internal capacity for advanced research are probably too late to restore Australia's scientific credibility in the Antarctic Treaty system.

3.2.2 PUBLICATIONS RECORD

The publication policy of the Antarctic Division is to publish in the regular scientific journals wherever possible. However, the Division also publishes research in its own range of journals and reports if specialized studies are not catered for by appropriate journals. In past years the Division's journals consisted of the ANARE Scientific Reports which covered publication of comprehensive works; the ANARE Interim Reports which catered for articles based on preliminary research; the ANARE Data Reports which covered numerical or graphical data; and, a series known as Technical Notes which published information in the instrumentation and logistics area.
Today, the Division's scientific journals consist of the ANARE Reports which supercede and include the former Scientific Reports, Data Reports and Interim Reports. The ANARE Reports publish Australian Antarctic research which has undergone external review. The Division also publishes the ANARE Research Notes which includes the former Technical Notes and provides an avenue for the rapid publication of technical data and scientific results. By February 1986, 133 Reports had been published.36

In 1973, the Publications Officer of the Antarctic Division, M.R.O. Millett, outlined inefficient procedures and delays that had occurred in the publication of Antarctic research. Publication problems outside the control of the Division had compromised one of the basic tenets of the Antarctic Treaty, namely the complete and timely international exchange of all scientific research obtained by parties to the Treaty. The time lag in publication for meteorological and terrestrial magnetism research due to be published in the ANARE Data Reports had stretched to more than five years by 1973.37 Millett commented:

It is quite disgraceful that data which have been collected at great cost are not readily available probably because the Public Service Board either will not increase the salaries of the labour required or will not even provide and allow clerical category officers to get the work done until proper facilities are available.38

Between 1948 and 1972 the number of publications resulting from the work of ANARE gradually increased reaching a peak in 1962 of 85 publications for that year.39 By 1972 this number had fallen dramatically to 14 publications for the year, or a level equivalent to the number of publications for 1950.40

An analysis of ANARE Scientific Reports, Data Reports and Interim Reports published between 1950 and 1972 reveals the strengths
and weaknesses of the Antarctic scientific program (Table 1). 41

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<td>Botany</td>
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<td>Cosmic Rays</td>
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<td>General</td>
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<td>Terrestrial Magnetism</td>
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<td>Upper Atmosphere Physics</td>
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<td>Zoology</td>
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<td><strong>TOTAL</strong></td>
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The medical sciences, geology, botany and oceanography account for less than 10 per cent of the total number published. In some contrast, two of the eleven disciplines, cosmic rays and meteorology, account for 42 per cent of total publications.

An important omission in the Division's publications is the complete absence of reports based on a political, legal or social science analysis of Antarctic issues. There is a similar lack of published policy documentation. Despite the fact that the Division's stated functions do not preclude the publication of social science reports, the Division has chosen to limit the subject area of its publications. Division officers such as
M.R.O. Millett were aware of the shortcomings of the Division's narrow approach to publications in 1973. Millett writes:

It is highly desirable that any publications policy should be positive instead of negative. The Division should seek to promote its image by positive steps to take its own initiative in the dissemination of information. Waiting only until we are asked for information by institutions which have vaguely or accidently [sic] heard of ANARE is simply not good enough. The time will come when questions will be asked: "What is Australia doing in Antarctica and why?" The best answer to this question, be it asked rhetorically or in deadly earnest, is a positive policy to ensure the wide dissemination of the results of ANARE's activities. 42

While Millett points to shortcomings in the Division's provision of access and distribution of ANARE publications, it is ironical that the question that the Publications Officer poses concerns the content and raison d'etre of Antarctic research, not its distribution and access. The Division makes no provision in its categorization of publishing interests for articles based on these topics or questions.

3.2.3 JOINT MANAGEMENT REVIEW

A joint management review of the Antarctic Division was completed in December 1983. The Steering Committee consisted of a Chairman, Mr P.V. Moran, Senior Assistant Commissioner to the Public Service Board, and members Dr R.M. Green, Deputy Secretary of the Department of Science and Technology, and Mr C.G. McCue, Director of the Antarctic Division. Management consultants John P. Young and Associates were employed as the Review Team.

The Permanent Head of the Department of Science requested the review on the basis that the Division was "showing signs of great managerial stress" 43 which was impairing the Division's ability to respond to developing Government policy for Antarctica.
Included in the newly elected Hawke Labor Government's policy for Antarctica was an "increased level and change in direction of research activity".44

The Management Review's findings included the following:

* Management had become task oriented and had neglected long and short term planning effort and program establishment.

* Communications were spasmodic and inefficient. The absence of an effective management information system had resulted in few operation or policy guidelines or established procedures.

* Many staff had difficulties understanding the aims and objectives of the Division as no adequate definition of the role of the Division existed at the start of the Review.

* The Division did not have an annual operating plan which had resulted in Branches preparing individual plans. This practice meant that Branches did not understand or were aware of and responsive to the requirements of other sections within the organization.

* Personnel practices were marred by lack of any regular performance appraisal. Staff selection was geared to criteria related to a person's capabilities as an expeditioner rather than the personal qualities and skills required for the job in question.
* Science programs were not prepared and finalised a year in advance causing dissatisfaction in the wider scientific community about the level and allocation of available resources and logistic support.

* The ten year building program had been poorly handled.

* Antarctic maps were 20 years old.

* The Division had neglected to investigate the legal status of station officers-in-charge or liability for accidents and the legal basis for the control of fishing within the waters of sub-Antarctic islands.

The Joint Management Review put forward a total of 86 recommendations and suggested that 15 new positions be created within the Division. One of these positions was that of Senior Principal Research Scientist or a Branch Head for the Science Branch. This position was originally proposed by Dr William Budd in 1974 in his minority report to the Director of the Antarctic Division. The Review also redefined the importance of the Science Branch to the success of the Division. The new Science Branch would become the Division's "main producer" so that,

The competence of the Division may well be judged by the way it runs its operation and the standards it maintains. Excellence, however, can only be achieved if the Science Branch not only produces but produces work of high quality.45

The Review Team's appraisal of the Science Branch included some important comments on procedures for project selection and approval. The Review examined the procedures followed by ARPAC
...the proper distinction between an advisory body, such as ARPAC, and the Executive Authority (in this case the Minister and, by delegation, the Division) must be made. It is unreasonable for part-time members of an advisory body to be expected to take responsibility for decisions in areas outside their control. It is also unreasonable to seek their advice on matters outside their Terms of Reference. 46

The Joint Management Review recommended that Division officers not serve on the science advisory committee "to avoid any conflict of interest". 47

The Review's recommendations concerning new procedures for research project selection effectively curtailed what were obviously regarded as the growing powers of ARPAC and the improper external involvement of Division officers in policy matters. The Review proposed that the Antarctic Division, not ARPAC, advertise for applications for research proposals; that ANARE science co-ordinators, not ARPAC co-ordinators, arrange for peer assessments and rank proposals; that an ANARE Planning Committee, not an ARPAC Ad-Hoc Working Group, develop the scientific program; and, that the Director of the Antarctic Division, not ARPAC, submit the final program to the Minister for approval.

The most important effect of the Joint Management Review's recommendations regarding science was to displace the powers of the external science advisory committee, ARPAC, and transfer the responsibility and managing role for Australia's Antarctic research program back to the internal control of government. Whereas the focus of ARPAC had been to open up the processes of research project selection and approval to external interests, the transfer of responsibility to ANARE, a body administered by the Antarctic
Division, closed the door on any direct non-government influence on the Antarctic science program. Another important by-product of the Review's revised procedures, one which is less obvious, was the removal of an important avenue of influence utilised by the Antarctic scientific elite which had been active within ARPAC.

It is not surprising that scientists within the Antarctic Division as well as Antarctic scientists in the wider scientific community remember ARPAC as a committee geared to their scientific interests. Both government and non-government Antarctic scientists enjoyed extensive representation and power on ARPAC sub-committees which enabled them to set scientific priorities, select and approve research proposals and construct an Australian Antarctic science program which reflected scientific interests rather than political or policy interests. This is no longer the case. While the Antarctic Division has expanded its powers over procedures for research project selection as suggested by the Joint Management Review, priority areas for research are now closely defined by ASAC and ASAC membership is not composed of members of the traditional Antarctic scientific elite.

In December 1986, Marinex Pty. Ltd. completed an Implementation Review of the Antarctic Division's Joint Management Review. The implementation Review reported that 51 of the original 86 recommendations had been implemented, 24 were proceeding or partly adopted and 5 were no longer applicable. The Implementation Review reported that the procedures for research project selection and approval had been successfully modified so that the ARPAC Ad Hoc Working Group had been replaced by an ANARE Planning Committee administered by the Projects and Policy Branch within the Division (Recommendation 65).
Despite the establishment of a new science advisory committee, ASAC, the procedures for research selection and approval still follow the procedures originally suggested by the Joint Management Review.

This chapter has argued that the social organization of Australian Antarctic science is the result of the interaction of a number of factors. In the past the substance and direction of the Australian government's program of Antarctic science has been heavily influenced by the priorities and objectives of a professional scientific elite. By their support for University involvement in Antarctic research and their opposition to Antarctic Division control over research programs, the elite contributed to retarding the development of the Division as one of Australia's primary research establishments. A poor administrative structure within the Division ensured the lengthy dominance of logistics over science interests. While the Joint Management Review marks the end of the Division's decline by transferring responsibility for the management of the Antarctic science program back to the government, Division scientists are no more in control over the content of Antarctic science than they were under the influence of the scientific elite. The social organization of Antarctic science is a product of the closed political environment which determines Australia's role in Antarctic matters.
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6. P. Weingart, "The Scientific Power Elite - a Chimera; The De-institutionalization and Politicization of Science" Ibid.


8. Michael Mulkay provides a valuable criticism of the work of van den Daele et. al. in Current Sociology, Vol.28 (3), 1980, pp. 103-109


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13. W.L. Morrison is directly quoted by Dr Phillip Law in the draft of an article "My Say: The Big Freeze -- Why Antarctic Research?" submitted to Australian Academy of Science President Sir Rutherford Robertson on 8 March, 1974. *ANCAR File, 1974*. Adolph Basser Library of the Australian Academy of Science, Canberra

14. Ibid.

15. Ibid.


17. ANCAR Correspondence File, 1975. Information is quoted in a Memorandum to Officers titled "Green Paper on Antarctic Research" signed by H.A.W. Southon, Executive Secretary and

18. Ibid.


31. ANARE News, December, 1986, p.10


33. Ibid.

34. Ibid.

35. Ibid.


of Science, Canberra. Document MS 123/1 ANCAR (d). A copy of the Division's publications policy was included with a brief note to P.G. Law, 7 March, 1973.

38. Ibid.
39. Ibid.
40. Ibid.
42. M.R.O. Millett, op.cit. note 31
43. John P. Young and Associates, op.cit., note 24, p.ii
44. Ibid.
45. Ibid., p.60
46. Ibid., p.55
47. Ibid.
The Australian science policy advisory system is still in its infancy. No science policy machinery existed in Australia prior to 1972 and it was not till 1975 that an Australian Science and Technology Council (ASTEC) was established. Despite ASTEC's existence successive Australian governments have taken decisions on research and development without reference to this body. The late Leon Peres formerly a Reader in Political Science at the University of Melbourne observed:

Australian science politics have been either very gross or very fine. Gross with respect to broad allocations between performance sectors, fine with regard to the administrative detail of research organization and management. Gross or fine, there has been no continuing relationship between science and the political system and no great demand for scientific output. 1

Despite the fact that Australian science has not had an instrumental role in Australian politics, there are indications that the official interaction between science and the political and bureaucratic establishment is increasing. The appointment of parliamentary inquiries which encompass the Australian Antarctic Territory and administrative inquiries like the Joint Management Review of the Antarctic Division in 1983, indicate that there is a developing trend towards a closer association between Antarctic science and Australian politics.

An important factor in the connection between Antarctic science and the government's political objectives has been the way in which Antarctic science has become the focus of controversy. Government interest in the possibility of minerals exploitation in the Antarctic2 and conservation issues like the overfishing of sub-Antarctic waters have attracted greater government and community
attention. Increasing demands are being made on the Australian government to account for its official activities and decisions taken regarding the Australian Antarctic Territory.

Different views exist concerning how to best achieve a satisfactory amalgamation of political objectives with scientific programs. Whereas Jarlath Ronayne\(^3\) argues that Australian science requires the direction of a central co-ordinating body in order to effectively achieve national objectives, C.L. Rubenstein\(^4\) recognizes the fluid nature of the political process which determines national goals and concludes that only a multiplicity of decision points within the communication network servicing government and research institutions will stimulate interaction between the two sectors. The establishment and terms of reference of ASAC appears to support the second view. The Australian government has chosen to dictate policy through a specialized advisory body rather than a centralized science policy system.

### 4.1 GOVERNMENT REPORTS

Some of the more significant official inquiries into Australia's activities in the Australian Antarctic Territory include the 1974 report of the Advisory Committee on Antarctic Programs (ACAP)\(^5\); the 1975 Green Paper on Antarctica\(^6\); the 1978 report on the impact of Law of the Sea requirements on the Australian Antarctic Territory prepared by the Joint Parliamentary Committee on Foreign Affairs and Defence\(^7\) and, the 1985 inquiry into the natural resources of the territory undertaken by the Senate Standing Committee on National Resources.\(^8\) These reports illustrate the gradual changes which occurred in the political perception of
Australian Antarctica between 1974 and 1985. The ACAP report and submissions to the Green Paper in the mid 1970's are characterized by an insular outlook and appreciation of Antarctica, choosing to concentrate on issues like University involvement in research and the inadequate organizational and professional structure of the Antarctic Division. Later reports indicate a growing perception of Antarctic issues in terms of their global and international implications. There is less of an emphasis on internal Australian arrangements for research and more attention is given to the international context of Antarctic science.

The principal recommendations of the ACAP report concern what Leon Peres has previously described as "fine" science politics or a concentration on the administrative detail of research organization and management. As a result the report has minimal political impact. The Green Paper does at least attempt to place Australian Scientific research in Antarctica within a broader policy context. Despite its intention to develop a new policy for Antarctic science, the Green Paper is flawed by its limited framework for discussion. The Green Paper limits itself to a consideration of the role of the Antarctic Division and a review of research programs. Not surprisingly, responses to the Green Paper became bogged in submissions devoted to administrative minutiae based on the comments of disgruntled public servants.

The Green Paper elicited a number of submissions from Antarctic Division staff which served to highlight the low morale within the Division. For example, the late Gavin Johnstone, a biologist in the Division between 1969 and 1987 focussed attention on the fact that the position of Assistant Director (Scientific)
had not been filled on a permanent basis for ten years despite the fact that the incumbent, P.H. Sulzberger, had been working in that position for ten years. According to Johnstone, the effect of government neglect had been to seriously "undermine" the position so that,

The morale of the Scientific Branch is sapped. If 'our masters in Canberra' do not think it important to appoint a suitably qualified scientist to the position in a permanent capacity...what value can they attach to the work of the Scientific Branch of the Antarctic Division? 9

Division physicist John Reid also submitted a response to the Green Paper which stated that unless the government formulated a statement of objectives regarding Antarctica that the Division would continue to be gripped by "institutional schizophrenia" where the Division did one thing while purporting to do another. 10 Like Johnstone, Reid pointed to the "inappropriate logistical orientation of the Division" 11 and stated:

We employ scientists as expeditioners to carry through programs. The whole orientation is wrong... In fact we employ observers rather than scientists and what true research is done happens despite the system rather than because of it. 12

Further evidence of mismanagement of the science program was submitted by D. Mck, Sharpe (sic), a former Officer-In-Charge at Macquarie Island. Mck, Sharpe writes:

Only 4 out of 19 at Macquarie Island could be classed as scientists and much of their work was routine and sub-professional and capable of being automated or done by technicians. It would be difficult to total up more than 2 man-years of truly scientific work. 13

The Green Paper also attracted submissions from other government and semi-government agencies. In the light of recent claims that nuclear tests have been undertaken in the Norwegian sector of Antarctica, 14 it would be interesting to determine how
much credence was given to the submission of Australian Atomic Energy Commission employee, J.M. Rolland who wrote:

We are unaware of any scientific basis for Australia adopting an irrevocable position on high-level radioactive waste disposal in Antarctica...No information has been found that precludes the technical feasibility of Antarctica's use for that purpose.15

In the final analysis, the Green Paper achieved very little. While it fostered discussion within the bureaucratic and scientific community, it failed to develop a new policy for the structure and functions of the Antarctic Division or to define the role of Australian Antarctic science programs within national science policy. The new Fraser Liberal-Country Party Coalition government of 1975 did not act on the responses initiated by the Green Paper or on the results of workshops held in a number of states to discuss the Green Paper.

In 1977 a Sub-Committee of the Joint Parliamentary Committee on Foreign Affairs and Defence prepared a research paper on Australia's territorial boundaries with special reference to the Australian Antarctic Territory. This paper was later incorporated into the Interim Report of the Joint Committee and published in 1978.16 The Interim Report marks an important turning point in governmental attitudes towards Antarctic territory. The Joint Committee was the first parliamentary committee since the Second World War to investigate aspects of Australia's management of the Australian Antarctic Territory and to set out the current state of knowledge regarding Antarctic resources. In addition, the report marks the first real attempt to define the strategic position of Antarctica within Australia's defence system.
The original research paper submitted by the Sub-Committee on Territorial Boundaries in 1977 contained an extensive section on "Australia's Security and Antarctica" which examined the military consequences of lapses in the Antarctic Treaty. The research paper points out that Australia's strategic thinking and defence resources have traditionally concentrated on northern defence and neglected consideration of the fact that Australia's main population centres are closer to Antarctica than Asia. The paper suggests that if the Antarctic Treaty lapsed, ...

...the Soviet Union could establish a submarine naval base unhampered by the requirements of an independent local government. Or again, France is coming under increasing pressure to halt its nuclear testing in French Polynesia, and could be tempted to remove these operations to Adelie Land. 17

The 1978 Interim Report does not include the more detailed security assessment found in the research paper although large slabs of the research paper on other aspects of Antarctica's boundaries are transposed verbatim to the Interim Report. Instead of a special section on Australia's security, the Interim Report refers briefly to the Defence Department's submission to the Joint Committee which declared that the Australian military had identified "no specifically defence-related requirement" 18 for Antarctic defences, preferring to rely on the "continued international acceptance of the Antarctic Treaty". 19

The Interim Report was the first official indication that government policy towards Antarctica was due for some changes. Both the 1977 research paper and the 1978 Interim Report are the only examples of public access documents which link scientific interests with strategic and military considerations. While the Interim Report is notable for the fact that it does not examine
the role of the Antarctic Division in the administration of new maritime laws and regulations arising from Law of the Sea responsibilities, it does make an oblique reference to the Division's expenditure by pointing out,

To give the claim for sovereignty over the area of the Antarctic Territory greater international validity, Australia must obviously demonstrate a greater interest in the Territory...Annual expenditure on the Territory and associated research programs has been miniscule, much less than the cost of one F111 fighter bomber. 20

In June 1983 the Federal Australian Senate resolved to include an examination of the natural resources of the Australian Antarctic Territory in the report of the Standing Committee on National Resources. The final report of the Committee presented on 5 December 1985 constitutes the most comprehensive examination by a parliamentary committee of issues like the political and legal status of Antarctica; the nature and extent of the natural resources of the territory; environmental issues; and the role of the Commonwealth in the management of the Australian Antarctic Territory. The report marks the first successful attempt by an Australian government committee to integrate the foreign relations aspects of Antarctic issues with national administrative arrangements for research. Topics range from the internationalisation of Antarctica and global environmental concerns like the impact of human activities and resource exploitation on the environment to bureaucratic questions concerning suitable procedures for staff selection and training for national Antarctic personnel.

Unlike the 1974 ACAP Report and the 1978 Interim Report into territorial boundaries, the Senate Committee report directly incorporates substantial extracts of the Antarctic Division's submission into the final Report. The Antarctic Division's
submission is referred to or directly quoted in relation to the following:

* The activity of foreign fishing fleets in the harvesting of krill.  

* The inability of the AAT to sustain a high level of commercial fishing except for the area around Heard Island.  

* The potential of Antarctic ice as a freshwater source although little research had been done on possible adverse effects of iceberg harvesting.  

* The non-foreseeable use of Antarctic coal.  

* The existence of technical problems like "lakes" of water under moving ice limiting the activity of onshore exploitation of minerals.  

* Differences between legitimate geophysical research and minerals prospecting.  

* The international prestige value of good Antarctic research as well as its value to specific disciplines.  

* A report of the progress of the Division's waste disposal program.  

* The activities of the interdepartmental Antarctic Environment Committee and recent Division initiatives in environmental policy.  

* Suggested limits to tourism.  

* The effect of oil spillages on marine life. The Division stated that the effect of oil spillages on krill production and offshore fish stocks was unlikely to have a significant effect.  

* Support for the developing minerals regime under the Antarctic Treaty provided that environmental-related research supports any new system.
* The advisability of establishing a specific Antarctic research fund.\(^{34}\)

* The inability of the Division to achieve "Centre of Excellence" status.\(^{35}\)

* Funding and logistic problems associated with the rebuilding program of Antarctic bases.\(^{36}\)

* Logistic constraints on annual research programs.\(^{37}\)

* Options for improved transport arrangements to the AAT.\(^{38}\)

* Division procedures for staff selection and training, particularly expeditioners.\(^{39}\)

The Senate Standing Committee's report is an important document in the growth of the Antarctic Division as a separate research organization in the Australian scientific community. The Committee's deference to and recognition of the scientific expertise of the Division marks an important turning point in governmental perception of the role and functions of the Antarctic Division. The views expressed by the Division in its evidence to the Standing Committee no longer reflected purely logistic or administrative concerns. The Division now gave qualitative advice on a wide range of issues pertinent to the Antarctic territories.

The final Report makes 28 recommendations, 6 of which directly concern the Antarctic Division. The recommendations include the Division undertaking a feasibility study into iceberg harvesting; a recommended increase in human and financial resources to continue the Division's program of Antarctic waste disposal; finalization of Division proposals to reserve areas of the Vestfold Hills for environmental protection; recognition and support for Division control over Antarctic tourism; a directive that the
Division undertake a study of the environmental impact of minerals exploitation; and, that an external agency review the adequacy of the Division's expeditioner selection and training procedures.

By far the most significant of the recommendations relating to the Division is Recommendation 21 which calls for a Division study of the environmental impacts of minerals exploitation. Whereas the report recommends that an international body, the Scientific Committee of the Convention for the Conservation of Antarctic Marine Living Resources (CCAMLR) be responsible for any research into the impact of the exploitation of marine resources, the Report assigns responsibility for environmental research into the possible impacts of mineral development to a national government department, the Antarctic Division. Unlike previous years when the Australian Government relied on research gained through the Antarctic Treaty system from international organizations like SCAR, current practice favours greater reliance on national research effort for current scientific information as an aid to general policy-making.

The possibility of resource exploitation in Antarctica has had an important effect on the position of science within the political environment. Not only has the Federal Government consolidated its control over how and by whom a policy for Antarctic science is set, but science has now assumed a political role in the formulation of Antarctic policy. The most recent report by a parliamentary committee, the 1985 Senate Standing Committee's report, is a prime example of how scientific advice becomes incorporated in policy.
4.2 ANTARCTIC SCIENCE ADVISORY COMMITTEE

The Antarctic Science Advisory Committee (ASAC) was established in September 1985 and replaced the Antarctic Research Policy Advisory Committee (ARPAC) established in late 1979. Membership of ASAC and ARPAC differ in a number of significant ways. ARPAC's membership consisted of a relatively diverse group of individuals. The original seven member committee included two non-government representatives, Dr K.T.H. Farrer, Chief Scientist to Kraft Foods Ltd, and Mr R. Woodall, Director of Exploration for Western Mining Corporation Ltd. Professor D.E. Caro, Vice-Chancellor of the University of Tasmania acted as Chairman with the remainder of ARPAC's membership evenly divided between government departments and universities. In addition to formal membership, ARPAC permitted a number of organizations like the Australian Science and Technology Council and the Australian National Parks and Wildlife Service to provide observers to ARPAC meetings. The resignation of Mr R. Woodall in June 1980 was followed by the appointment of Mr B. Hopkins, Manager of New Exploration Ventures of the Oil and Gas Division of Broken Hill Proprietary Ltd. The Australian National Committee for Antarctic Research (ANCAR) of the Australian Academy of Science was also admitted as an ARPAC observer in 1980.

ASAC differs from ARPAC insofar as its professional representation is less diverse. Membership of ASAC consists of representatives exclusively drawn from either universities or government departments and agencies. Unlike ARPAC, ASAC does not include any commercial representation from the private sector. Both science advisory committees have lacked any community group representation. ASAC's membership is notable insofar as it is the
first Antarctic science advisory committee to include female representation in the person of Dr Gillian Triggs, Senior Lecturer in Law from the University of Melbourne.

A clue as to the reasons why ARPAC was replaced by ASAC is contained in the Antarctic Division's 1983 Joint Management Review. With regard to project selection and approval procedures, this Review reported that,

There is considerable dissatisfaction both within the Division and within the wider scientific community about the way the process has operated. 40

The Review also suggests that ARPAC was being consulted on matters outside the committee's terms of reference. The Review points out that nearly all the ARPAC Co-ordinators responsible for project selection were also Chairmen of relevant sub-committees of ANCAR. This meant that they also acted as Australia's representatives on sub-committees of the international organization of SCAR. By implication, the Review suggests that improper procedures for external peer assessments of research proposals had been followed. The potential for vetting projects based on self-interest existed so that favoured projects might not only find approval on a national level but could also influence the direction of international scientific programs formulated by SCAR.

The Joint Management Review also makes an oblique reference to the influence of an Antarctic scientific elite. The Review suggests that selection processes for research proposals that were internal to the Australian scientific community but independent of ARPAC were operating through communication networks based on Australian Academy of Science - ANCAR linkages. 41
ASAC's major achievement has been the introduction of an Antarctic Science Grants Scheme to support Antarctic research. The scheme was originally proposed by ARPAC in its initial report to the Australian government in November 1979. That report recommended that a supplementary fund of $500,000 be created to support Antarctic research proposals unlikely to qualify for funding from existing grant-in-aid schemes. By late 1986, the new $300,000 grants scheme funded out of the Antarctic Division's budget had attracted 44 proposals. Research allocations under the scheme numbered 28 projects and totalled $282,251 for the 1987-88 Antarctic season. The scheme identifies six priority research areas for successful proposals: Antarctic environment; Antarctic weather and climate; marine science in support of CCAMLR; Antarctic geoscience; unique Antarctic science and, for the first time, social science research relevant to Antarctica.

Despite ASAC's success in instituting the grants scheme, an influential member of the Antarctic scientific elite recently described ASAC as "a disaster". This scientist criticised the professional composition of ASAC's membership as well as the system of prioritised research areas defined by the grants scheme. The fact that ASAC's membership did not include a physicist or biologist was seen as a disadvantage with regard to ASAC's role in the Grants Scheme. While the Antarctic Division is responsible for an initial cull of proposals, ASAC provides final approval for projects funded under the scheme and recommends successful projects to the Minister. It has been argued that ARPAC's membership attempted to represent each discipline with Antarctic science while ASAC's membership is merely "dominated by government appointees."
The ASAC Grants Scheme priority areas also came under some criticism from the scientist previously quoted. He argues that the priority area, "Antarctic environment", has been left largely undefined with the result that biological research proposals have dominated this area while marine monitoring programs have tended to be excluded. Another priority area, "Antarctic geoscience", has attracted such broadly described projects that the possibility of minerals prospecting could easily fit within the project's title. A serious indictment of criteria followed in the selection of Antarctic research proposals has been made by this Antarctic scientist who stated that science projects had been evaluated on the basis of the number of publications that the project might generate.\textsuperscript{46}

There seem little doubt that the Australian Antarctic science program is currently geared to short term political results. While the autonomy enjoyed by the old Antarctic scientific elite has been eroded by the strictures of ASAC, the objectives defined and pursued by ASAC are not necessarily the best alternative development. While there is some evidence that Antarctic science has become more visible to the general community,\textsuperscript{47} it has yet to achieve some degree of accountability.

4.3 PUBLIC INTEREST ANTARCTIC SCIENCE?

Charles Schwartz has defined "public interest science" in terms of working to oppose the military, economic, political and communications centralization of power which the utilization of science and technology encourages.\textsuperscript{48} Schwartz states that public interest science should try to,
...put the resources of scientists at the service of those large numbers of people furthest from the centers of control rather than allowing those few already in the seats of power to increase their advantage through the use of science. 49

In the past, Antarctic science has served the national interests of the executive and legislative branches of the Australian governmental system and the professional interests of a small sector of the Australian scientific community. On an international level, Antarctic science supports the interests of a restricted group of countries which have achieved consultative party status within the Antarctic Treaty system. The emergence of environmental interest groups into the Antarctic arena has not seriously challenged the ruling partnership between science and government. Despite the activities of organizations like Greenpeace Australia, the Australian Conservation Foundation and The Fund for Animals, environmental groups have yet to achieve either a participatory science-citizen partnership with regard to Antarctic policy making or the transformation of conservation questions into election campaign issues. Antarctica has yet to achieve the prominence of a Tasmanian rivers campaign or the status of the Daintree Rainforest issue.

It has taken the environmental movement some time to turn its attention to the conservation issues associated with Antarctica. The first serious attempt to examine the environmental management of Antarctica was by Friends of the Earth author B. Brewster, who in 1980 documented the hazardous operations of the United States nuclear reactor at McMurdo station between 1962 and 1972. In 1981 members of the Antarctic and Southern Ocean Coalition wrote to government members of the Antarctic Treaty urging them to consider the establishment of a World Park for the entire Antarctic continent and also lobbied against mineral development.
Environmental groups like Greenpeace Australia have opted to work within the Antarctic Treaty system in order to gain a political voice at future Treaty meetings. Under the Treaty, full voting rights can only be achieved if nations establish an effective presence in Antarctica and conduct a substantial scientific program. In February 1987, Greenpeace successfully established a base camp at Cape Evans in the Ross Sea. Four Greenpeace scientists recently completed the first year of scientific work on the continent. They are the first permanent non-government group to have achieved this feat and by their actions have forced an opening in the government science barricade.

Despite the actions of Greenpeace, there has been some criticism of the environmental movement's strategy regarding Antarctica. Timothy Doyle of the School of Australian Environmental Studies at Griffith University recently questioned the current practice of environmentalists working within the Antarctic Treaty framework. Doyle argues that Antarctica has become an issue for "a new breed of conservationist" and is dominated by "a handful of expert, professional conservationists" and scientists. Environmental interest groups concerned with Antarctica seem to accept the proposition that Antarctica requires the guidance of scientific "experts". They have largely neglected the task of convincing the Australian public of the importance of protecting the Antarctic environment and of the public's right to be involved in any decision making regarding the Australian Antarctic Territory. As a result of this failure to inform, there has been no threat or challenge to the established model of a science-government partnership constituting the only legitimate party in the science policy making area.
Another reason for the failure to develop a science policy based on public interest has been the way in which environmental interest groups have concentrated their strategies on following a "high-level" international approach to Antarctic issues rather than lobby for representation on "low-level" national committees like ARPAC and ASAC. There seems little comprehension by the environmental lobby that Australian Antarctic policy is developed and implemented at the ASAC level. The environmental movement has accepted the myth that Antarctic science is apolitical and, in doing so, has relinquished any control or influence over Antarctic science policy. It is Australian Antarctic science policy which determines the type and extent of environmental management programs in the AAT. Therefore ASAC should be the local forum for conservationist's actions and strategies.

The only way to achieve public involvement in Antarctic science policy making is for non-governmental interest groups like those represented in the environmental movement to recognize that bodies like ASAC are formulating political choices and policies, and to adapt their strategies accordingly. Until this is achieved, Antarctic science will continue to serve the narrow political interests of a few politicians and scientists rather than the interests of the wider community.
REFERENCES TO CHAPTER 4


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11. Ibid.

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30. Ibid., p.75, p.77-78
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45. Ibid.

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5. TOWARDS A PARTICIPATORY ANTARCTIC SCIENCE POLICY

This thesis has examined the way in which Australian Antarctic science policy has evolved. Against a background of years of government indifference, a small group of Antarctic scientists exerted considerable influence on the direction and content of Antarctic science. This elite formulated an "unofficial" science policy based on the professional scientific interests of members of the group. Governmental decision-makers did not become involved in the details of Antarctic science policy until the late 1970's. The reason for this late involvement lies in the nature of the past relationship between the Antarctic scientific community and Australian politicians. For three decades both groups shared a community of aims and interests. As soon as government interests diverged from scientific interests, science policy came increasingly under the control of the Australian political and bureaucratic establishment. Scientific interests were no longer allowed to be equated with "the public interest". Australian Antarctic science politics has now turned full circle to a situation where the opponents of government interests in Antarctica are excluded from participation in the political processes determining science policy and scientists also have less to say about what sort of research is acceptable.

A number of points about existing science advisory procedures and operations can be made as a result of this study. First, a review of ASAC's effectiveness as a science policy making body needs to be undertaken. ASAC's base of representation needs to be broadened to include specialized policy experts rather than only scientists and academics. If the government is seriously committed
to environmental management within the Australian Antarctic Territory, representation to ASAC could be further democratized by including one or more representatives from leading Australian conservation groups.

Secondly, there is room for improvement to the procedures utilized to determine Antarctic research priority areas. It is obvious that the philosophy of accountability for Antarctic science currently holds precedence over the traditional autonomy enjoyed by past Australian Antarctic scientists. However, accountability seems to be directed to answer narrow political demands rather than wider public interests. Not only is there room for granting greater autonomy to scientists in the selection of research proposals, there is also a need for public interests to be involved in the determination of research priority areas. While representatives from environmental groups like Greenpeace Australia (N.S.W.), Ecofund Australia and the Australian Conservation Foundation did make submissions to the first forum conducted by ASAC in October 1986, they have had no further input into policy making to determine final priorities for Antarctic science.

A healthy Antarctic research program is one which avoids imbalance and inequity in the selection of research projects. Such an approach would eliminate the need for ASAC priority areas and questions like whether a project emanates from the social sciences or the "pure" sciences would be irrelevant. There is some evidence that changes are occurring in this area. For the first time, ASAC Grants Scheme research allocations for 1987-88 included a few social science projects in the administrative science
and legal studies areas. Perhaps it is time that ASAC changes its name to one which acknowledges that science is not the only legitimate activity in Antarctica. Australia's Antarctic program should be based on research which is relevant to the entire range of Antarctic interests. These interests are no longer confined to the pure sciences.

Finally, as the only representatives of the wider public involved in Antarctic issues, the environmental movement has a responsibility to become involved in fostering the growth of "public interest" Antarctic science which reflects community concerns. For example, Australian Antarctic scientists have undertaken little research on the effect of chlorofluorocarbons on Antarctic ozone levels, choosing to concentrate research on the "greenhouse" effect. Australia's proximity to Antarctica would seem to suggest that this is an area in which additional research could be done. Australian environmental groups have failed to initiate any sort of campaign which links the results of Australian Antarctic research to legislative and environmental controls on common pollutants.

All of the above points indicate that Australia's Antarctic research system needs to be opened up to the research interests of groups other than government and university scientists. Democratizing Antarctic science would contribute to the establishment of public interest science and research. It is time to destroy the myth that Antarctica belongs only to the scientist.
### APPENDIX 1. FEATURES OF THE ANTARCTIC SCIENTIFIC ELITE

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<thead>
<tr>
<th>NAME</th>
<th>ANCAR (Includes Sub-Comm.)</th>
<th>Antarctic Div./ANARE Employment</th>
<th>Member NG/G Review Committees</th>
<th>Submissions or Witnesses to NG/G Committees</th>
<th>ARPAC/ASAC Membership Grants</th>
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<td>*Witness to Senate Standing Committee on National Resources (SSCNR) 1983–85</td>
<td>*Member of ASAC 1985–</td>
<td>*ANCAR/ASAC</td>
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<td>*Submission to 1986 First ASAC Forum</td>
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<td>*ANCAR/CCAMLR Scientific Advisory Panel</td>
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<td>*Submission to 1986 First ASAC Forum</td>
<td>*ARPAC Approved Research Projects 1980–81, 81–82, 82–83, 83–84</td>
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<td>*Evidence to 1967 Australian Academy of Science Report. Scientific Research in the Antarctic (AAS.SRA)</td>
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<td>NAME</td>
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<td>B.P.LAMBERT</td>
<td>1959-1976</td>
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<td>*Submission to 1974 ACAP</td>
<td>*Evidence to 1967 AAS.SRA</td>
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<td>*Submission 1986 First ASAC Forum</td>
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<td>J.F.LOVERING</td>
<td>1976-1987</td>
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<td>*ANCAR/ASAC</td>
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<td>Assistant Director (Polar Medicine). Division Medical Officer since 1960s</td>
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<td>*Submission 1986 First ASAC Forum</td>
<td>*ARPAC Approved Research Project 1980-81</td>
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<td>H.R.PHILLPOT</td>
<td>1968-1987</td>
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<tr>
<td>J. RAYNER</td>
<td>1959-1975</td>
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<td>*Evidence to 1967 AAS.SRA</td>
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* denotes participation in significant activities related to Antarctic research and policy.
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* evidence of overlapping membership
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