



JOINT CENTRE
FOR
ENVIRONMENTAL SCIENCES

UNIVERSITY OF CANTERBURY AND LINCOLN COLLEGE
NEW ZEALAND



Preservation and Recreation

W. H. Barker
A. J. Brown

Joint Centre for Environmental Sciences
Occasional Paper No. 9
October 1979

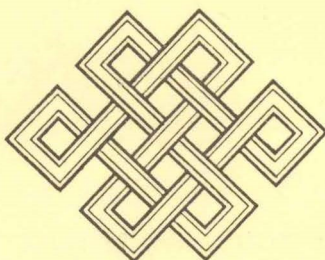
THE JOINT CENTRE FOR ENVIRONMENTAL SCIENCES

The Joint Centre for Environmental Sciences, established in 1973 by the University of Canterbury and Lincoln College, maintains a working base at each institution. The Joint Centre has two main aims: to provide training programmes oriented towards resource management and research; and to promote applied research of an interdisciplinary nature in environmental sciences.

Reports published by the Joint Centre for Environmental Sciences as Occasional Papers are listed on the inside of the back cover. While they remain available, copies of these publications may be obtained on request from:

The Director,
Joint Centre for Environmental Sciences,
at the University of Canterbury,
Christchurch 1,
New Zealand.

The design below, which has been adopted as the colophon for this series of publications, is the ancient symbol of the "endless knot" showing the interconnection of all things in an evolving but eternally self-regulating universe.



PRESERVATION AND RECREATION

A paper prepared for the New Zealand
Land Use Advisory Council

FOR INTERNAL USE ONLY
NOT TO BE REPRODUCED FROM THE LIBRARY

Occasional Paper No. 9

October 1979

Joint Centre for Environmental Sciences
University of Canterbury and Lincoln College
in association with
Davie Lovell-Smith & Partners

ACKNOWLEDGEMENTS

A number of people have contributed a considerable amount of time, effort, advice, ideas and criticism in the preparation of this report. They are too numerous to mention individually by name but their assistance is greatly appreciated. In particular we acknowledge assistance from the following government departments, agencies and organisations:

Commission for the Environment

Department of Lands and Survey

Federated Mountain Clubs

New Zealand Forest Service

Reserves and Recreation Planners

Sport and Recreation Consultants Ltd.

Tussock Grasslands and Mountain Lands Institute

SATIS

1.	INTRODUCTION	1
	Purpose and structure of paper	
2.	PRESERVATION	3
	Definitions: Preservation Conservation Depletion	
3.	WHY PRESERVE?	4
4.	WHAT KINDS OF RESOURCES SHOULD BE PRESERVED AND HOW CAN PRESERVATION BE ACHIEVED?	6
5.	EXISTING PROVISION AND MANAGEMENT	9
6.	DIFFICULTIES IN ACHIEVING PRESERVATION AND EFFECTS OF PRESERVATION	16
7.	FINDINGS	16
8.	RECREATION	18
	Definitions	
9.	RECREATION NEEDS	19
10.	RECREATION DEMANDS	20
	Most popular activities	23
11.	RECREATIONAL RESOURCES AND CAPABILITY	28
12.	IMPACT	34
13.	RECREATION PLANNING	36
	Carrying capacity	37
	Resource management concepts	38
	Zoning	39
	Coordination	39
14.	FINDINGS	40

PRESERVATION AND RECREATION

1. INTRODUCTION

Purpose and structure of paper

- 1.1 This is the second of four background papers designed to explore priority land use issues in the rural sector. This paper is concerned with preservation and recreation and is divided into two parts: the first deals with preservation: what is meant by preservation; why it is necessary to preserve; what kinds of resources need preserving; where these resources are, how preservation can be achieved and the effects of preservation. The second part of the paper deals with recreation: what is recreation; why it is necessary; what kinds of resources are required; how provision is and can be achieved and the effects of recreation.
- 1.2 It is important to note that land does not have to be "preserved" to provide for most forms of recreational activity, and recreation is only one of the reasons for preserving areas; some recreational activities conflict with preservation, and others are amongst the few types of activity which are compatible with preservation.
- 1.3 The demands on resources and the conflicts between competing uses for them have intensified in New Zealand with increasing urbanisation, rising living standards and growing expectations and aspirations. The resolution of conflicting land uses has become increasingly difficult and has resulted in a mass of legislation and numerous types of land use controls, all of which impose constraints on the use of land in the "public interest". Decisions to use land for preservation and/or recreational purposes are difficult where other uses of the same piece of land may lead to economic gains, albeit often short-term ones. How does one evaluate a scenic view against cutting down a productive forest, or a wilderness area or an endangered species against hydro-electric power generation or mineral exploitation?
- 1.4 Decisions about the best use of resources in New Zealand have frequently been made on the basis of short-term economic gains ... without a clear understanding of the environmental implications of such decisions. The environmental impact of fires and hunting

during Maori settlement in New Zealand was considerable, and since European settlement there have been even more dramatic environmental changes. The original forest, which covered approximately two-thirds of the land area, has been reduced to less than a quarter of the land area. Lowland forests now cover only one-fifth of their original area. Extensive native grasslands have been burnt for sheep grazing and ploughed for arable farming; wetlands have been drained, minerals exploited, lake levels raised and wildlife habitats disturbed. The biggest threat of all to the survival of indigenous flora and fauna is not the growth of population alone but the dramatic increase in use of natural resources per capita.

- 1.5 Over the past two decades in New Zealand there has been increasing recognition of the need to "conserve", and in some cases to "preserve" our natural resources. This is to ensure sustained use of the basic resources on which our economy depends, to make certain that they remain available in perpetuity. There is growing recognition that uncontrolled economic development without reference to natural ecological systems often results in severe, and in some cases irreversible damage to the environment, thereby harming or depleting the very resources on which the nation depends.
- 1.6 Decisions have to be made about the balance to be struck between use of resources and the preservation of those resources. In order to make such decisions it is essential to understand:
 - (a) the characteristics of the resource - its location, distribution, habitat requirements, quantity, quality, life cycle, structure, functioning, dynamics, accessibility, existing use(s), potential for specific or multiple uses, replaceability, vulnerability, rarity, distinctiveness.
 - (b) the demands on the resource - the types of activity, competition and compatibility between uses, scale, nature, extent, intensity, frequency, duration of use; nature and degree of modification by man.

2. PRESERVATION

DEFINITIONS

- 2.1 The concepts of preservation, conservation, exploitation, and depletion are amongst the most confused and misunderstood in our language today, and they are defined and used in many different ways by scientific and popular writers. This paper adopts definitions for these concepts which clarify their meanings in relation to resource use, non-use, or modification.

PRESERVATION

- 2.2 Preservation, for the purposes of this paper, is considered to be one end of a spectrum ranging from preservation through conservation to depletion. Preservation means the maintenance of the state of things (existing or original) including quantity, quality and variety. Preservation may therefore require cessation of use by man in some areas and interference by man in other areas to arrest natural processes. In either case preservation may involve time, money and foregone opportunities. A resource to be preserved may also be used where such use does not involve depletion, but only "to a degree" which is compatible with its preservation (e.g. low intensity recreation use in a wilderness area of a National Park).

CONSERVATION

- 2.3 Conservation is a much broader concept than preservation, implying "wise" or "rational" use of resources in accordance with natural processes and biological systems in order to retain the characteristics of the resource, and to ensure continuation of that resource in perpetuity. Resources may be used and modified providing that the quality is not being irreversibly damaged and the total quantity of the resource is not being utilised at a rate faster than it is being replenished. This definition differs from popular usage of the verb "to conserve" which is "to deplete slowly", e.g. to conserve petrol in common usage means to deplete it more slowly than previously.

DEPLETION

- 2.4 At the other end of the resource utilisation spectrum is depletion of a resource or use at a rate faster than the resource can be renewed. Depletion may sometimes be regarded as an economic necessity, but it is not compatible with preservation (do not

modify at all) or conservation (use or modify, but no faster than the rate at which the resource can be renewed).

- 2.5 The commonly accepted meaning of the term "exploitation" is wasteful or destructive utilisation, or simply "over" use. However some dictionaries define it as any use at all. It is therefore a rather imprecise term and could be applied equally to conservation or depletion. The term over-exploitation is more precise when the meaning to be conveyed is depletion.
- 2.6 In practice some resources cannot be both used and conserved because their rate of renewal is very slow (e.g. fossil fuels) and normal use must involve depletion. In many cases preservation may be the ideal "environmental" solution but cannot be implemented because of political or economic reasons. For example: complete cessation of timber extraction from indigenous forests might be the best solution to depletion or erosion, but it could have serious economic consequences directly affecting employment and incomes in a locality, and possibly the national balance of payments. Man can certainly ensure that the rate of use is reduced by avoiding waste, recycling, reducing demand, improving products, and developing substitutes with much higher renewal rates. These measures are popularly described as "conservation" measures, but if the rate of use of a resource exceeds its renewal rate the resource is clearly being depleted and not conserved in terms of the above definitions.
- 2.7 The total adoption of either preservation or depletion would be both impossible and impractical. The real issue involves the balance to be struck between use now and preservation of resources in order to keep options open for the future. In other words, what is needed is a clear understanding of how much preservation is necessary, how much conservation is possible and how much depletion is tolerable.

3. WHY PRESERVE?

- 3.1 The main purpose of preservation is to ensure the retention of a resource in perpetuity, in terms of quantity and quality. The main goal of preservation in national planning should be to maintain the greatest variety or diversity of environments and species.

According to Serventy (1973), the quality of human life depends on the quality of the environment in terms of diversity. This applies equally to natural and cultural areas and implies that representative examples of significant ecosystem types and natural and cultural landscapes should be preserved. A number of other purposes may be distinguished:

- (a) For scientific and educative purposes, in order to understand and explain natural processes.
- (b) To maintain genetic diversity and indigenous gene pools.
- (c) To act as baselines for measuring and monitoring changes in man-modified systems.
- (d) To preserve species of potential future use to man for breeding new crops, for pest control, for providing new chemicals and drugs etc.
- (e) To illustrate past events of historic or cultural importance.
- (f) To act as indicators for management decisions.
- (g) For recreational and aesthetic purposes.

3.2 Resources have a number of different values for man - for direct exploitation (e.g. minerals), or production (e.g. agricultural land); for soil and water conservation; for scenic and recreational purposes, and for their own intrinsic scientific, cultural or historic interest. Whatever use man decides to make of a resource has an environmental implication for that resource and all others which depend on it or interact with it in some way. All ecosystems are constantly changing without man's intervention but the rate of natural change is generally extremely slow. Once man interferes rates of change alter, often dramatically, and sometimes irreversible changes occur. In New Zealand, native forests (particularly lowland forests) which supported a rich diversity of indigenous fauna and flora have been substantially replaced by ecosystems supporting few species, many of them introduced. Such a decrease in species diversity leads to a decreasing complexity in ecosystems and to instability. Vida (1978) estimates that replacement of a natural forest ecosystem by modern agriculture reduces diversity by at least three times.

3.3 Though many of the consequences of man's intervention are obvious, e.g. soil erosion, air and water pollution, etc., others may not yet be recognised and solutions to many acknowledged ecological problems are still being sought. Some species have most probably become extinct without our knowledge and the role that they play in an ecosystem is lost. In order to understand how an ecosystem functions without man's interference, and to measure the effect of man-induced changes, it is necessary to have a baseline against which to measure change. Many species can, of course be preserved in zoos or laboratories, but, in order to understand the dynamics of a natural ecosystem, how it has evolved, how the species of which it is composed feed and reproduce, and how the ecosystem is naturally regulated etc., it is necessary to study a species in the environment in which it has evolved and to which it is adapted.

4. WHAT KINDS OF RESOURCES SHOULD BE PRESERVED AND HOW CAN PRESERVATION BE ACHIEVED?

- 4.1 The list of reasons for preservation raises a number of questions: What is representative? What is significant? How much of each type do we need? Why do some resources have to be "preserved" to retain them? We are still unable to answer some of these questions adequately; they depend on national goals and values as well as the characteristics of the resources themselves. Each question "enters the realms of economics, aesthetics, scientific fact and opinion and emotionalism"¹ to a greater or lesser extent.
- 4.2 An essential start to answering some of these questions is to have a detailed inventory and classification of indigenous and introduced flora and fauna, and their habitats, together with features of scenic, landscape, historic or cultural significance. The inherent characteristics of each resource needs to be described, including, where relevant, its habitat requirements, structure, functioning and dynamics; its current and past uses; nature and degree of modification by man; and rare or endangered species need to be identified. Although a considerable amount of research has already been undertaken towards making such an inventory and classification of resources we still have little or inadequate knowledge about many of these features and processes and much more research is needed.

1. *New Zealand Forest Service, 1974 Role of the indigenous forests in the preservation of natural ecosystems for scientific purposes. Forestry Development Conference 19-21 November, 1974, Wellington.*

4.3 In addition to these resource data requirements further assessments need to be made of resource use capability, population demands and needs, and alternative means of meeting these needs, and an assessment of competition, complementarity and compatibility between uses. (O'Connor, 1972.)

4.4 Without the foregoing information it is not possible to say with reasonable certainty what extent of preservation is required. It is possible, however, to identify some criteria which may be used to assess whether preservation is necessary:

(a) Is the resource endangered?

If the population of a resource is so critically small that there is a strong possibility of loss of a species through a natural disaster, man's influence, or insufficient genetic diversity to maintain breeding levels, preservation may be necessary.

(b) Is the resource vulnerable?

If the resource is likely to be endangered through its inherent instability and low resistance to man's interference and/or because of its location, accessibility and the demands placed upon it, preservation may be necessary.

(c) Is the resource rare?

A resource may be of international, national or regional importance, depending on how rare it is, and may need to be preserved for its own scientific or educative value.

(d) Is the resource representative of a significant environment or major ecosystem type?

A basic principle of preservation is to establish a representative range of all types of habitat, with variations in altitude, soil type, floristic composition etc., in order to cover as wide a range as possible of the important ecosystem types and to allow extrapolation of research findings through a large area. Many of these environments and species do not need to be "preserved" to survive, but conservation is essential and preservation may be necessary depending on a - c above.

(e) Is the resource of a high quality or significance?

If the resource has a special significance for natural history, recreation, cultural values, scenic values etc. it may need to be preserved in order to retain it in its existing state. The values of beauty, tranquility, remoteness etc., are very easily destroyed and may necessitate fairly tight restrictions on access and development to preserve the very resources which attract man in the first place.

- 4.5 It is also possible to identify certain well-established principles which ensure that areas are preserved more effectively. These relate to the size and shape of reserves, and to management techniques such as zoning.
- 4.6 The size of a reserve needs to be related to the ecological requirements, genetic variability and mobility of the species to be protected. Generally the larger the area the greater the diversity of habitats and therefore species, although size is likely to be more of a limiting factor for fauna rather than flora, and small reserves may be perfectly satisfactory for the preservation of unique features.
- 4.7 A reserve with a compact shape is generally preferred. As Helliwell (1976) points out: "Patterns which combine a minimum of fragmentation with extensive regional coverage are likely to be preferred to more fragmented patterns involving the same total area of land".
- 4.8 A careful system of zoning can permit development, conservation and preservation to operate alongside one another with a minimum of conflict. Ideally a reserve should contain a fully protected core area which is concerned primarily with the preservation of ecosystems in their natural state. This core area may contain ecosystems representative of major biomes, unique areas or areas with special interest. Surrounding the core area should be a buffer zone, which is close to natural, but may contain land uses which do not conflict greatly with preservation of the core area.

5. EXISTING PROVISION AND MANAGEMENT

5.1 Despite the lack of inventories, resource use assessments and recognised selection criteria, various types of preservation and conservation provisions have already been made in New Zealand. This has been possible partly because demand for alternative uses of resources has been low in the past and also because individual New Zealanders had the foresight to set aside areas of land from productive use. However, there are many examples where preservation probably should have occurred, but resource use decisions were dominated by the prospect of economic gains (usually short term).

5.2 Areas are reserved in National Parks, scenic, historic and allied reserves, maritime parks, domains, private reserves, wildlife refuges, state forests etc. The main pieces of legislation governing these areas are outlined in Appendix I. It is beyond the scope of this paper to make a detailed assessment of the quantity, representativeness and quality of existing reserved areas and management practices, but such an assessment should be made. In this paper only the main reserved areas are outlined. The degree of control over access and development varies between each category of reserve, and within different zones of one category depending on the characteristics of the resource and the nature of the competing and/or conflicting demands placed on it. In some cases where there is a particularly vulnerable or scarce resource, or a rare or endangered species, strict preservation is necessary. In other areas multiple use is appropriate without fear of diminishing the resource, but the scale, nature, duration, intensity and frequency of use(s) must be compatible with the conservation of the resource.

5.3 The largest total area of reserved land in New Zealand is in its ten National Parks (covering nearly 8%, 2.15 M ha, of the land area). The 1952 National Parks Act states that parks "shall be preserved as far as possible in their natural state" and that native flora and fauna should be preserved and introduced fauna and flora exterminated, as far as this is possible. The Parks' value as soil, water and forest conservation areas should be maintained. (Act 3(2)).

now 13
N.P.s
(1991)

- 5.4 The main purpose of designating these parks is to preserve them in perpetuity and, so far as the principle of preservation allows, to permit the fullest proper use and enjoyment of them by the public.¹ The "proper" use of the Parks is described as "quiet enjoyment, inspiration and other benefits that come from remoteness, wilderness and silence of parks and from beautiful or unique natural features within them".¹ The potential conflict between "use" and "preservation" is apparently resolved by ensuring that the carrying capacity of the park is not exceeded. The level of use the park can sustain without deterioration is assessed in biological, physical and psychological terms.²
- 5.5 In practice absolute preservation is extremely difficult to achieve - the developments which permit public use and enjoyment inevitably involve some disturbance to the natural scene - roads, accommodation, installation of power and water supplies, ski areas etc., all act as a threat to "preservation". In addition parks can be subject to prospecting and mining, although only with the consent of the Minister of Lands.
- 5.6 The 1952 National Parks Act provides for boards to grant easements over park land (with the prior consent of the National Parks Authority and on such conditions as the Authority requires) for a variety of purposes including access, water, power use, transmission and power lines, water rights and pipe lines.
- 5.7 Within National Parks, areas are classified into Special Areas, where preservation of indigenous plant or animal life is of paramount importance and access is restricted to ensure the minimum of human interference. Wilderness areas are zoned where the predominant character is the result of the interplay of purely natural processes. These areas are large enough and so situated as to be unaffected, except in minor ways, by the activities taking place in the non-wilderness area around it. Access to and within a wilderness

1. *Department of Lands and Survey 1978 National Parks Authority General Policy National Parks Series No. 9.*

2. *The physical carrying capacity is the number of people and activities which can be accommodated in the park without harm. The biological carrying capacity is determined by the effect of visitors' activities on flora and fauna - if these are detrimentally affected the biological carrying capacity is exceeded. The psychological carrying capacity is exceeded when the number of people interfere with perception, appreciation, and enjoyment of the park. Dept. of Lands and Survey, 1987 National Parks Authority General Policy. National Parks Series No. 9.*

area is by foot only. Natural Environment Areas are areas maintained predominantly in their natural state, but where tracks, foot-bridges and outlying huts may be provided for use and enjoyment and for public safety. Facilities areas are areas where park users are provided for but with the least possible human interference to the natural environment.

- 5.8 New Zealand National Parks were originally designated because of their uniqueness and their outstanding natural beauty, and not in order to protect representative ecosystems. The aim of Reserves policy, on the other hand, is the establishment of a New Zealand wide reserves system to preserve a representative range of natural and historic features, and to provide a range of recreational opportunities to meet the needs of all New Zealanders. (Coad, 1975.)
- 5.9 There are over 1000 scenic reserves allocated under the Reserves Act, 1977 (see Appendix I) of local, regional, or national significance, covering a total of nearly 300,000 ha, set aside to preserve special areas of scenic interest, including native forest, thermal areas, sea coasts, waterfalls, lakes, rivers, caves etc. There are less than 100 historic reserves covering 1,735 ha marking the sites of significant events in the past, including sites of Maori rock drawings and marking the landing places of the early explorers. There are 82 reserves for the preservation of flora and fauna totalling 190,830 ha, with access by permit only being the general rule to ensure a minimum of human disturbance. In addition to reserves on Crown land there are private reserves which remain in private ownership but receive the protection of the Reserves Act. There are three Maritime Parks - Hauraki Gulf, Marlborough Sounds and Bay of Islands, composed of a variety of former sea-shore and island reserves, previously designated for a variety of purposes and which were amalgamated under a central administration so that they could be comprehensively managed. There are also 860 public domains covering 22,774 ha designed primarily for districts to provide for the organised recreational needs of the people as a whole.

- 5.10 The Wildlife Act of 1953 provides for the constitution of refuges described primarily as habitat areas for wildlife, with a maximum degree of protection afforded. In addition there are wildlife sanctuaries where access is restricted with prohibitions on killing or disturbing wildlife. A review of coastal land, lake shores and river margins is being undertaken by Lands and Survey to identify areas which should be brought into public ownership or otherwise protected from unnecessary or undesirable development. This survey is identifying areas suitable for scenic, scientific or historic purposes as well as areas for recreation purposes.
- 5.11 Part of UNESCO's Man and the Biosphere (MAB) Programme, Project No. 8 is the development of a global network of "biosphere reserves" intended to combine ecological preservation of representative ecosystems, with research into the functioning of such systems. Emphasis is placed on the use of natural areas, with the inclusion of man-modified ecosystems for comparative purposes, including scenically insignificant and eroded or degraded areas. Emphasis is also placed on whole ecosystems, rather than individual species, and reserves are selected on the basis of their representativeness rather than their uniqueness in order:
- (a) to provide conservation and research sites covering as broad a range as possible of biotic diversity.
 - (b) to allow extrapolation of research findings throughout a large area (di Castri and Loope, 1977).
- 5.12 New Zealand is actively involved in UNESCO's MAB programme and potential biosphere reserves are currently being investigated. These may partly coincide with, or incorporate parts of existing reserved areas in New Zealand, with the addition of man-modified areas for comparative purposes.
- 5.13 State Forests, unlike National Parks are operated under a multiple-use management plan, with a three-fold purpose - for production, protection, and recreation. Any one of these may be predominant in a particular zone within the forest, although soil and water conservation measures take precedence over all other uses in any forest where this is considered to be necessary. Other uses may be permitted within each zone providing these do not conflict with

the predominant use. (see Table 1) The New Zealand Forest Service (NZFS) has administrative responsibility for 4.1 M ha of public land, and 0.39 M ha of exotic forest, predominantly in the North Island. The protection of indigenous forest is essential to the retention of many types of fauna and flora. Where exotic forests are planted alongside indigenous forests (e.g. in Westland), studies indicate that in exotic forests only 55% of the number of litter fauna species returns within 25 years, and in 50 years, the percentage recruitment rises to only around 57%. The indigenous forest fauna has been conservatively estimated to contain around 6000 species of insects and spiders whilst less than 5% have adapted to agricultural and urban environments.¹

5.14 Where protection is the predominant use of a forest this may be for the maintenance of soil stability, for the conservation of water, for the protection of indigenous flora and fauna, or for the protection of cultural features of historic, archaeological or educational interest. Where the preservation of flora or fauna is the prime concern, areas may be zoned as Forest Sanctuaries or ecological reserves.

5.15 Ecological reserves are currently being designated in State Forests in order to preserve unique and representative examples of flora and fauna. The Scientific Coordinating Committee of the NZFS has produced a set of guidelines for the ideal reserve, recommending that each area should:

- (a) Represent the full range of land forms, vegetation and soil sequences, and animal communities of the region.
- (b) Be large - a minimum of 1000 ha, though small reserves can be created to preserve unique features or special values.
- (c) Include at least one complete undisturbed catchment of a permanent waterway.
- (d) Have a compact shape.
- (e) If possible have boundaries clearly defined by natural features.
- (f) Be unroaded, at least within the main catchment.²

1. *New Zealand Forest Service 1974 Role of the indigenous forests in the preservation of natural ecosystems for scientific purposes: an entomologist's point of view. Forestry Development Conference 19-21 November 1974*

2. *New Zealand Forest Service press release.*

TABLE 1 : Zoning of State Forest Land

<u>Zone Class</u>	<u>Category</u>	<u>Zone</u>
Protection	(Soil and Water	Steepland Protection
	(	Water Supply
	(	Lowland Protection
	(	Rehabilitation
	(	Research
	(Flora and Fauna	Forest Sanctuary
	(	Ecological
	(	Historical
	(Cultural	Archaeological
Production	(Indigenous Production	Long Term Indigenous Management
	(	Indigenous Utilisation
	(Exotic Production	Exotic Management
	(	Production Research
	(	Mining
	(Special Purpose	Agriculture
	(	Specific Use
Recreation	(Extensive	Wilderness
	(	Remote Experience
	(	Natural Environment
	(	Amenity
	(Intensive	Recreational Hunting
		Recreational Development
Unclassified		

Source: New Zealand Forest Service 1978 Revised Zoning and Classification of State Forest Land. Forest Management Information No. 2 August 1978.

ADEQUACY OF EXISTING PROVISION

- 5.16 The foregoing reserved areas must be assessed in detail to ensure that they adequately represent all significant environments and features. Many areas immediately appear to be inadequately represented - particularly lowland forests, wetlands, historic sites and cultivated landscapes. There are no doubt many more.
- 5.17 In view of the accelerating rate of change to natural areas following man's intervention it is essential that adequate protection is given to significant areas currently not (or inadequately) reserved before these areas are irreversibly altered. In many areas it may already be too late and areas of great significance to the natural and cultural heritage of New Zealand may already have been lost. Especially important is the preservation of remaining areas of lowland forest which are vital to the preservation of certain types of flora and fauna. The imbalance between the amount of lowland and upland forest currently preserved may well explain the high percentage of New Zealand bird species which are on the International Union for Conservation of Nature and Natural Resources (IUCN) endangered list.
- 5.18 Until inventories and assessments are available to identify features requiring preservation, existing legislation and procedures must be utilised as fully as possible. Environmental impact assessments should be required for all significant modifications to environments and resources to identify features which require preservation or conservation.
- 5.19 Management procedures should also be rationalised, coordinated and integrated between the various administering authorities. A consideration of the purposes for which an area is reserved, of the ecological characteristics of the species within it and the demands placed on it permits realistic management policies to be developed towards achieving the goals of preservation or conservation. Management plans and techniques have traditionally been oriented to 'depletion' of resources, with 'conservation' objectives ignored, paid lip service only, or only recently given serious weight. A need is seen for 'preservation' objectives in management planning, to a greater degree than at present.

5.20 It would seem to be desirable for a multi-disciplinary team to be established to:

- (a) ensure that significant natural and cultural areas are adequately represented.
- (b) coordinate scientific research in natural and man-modified systems.

6. DIFFICULTIES IN ACHIEVING PRESERVATION AND EFFECTS OF PRESERVATION

- 6.1 Although there are sound reasons for preservation there are a number of pressures and conflicts which make preservation very difficult to achieve. There are persuasive economic arguments against preservation - resources may "need" to be exploited to ease the balance of payments deficit, to raise standards of living, to provide employment and incomes, or to provide recreational opportunities. These are all "opportunity costs" which have to be taken into account when opting for preservation of a resource which may exclude such activities. Preservation may often be more "expensive" (in net monetary terms) than other alternative uses and this factor has to be considered.
- 6.2 There are other major agents of change and instability which make preservation difficult, if not impossible. These include natural changes, such as volcanic eruptions, earthquakes, climatic changes, and natural fires and disease. These agents of change and instability generally have to be accepted as natural ones and cannot be avoided. Man-induced changes can be controlled and these include fire, hunting, grazing, the introduction of noxious animals and plants, mineral extraction, road building, recreation developments, urban expansion, forestry, hydro-electric power generation etc.
- 6.3 Preservation only minimises man's influence. In any 'preserved' area natural ecological succession will proceed to the climax state, at which time the rate of change slows down by orders of magnitude. It may often be debateable whether the system that is being preserved is desired for its present state, or for its ultimate state, or indeed for its system characteristics. Maintenance of an intermediate successional state may require human interference.

7. FINDINGS

7.1 The findings for this "Preservation" section of the paper suggest that strict preservation, in terms of the definition adopted is difficult to achieve. Any form of preservation will involve time, cost and foregone opportunities. The value of preservation, although not possible to cost in dollar terms, will of necessity often be related to opportunity costs. It is therefore important that the value of preservation is firstly impressed upon all members of the public who will be paying for it and secondly is not compared with the short-term value of developments threatening preservation.

7.2 Preservation of a full-range of significant and representative natural and cultural features in New Zealand is highly desirable. In order to achieve this several steps are necessary:

- (i) A comprehensive inventory of resources needs to be made (fauna, flora, historic and cultural features).
- (ii) Resources need to be classified according to their significance, based on various criteria (uniqueness, representativeness, vulnerability etc.).
- (iii) An assessment needs to be made of the adequacy and representativeness of existing reserved areas.
- (iv) New reserves should be designated where a feature or environment is inadequately represented.
- (v) Existing management policies should be evaluated and policies coordinated between administering bodies (e.g. common system of zoning irrespective of ownership, tenure etc.).
- (vi) Research into natural and man-modified systems should be coordinated.
- (vii) Research into methods of achieving preservation at lower costs (e.g. tourism, some new uses of historic buildings compatible with preservation, honeydew production from beech forests).

8. RECREATION

DEFINITIONS

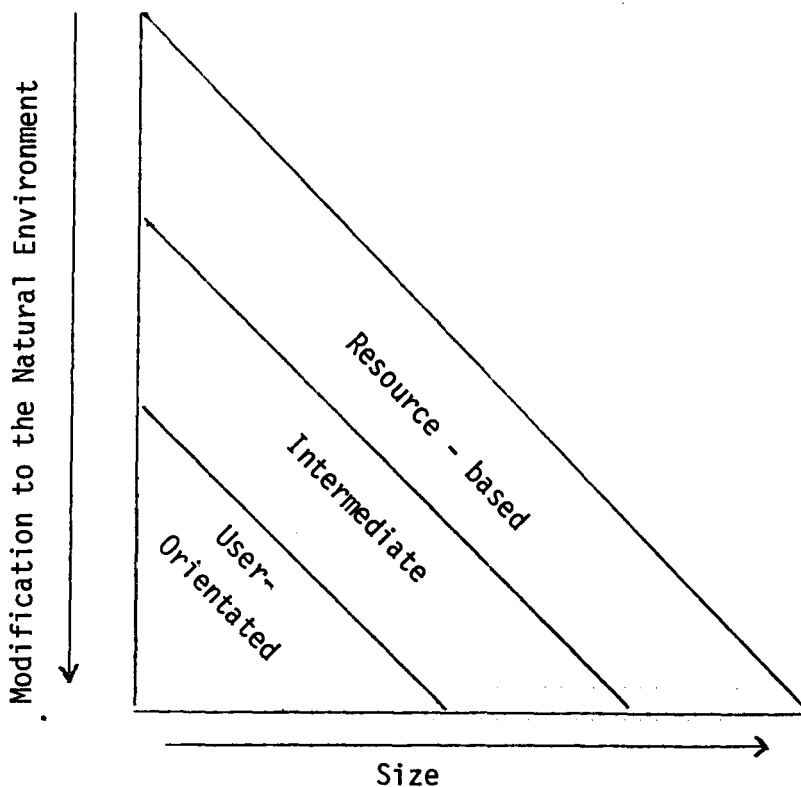
8.1 The 1973 Recreation and Sport Act defines recreation as:

"any leisure activity or pastime including those which provide relaxation and enjoyment and which promote the total well-being of individuals."

This paper is confined to outdoor recreation outside the urban area, including both active and passive recreational activities, and including tourism as a form of recreation. "Active" recreation involves a greater amount of physical exertion than "passive" recreation (e.g. skiing compared to driving for pleasure).

8.2 Distinction is also made between "resource based", "intermediate" and "user oriented" recreation, first distinguished by Clawson and Held in 1968. (see Figure 1.)

Figure 1 : Recreation classes in terms of size and modification to the natural environment



Source: Gresham and Goodrich 1977. Outdoor Recreation Research in New Zealand, what are we doing, where are we going? In *Outdoor Recreation Planning Symposium Proceedings* 24 - 26 August 1977.

- 8.3 Resource-based activities are those forms of recreational activity dependent on natural resources, and generally involving a relatively small number of users, e.g. tramping, fishing, scenic viewing, etc. The quality of the resource (irrespective of its location and accessibility to the user) is the most important consideration. User-oriented activities depend much more on developed facilities, and the location of the facilities, and their accessibility to the user are generally much more important considerations than the quality of the natural environment. User-oriented activities generally take place in the urban area. Intermediate activities are generally non-urban but near to population centres, and fall somewhere between resource-based and user oriented activities, e.g. driving for pleasure, picnicking etc.

9. RECREATION NEEDS

- 9.1 Man has a number of basic human needs - physical, psychological, social and spiritual - which can be satisfied in a variety of different ways. There is general agreement that recreation is one way in which some of these fundamental needs can be satisfied, but there is little consensus as to whether recreation in itself is a fundamental human need, i.e. is recreation a means to an end, or an end in itself, or both? (Laidler, 1977)
- 9.2 There is general agreement that there are health and welfare benefits to be gained from recreational activities, but these are very difficult to measure because they are largely intangible and subjective. With a large and increasing urban population, recreational opportunities which provide a contrast to where people live and work is regarded by many as essential to man's psychological well-being. Recreation may demand new skills, provide challenge, adventure, risk and excitement - all aspects which may contribute to man's basic well-being.
- 9.3 We have no clear understanding of what fundamental needs of man are satisfied by recreational activities, nor in detail why some people engage in certain activities and some do not, and we know little about the substitutability of activities or locations. Dower (1973)

suggests that people engage in certain recreational activities: "not because they earn 2000 pounds a year, but ... because they need to fulfil themselves in some way." Similarly, Clawson and Knetsch (1966) suggest that: "In the modern complex world, where so many aspects of life are socially ordered, recreation is often a major opportunity for self-expression."

- 9.4 Mercer (1973) suggests that "felt" needs for recreation are very much "learned patterns". People perceive their needs by reference to family and peer groups and the media and learn behaviours which are necessary to satisfy these needs. Leisure needs vary enormously between individuals and between the same person at different stages of the life cycle. Awareness of recreational opportunities and how these can satisfy their felt needs is essential. Greater opportunities in childhood, education, personal wealth and time are all highly correlated with recreational participation. These all influence attitudes, values, tastes, motivations, and behaviour. The paradox is that those who arguably have a greater need for recreation may be least able to fulfil this need because of low income, low education, low car ownership, and low awareness of the availability of recreational opportunities and the way in which these may fulfil their basic human needs. People's perception of their ability to participate in a particular activity (in terms of income, mobility or personal characteristics) is probably more important than the reality. Existing surveys support this view: participation in some low cost activities (e.g. tramping) has been correlated with middle to high income groups and conversely many people with lower incomes participate in high cost activities (e.g. trail bike riding, motor-cross racing). Once again - this points to further research into people's perception of "need" and into people's priorities in expenditure.

10. RECREATION DEMANDS

- 10.1 Demand for a recreational activity is simply the number of people who wish to take part in that activity. Distinction is made between effective demand, or participation, and potential or latent demand, which derives from those people who wish to take part in a particular activity but who are unable to do so because they lack the means (money, mobility, awareness) or the facilities to do so.

Factors such as age, health, education, income, occupation and residence have a strong influence on the amount of time, money and desire to recreate.

- 10.2 Demand itself is very unpredictable: it depends on changing fashions, external influences such as fuel prices and regulations, and on the nature and location of supply. Provision of new facilities generates a new demand, which may previously have been unrecognised. Demand may also be influenced in other ways - through management and marketing policies, through new information, substitution of different activities, price mechanisms etc.
- 10.3 In the last three decades in New Zealand there has been a dramatic increase in participation in active and passive outdoor recreational pursuits, a trend apparent in all western societies. Generally those factors which are considered to be related to the increase in outdoor recreation include an expanding population and increasing urbanisation; increased leisure time (shorter working weeks, paid holidays, labour saving devices); rising real disposable incomes; greater mobility (rising car ownership, improved accessibility); educational changes and technological advancements. These factors vary in their relative importance in New Zealand compared to other Western Societies. In New Zealand there was a 60% increase in population between 1950 and 1976 (from 1.9 million to 3.1 million) and the percentage of population living in urban areas increased from 73% to 83% between 1951 and 1976.¹ More significant still was the five-fold increase in number of cars from 0.24 million in 1950 to 1.26 million in 1979 and from 1 car per 8 persons to 1 car per 2.5 persons over the same time period. There has been no reduction in the standard working week over the last 30 years - the 40 hour, 5 day week has been standard for most occupations since 1946, but there has been an increase in leisure time in the form of paid holidays. In 1974 an amendment to the Annual Holidays Act of 1944 raised the annual paid leave from 2 to 3 weeks. The amount of real disposable income available for spending increased by 31% from 1950 to 1979.²

1. *Urban population includes the 24 main urban areas together with all other centres of over 1000 population, at 23 March 1976. (Department of Statistics.)*

2. *The best indicator of the purchasing power of the average weekly wage is the nominal weekly wage rates index divided by the consumer price index. Using 1977 as a base year (1977 index = 1000) the index has risen from 775 in 1950 to 1019 in 1979. This index has fluctuated over the last 4 years with a peak of 1090 in 1975, and a low of 1009 in 1978.*

- 10.4 All these factors have been linked with an increase in total participation in outdoor recreation and in the variety of activities undertaken and recreational areas used. However, we really know little about the relative significance of each of the variables and the effect of other factors such as age, stage in life cycle, occupation etc. These personal characteristics whilst they appear to be necessary, do not appear to be sufficient reasons why people recreate - i.e. they are related but not causative. The Outdoor Recreation Resources Review Commission (ORRRC) Study Report on recreational patterns in the United States found that conventional socio-economic variables accounted for no more than 30% of the variation in outdoor recreational activity.
- 10.5 To what extent these trends will continue is difficult to forecast. New Zealand's population is now static or declining, car ownership and use may be significantly affected by the fuel crisis, and the current economic climate does not suggest any dramatic rise in real disposable incomes. Higher petrol prices, weekend sales bans, car-less days, and perhaps rationing in the future will almost certainly influence the location, frequency and number of recreation trips. The amount of discretionary time will also influence participation, as well as changes in work patterns, and the age at which certain changes take place in the life cycle (marriage, child-bearing, retirement etc). The full impact of the current economic and energy climate on outdoor recreational opportunities has yet to be assessed but it would appear that certain activities relatively close to home will see a significantly more rapid growth than more distant ones. Fuel costs and scarcity may also have some impact on energy consumptive recreational activities (e.g. jet boating, water skiing, 4-wheel drive activities), and also on resource-based activities which are mostly located at a distance from urban areas (e.g. skiing, surfing, wilderness tramping).

DEMAND SURVEYS

- 10.6 Demand surveys, in addition to providing quantitative information about desire to participate in particular activities, may also provide information about the social and economic factors which influence man's propensity to participate, the external factors which affect man's decision to participate, (weather, facilities etc.) and details

about the recreation activity itself. Recreation studies in New Zealand fall into three main categories (Garrett, 1977): national surveys (e.g. the New Zealand Recreation Survey), regional surveys (e.g. Marlborough Outdoor Recreation Plan) and studies of single recreational resources (e.g. Coromandel Forest Park Survey). A number of surveys have been undertaken in New Zealand, particularly in the last 4 years, to measure current use of existing resources. These surveys are very important for the formulation of management guidelines, but it is important to note that they cover only one aspect of demand, i.e. effective demand, or participation. Others have attempted to measure potential demand by asking questions about use preferences.

- 10.7 Two bibliographies published in New Zealand list all known recreation research up to 1977. The first, by Jorgensen, was published in 1974, and includes a review of all available literature on recreation up to 1974, and an outline and critique of recreational activity surveys of residents in the major urban areas. A further Bibliography was prepared by Neave in 1977, and research works were placed under a number of subject headings. Currently in preparation is a review of all studies of mountain land recreationists in New Zealand, by Aukerman and Davison, "measured against the criteria of needs, behaviour and wants and the place of mountain land recreation in New Zealand". Aukerman and Davison classify studies into general population studies (those which take a population as their base), and user studies (those which are concerned with existing users of a particular site or area).

MOST POPULAR ACTIVITIES

- 10.8 Aukerman and Davison have made a useful summary of the most popular activities in New Zealand derived from various surveys. (see Tables 2 and 3.) The New Zealand Recreation Survey (commissioned by the New Zealand Council for Recreation and Sport in 1974) attempted to measure all leisure time activities of New Zealanders. A number of studies have also been undertaken in urban areas of all leisure time pursuits, (e.g. Auckland Regional Authority, 1971 and Pannett, 1977). These studies vary greatly in their statistical base, the adequacy of the sample, the purpose of the survey and the degree of sophistication of their questionnaires, and this makes comparison between them

extremely difficult. However, very broad patterns can be distinguished. The most popular "all leisure activities" appear to be biased towards the less strenuous, less organised, casual, and close-to-home activities. (See Table 2.) The results of the New Zealand Recreation Survey place active outdoor pursuits third in popularity after "sports", and "home science and maintenance".

- 10.9 A clearer picture emerges from studies which have been confined to outdoor recreational activities (e.g. Marlborough Pilot Study, 1977, Neighbour, 1973). Two types of recreational activity groups are frequently distinguished, reflecting the degree of physical exertion expended - active and passive recreational activities. Table 3 clearly indicates the popularity of less strenuous, relatively passive pursuits in the outdoors. Picnics, driving for pleasure and visiting the beach are by far the most popular outdoor activities. These activities generally involve the use of a car and the journey is usually a very important part of the recreational experience. How far the driving for pleasure pattern will change with the current fuel crisis is difficult to predict, but the distance travelled and frequency of trips, as well as the levels of participation are all likely to change.
- 10.10 National Park and Forest Park visitor statistics indicate a substantial increase in number of visitors over the last five years. (See Tables 4 and 5.) Between 1972 and 1977 annual visits to National Parks as a whole increased by 21%, with a 50% increase in number of visitors to Tongariro, and Abel Tasman and an 82% increase in visitors to Egmont National Park. (Table 4) Information from the Zealand Forest Service (Garrett, 1977) indicates a 37% increase in tramping/climbing/skiing in one year (1974/5 - 1975/6). Nature walks increased by 23%, scenic drives by 27%, walks by 35%, and picnicking and camping by 73%. Overall, in the five years up to 1977 there was an annual increase of 20% in the recreational use of State Forests (Hodder, 1977). From Beamish (1977) it is possible to estimate a doubling of users on the Routeburn Track each year from 1968 to 1975, or a 714% increase overall from 604 trampers in 1968 to approximately 5000 in 1975/6.

TABLE 2

PARTICIPATION RATES IN SELECTED RECREATION ACTIVITIES
(NATIONAL, URBAN AND REGIONAL GENERAL POPULATION STUDIES)
ALL LEISURE-TIME ACTIVITIES**

STUDY AND DATE OF SURVEY	RANK	N.Z.R.S. (1)	AUCKLAND (2)	PALMERSTON (3) *	DUNEDIN (4)				
		1975	1971	NORTH 1969	1976				
		% of respondents	% of respondents	Rank	% of respondents				
Most popular activities	1	Reading	16.0	Listening to records	24.0	Driving	7.4	Gardening	50
	2	Gardening	15.1	Swimming	21.0	Music	9.0	Driving	33.3
	3	Sewing	9.7	Cards	15.0	Swim Surf	9.0	Hotel drinking	31.0
	4	Rugby Union	9.6	Fishing	13.0	Television	9.4	Movies	
	5	Knitting	9.4	Dressmaking	12.0	Rugby Union	10.2	Picnicking	29.0
	6	Swimming	8.2	Collection groups	11.5	Fishing	10.8	Walking	26.0
	7	Visit entertain	7.1	Maori dances and crafts	10.5	Boating, row yacht pleasure	10.9	Beach activities	
	8	Golf	6.8	Regular dances	8.5	Movie theatre	10.9	Knitting	18.0
	9	Fishing (sea)	6.3	Rugby, camping, table tennis etc.	7.5	Tramp, hunt, ski	11.1	Sewing	17.0
	10	Religion	6.1	Boating/sail/ Yacht	7.0	Walking	11.3	Art appreciation	16.0

* Preferences not actual participation.

SOURCE: Davison, J. Personal Communication

**Direct comparisons between surveys are not valid, just interesting

(1) Robb, M. and Howorth, H. 1977.

(2) Auckland Regional Authority 1971.

(3) Crawford, P. 1969.

(4) Pannett, P. 1977.

TABLE 3

PARTICIPATION RATES IN OUTDOOR RECREATION ACTIVITIES

STUDY AND DATE OF SURVEY	RANK	AUCKLAND (1) 1972	HAMILTON (2) * 1970	WELLINGTON (3) 1973	MARLBOROUGH (4) 1974	CHRISTCHURCH (5) 1973	% of respondents		
		% of respondents	% of respondents	'000s of participants					
Most popular Activities	1	Visiting the beach	84	Driving for pleasure	57	Picnic - beaches & reserves	20	Picnics	88
	2	Driving for leisure	77	Picnicking in countryside	53	Swimming	16	Driving for pleasure	83
	3	Picnics	72	Visiting Parks and Gardens	49	Driving pleasure	16	Visiting the beach	77
	4	Swimming	66	Fishing, boating, tramping, hiking, and hunting	47	Beach swimming	13	Sport spectator	59
	5	Sport (spec- tator.)	51	Sport: team games	46	Walking	13	Walking	57
	6	Walking	50		32	Swimming (pool)	12	Swimming	52
	7	Swimming (pool)	44		24	Fishing, sea.	12	Bach	50
	8	Bach	44		20	Attend Sport	11	Organised Sport	33
	9	Fishing (sea)	36		16	Picnicking - urban	8	Horse & dog racing	31
	10	Organised Sport	31		14	Visiting Play areas	8	Fishing Sea	20

* No percentages available.

SOURCE: Davison J. (T.G.M.L.I.) Personal
communication.

- (1) Auckland Regional
(2) Hamilton City Council 1971.
(3) Henderson, E., and Stagpoole, J., 1974.
(4) Department of Lands and Survey 1977.
(5) Neighbour, A.M., 1973.

TABLE 4: NATIONAL PARK VISITOR FIGURES

<u>PARK</u>	<u>TOTAL NATIONAL PARK VISITORS</u>					
	<u>1971/2</u>	<u>1972/3</u>	<u>1973/4</u>	<u>1974/5</u>	<u>1975/6</u>	<u>1976/7</u>
Urewera	124,384	108,857	109,604	107,663	126,538	129,865
Tongariro	373,000	484,000	395,000	470,000	516,000	558,000
Egmont	139,820	187,820	164,000	196,290	193,210	254,820
Abel Tasman	47,409	56,122	57,000	63,000	69,300	71,125*
Nelson Lakes	71,804	76,798	78,256	83,280	83,493	83,504
Westland	580,706	366,950	442,376	359,375	333,888	500,000*
Arthurs Pass	137,600	169,500	229,134	293,494	294,000	102,800
Mt. Cook	159,500	168,800	177,000	195,000	202,000	198,000
Aspiring	174,100	256,350	285,100	250,000	300,000	275,000*
Fiordland	340,939	355,000	390,500	429,550	472,500	425,250
T O T A L	2,149,262	2,230,197	2,327,970	2,447,652	2,590,929	2,598,364

* Estimates

SOURCE: Park Board Returns

NOTE: The authors do not know why some figures show such wide variation (e.g. Arthurs Pass, 1975/76 - 76/77). We suspect that there may be differences in what was counted. Because to be counted a visitor must come to the official attention of Park staff in some way, the above figures represent only a percentage of actual visitors. We feel that a level of confidence can be given to the figures as understating the situation, but that this confidence can be taken no further.

TABLE 5: STATE FOREST VISITOR FIGURES

<u>FOREST SERVICE CONSERVANCY</u>	<u>TOTAL FOREST SERVICE VISITORS</u>					
	<u>1971/2</u>	<u>1972/3</u>	<u>1973/4</u>	<u>1974/5</u>	<u>1975/6</u>	<u>1976/7</u>
Auckland	37,090	62,471	76,877	89,793	70,943	66,025
Rotorua	63,570	95,106	131,581	127,859	147,513	170,354
Wellington	19,447	21,882	21,912	14,521	17,405	13,899
Nelson	8,328	15,371	15,175	10,680	17,105	22,394
Hokitika	3,300	8,745	4,448	3,676	2,176	2,570
Christchurch	53,078	63,898	74,210	68,135	56,151	15,265*
Invercargill	6,729	11,220	19,761	40,760	72,881	72,745
T O T A L	191,532	278,693	343,964	355,424	384,174	363,252

* The greatly reduced visitor figures for Canterbury was due to the serious storm damage of that year which resulted in many forests being closed to the public.

SOURCE: New Zealand Forest Service

- 10.11 Intensity of recreational activity tends to be greatest near urban centres and to decline with distance from the urban area. The Hamilton Recreation Study (1971) found that almost three quarters of residents travel less than 50 miles on a half-day trip, and over three-quarters of one-day trippers travel less than 100 miles. Neighbour's (1973) study of Christchurch residents found that two-thirds preferred to remain within 80 miles of home, while a quarter remained within 25 miles of home.
- 10.12 As the preceding sections reflect, information available on such things as day visitors, overnight stayers, and resident/tourist use of facilities is fragmented, not interrelated, and notable more for gaps than for what is actually known. Similarly, studies of intensity, duration and frequency of activity, and of the possibility of substitutes are presently not available. Given the importance of tourism to our national economy, the lack of reliable information on the needs and desires of tourists is indicative of the urgency for such studies.

11. RECREATIONAL RESOURCES AND CAPABILITY

- 11.1 An essential part of recreational planning is to establish what recreational resources are available, their location, quality and accessibility. However, decisions made on the basis on demand or supply alone are inadequate. The interaction between the two determines if, how and where a person recreates. Recreational resources include all natural and man-made facilities, and the value of a resource depends on man's attitudes and aspirations, perception and awareness, motivations and technical skills for realising the opportunities.
- 11.2 An identification of the suitability of resources for recreational activity depends on:
- (i) the requirements of the user - social values, attitudes, tastes, preferences, motivations.
 - (ii) the characteristics of the resource - location, distribution, quantity, quality, vulnerability, flexibility, and distinctiveness.

- (iii) the existing management policies of owners, leaseholders, managers etc.
- (iv) external factors e.g. accessibility - not simply in terms of distance, but also in terms of (iii) and access costs, planning constraints, substitutability between recreation activity, contrast, etc.

11.3 New Zealand has a large proportion of land which is suitable for recreational purposes, only part of which is set aside in parks, reserves and forest parks, where recreation may be a dominant or secondary purpose. (See Tables 6 and 7.) A review of legislation governing these areas is included in Appendix I. Approximately 2.7 M ha is set aside in National Parks, Maritime Parks, and reserves, and a further 1.3 M ha in State Forest parks, recreation areas etc. managed according to multiple use principles with recreation sometimes a predominant use. This total of 4.0 M ha covers nearly 15% of the land surface, and Molloy (1974) estimates that there is a further 20% of the land area which is ideally suited for outdoor recreation consisting of State forest, unalienated Crown land and pastoral leasehold land.

11.4 An examination of the location, distribution, access and accessibility of this land is vitally important because its value to the recreationist depends on these factors. Apparent abundance of recreational resources often fails to satisfy demand because the location of the provision, its accessibility and the needs of the user are not met at the time or at the place where demand is expressed. The supply of recreational resources can be considered on three scales - national, regional and local and there is a need for coordination between the provision of recreational opportunities at the three levels. Local provision of indoor and outdoor recreational facilities is designed to satisfy the needs of everyday users (e.g. swimming pools, squash courts). Regional provision considers the needs of residents within a catchment for half-day, day and weekend trips, and national provision satisfies the needs of recreationists and tourists for holidays, and other recreation trips. Clearly the boundaries between the three levels are not rigid, and facilities which provide for local needs may also be used by tourists, and similarly national provision may be used by local residents for recreational trips.

11.5 Seven of the ten National Parks are located in the South Island, far from the main centres of population, and the three National Parks and one Maritime park in the North Island are under heavy user pressure. The South Island enjoys an area of National Park land fifteen times more per head of population than does the North Island (Locker, 1979). The need has been recognised to concentrate on regional provision of recreational interests. This level of provision has been neglected in the past with a concentration of provision at a national and local scale, resulting in heavy pressure on National Parks and State Forest Parks, to the detriment of the primary objectives of these areas. The main objective of regional provision is to provide facilities for urban dwellers who wish to spend some leisure time in natural or semi-natural surroundings close to home and to reduce pressure and potential over use or damage to more remote areas. Regional Parks have been established close to Wellington and Auckland to provide for a variety of activities and to conserve features of natural, cultural and historical interest. The Wellington Regional Planning Authority, following a survey of "Participation, Attitudes and Aspirations in Regional Recreation" in 1974, drew up a series of policy statements relating to Regional Park provision. The basic role of regional reserve provision in the Auckland area is the provision for outdoor recreational opportunities in natural areas of sufficient quality and scale to form attractive amenities of benefit to the whole region.

11.6 Pressures on National Parks are also reduced by Forest Park provision closer to urban centres. Emerging from the Forestry Development Conference in 1974 was a policy for management of New Zealand's indigenous state forests (Conway, 1977). Four important principles are embodied in this policy statement:

- (i) ... "The development of National Parks and State forest parks should be complementary, with pressures on national parks being relieved by strategically located forest parks and recreation areas within easier reach of growing urban populations.
- (ii) That further development for recreational purposes should embrace state forests generally (indigenous and exotic) in a manner which is complementary to that for scenic reserves, other Crown-owned indigenous forests and other indigenous forests under the control of local authorities,

TABLE 6

Number and Area of National Parks and Reserves
as at 31 March 1979

NATIONAL PARKS		SCENIC RESERVES		HISTORIC RESERVES		NATURE RESERVES		RECREATION RESERVES		SCIENTIFIC RESERVES	
Number	Area	Number	Area	Number	Area	Number	Area	Number	Area	Number	Area
	Hectares		Hectares		Hectares		Hectares		Hectares		Hectares
10	2 152 834	∅ 1008	322 114	109	1 984	71	179 101	1115	33 326	15	2 052

∅ Includes Wanganui River Reserves

The complex presently comprises 137 units in total.

Source: Department of Lands and Survey, Wellington

- (iii) That development of State forest parks and other areas of State forest should be guided by regional recreational plans reflecting the needs and desires of all sections of the public.
- (iv) That rights of entry to State indigenous forests should be as liberal as is consistent with public safety, the safety of the forest itself, and the protection of other forest values."

11.7 Recreational use of State forest land is now treated as a primary use in its own right and is not considered only when "not pre-judicial to forestry" as was the case prior to the 1976 Amendment to the Forests Act (NZFS, 1978). Almost one third of the 4.1 M ha of forested land in the New Zealand Forest Service is in State forest parks. There are 18 State forest parks, which are set apart under the Forests Act (1949) for public recreation and for the preservation of the forest cover for soil and water conservation. In addition there are some 0.1 M ha set aside as recreation areas and 1.36 M ha of open indigenous forests (see Table 7). State forests therefore constitute a considerable recreational resource in New Zealand.

11.8 Other recreational resources include reserves, the New Zealand Walkway system, farm parks, etc. In 1966 the Department of Lands and Survey began a study of the N.Z. coastline to identify existing areas which are accessible to the public and to identify areas where additional reserves, including recreational reserves are needed in the future, to provide alternatives to National Parks, as well as for the protection of features of natural or cultural interest. The policy of encouraging a range of recreational opportunities also embraces the development of a New Zealand Walkway system with the ultimate object of linking existing and new walking tracks to provide a North Cape to Bluff Walkway. Priority at present is concentrated on areas near the city. The Queen Elizabeth the Second Trust was established by Act of Parliament in 1977 to ensure that sufficient open space is provided throughout New Zealand.

12. IMPACT

12.1 There is a great variety of environmental impacts (social, physical and economic) from recreational activities which may be either beneficial or adverse. The benefits include the social and psychological benefits for the user which derive from participation in recreational activities and the economic benefits which accrue to the local community, the region and the country in terms of income and employment through spending by tourists and recreationists. Adverse impacts include the degradation of the environment which may result from too many people concentrated in one area - e.g. litter, pollution, trespass, damage to crops, soil and vegetation, erosion, and social disbenefits which may affect residents. Most outdoor recreational activities are highly seasonal, and pressures are limited in time as well as space.

12.1 Few studies have been undertaken in New Zealand into the impact of recreation and tourism, although a considerable amount of research has been undertaken overseas. Research ranges from quantitative assessments of the amount of money and employment generated by tourism and recreation to the local area, region and nation, to subjective analyses of the adverse impact of recreational activities on flora and fauna.

12.3 The purpose of measuring impacts is to predict future changes and to manage these changes, controlling undesirable effects and encouraging beneficial ones.

12.4 The literature on the impact of recreational activities in New Zealand can be divided into a number of categories:

(i) Environmental Impact Reports

These are prepared to assess the impact of particular proposals e.g. Hobson Bay Marine Park (Harrison, Grierson and Partners, 1973); Remarkables Ski Field (Sheppard, Frederick and Partners, 1974).

(ii) Studies quantifying the ecological and social impacts of specific recreational activities

These include a study of the impact of users on the Routeburn track (Beamish, 1977) and a study of the impact of off-road vehicle activities in the Wellington Region (Applied Geology Associates, 1977).

(iii) Studies leading to the formulation of management techniques and policies

These include both the above studies and other studies specifically designed to explore such concepts as recreational carrying capacity (e.g. Gresham, 1976). Zoning techniques and procedures are outlined by Federated Mountain Clubs (1979), the National Parks Authority (1978) and the New Zealand Forest Service (1978). Various other studies explore the concept of wilderness and wilderness management techniques such as minimum impact codes and carrying capacities (e.g. Molloy, 1976; Gresham, 1976).

(iv) Impact of other activities on recreation and conflicts between recreational activities

These include the impacts of e.g. roading, forestry, hydro-electric power development and mining. Examples include the conflicts between the New Zealand Forest Service West Coast and Southland Beech forest proposals, and conservation and recreation interests; between asbestos mining and preservation and recreation interests in the Red Hills area of South Westland, between maintaining the Heaphy Track for trampers and the construction of a road from Collingwood to Karamea; between different types of recreational activity, e.g. safari hunting operations in South Island pastoral runs and tramping interests, etc.

(v) General works on tourism and its social, economic and environmental effects

These include Henderson's study of the impacts of Skifield development on Methven (1976), work by Cant in Queenstown (1978), a current study of the economic impact of users on Westland National Park (Pearce, in preparation) and reports on the environmental consequences of tourism with case studies for Queenstown and the Bay of Islands (Department of Lands and Survey, 1978).

12.5 Whilst both ecologists and planners aim to attain a greater degree of objectivity and quantification in tourism and recreation impact, all ecological evaluations are based on a subjective assessment. There is often a failure to distinguish between aesthetic and ecological degradation, and the way in which a situation is perceived varies considerably between agencies involved. The Nature Conservation Council, the New Zealand Forest Service, the Lands and Survey Department, and conservation and recreation lobbies, (for example

Forest and Bird Protection Society, Native Forest Action Council, Federated Mountain Clubs), all have different viewpoints and interests and their perceptions of problems reflect this. Use of a footpath or track may cause ecological changes in terms of the percentage vegetation cover, species composition etc., but the extent to which it is perceived to be a problem depends on the viewpoint, i.e.

- a) whether ecological change is thought to be significant.
- b) whether the footpath detracts from the aesthetic quality

12.6 Clearly the impact of any activity or development will vary from site to site, and the impact will depend on the perceived ecological value of the area as well as the nature, character and scale of the activity.

13. RECREATION PLANNING

13.1 Recreation planning is a field of planning similar to town and country planning, resource management, corporate management, strategic and tactical planning etc., wherein planning theory and techniques are applied to recreation decision making and problem solving. By planning, and thereby taking into account as wide a range of relevant factors as possible, and by making intelligent extensions of these factors into the future, decision making can be improved.

13.2 Recreation is only one of a number of competing demands for resources and allocation of land for specific or multiple uses depends on rational and comprehensive planning. The recreational planner's role is to strike a balance between the provision of facilities of the right scale, type and location to fulfil a variety of needs whilst at the same time conserving resources for future use and enjoyment. Planning is essential to minimise conflicts between competing uses, to ensure compatibility and complementarity between different uses, and to make best use of available resources.

13.3 From the base information of needs and demand (for all ages and sectors of the community, plus tourists) and available resources, it is possible to determine needed additions to the base stock of

recreation resources (or where there is an oversupply in terms of type, location or requirement). Once the overall position is determined, regional and local policies follow, and individual management plans for particular resources can be prepared. The framework of such plans should comprise:

- (i) An assessment of the needs and demands of recreationists, tourists, and the wider public.
- (ii) An appraisal of the existing and potential supply of recreational resources (characteristics, capabilities, location, accessibility etc.).
- (iii) A comparison of supply with demand to reveal quantitative and qualitative shortfalls or surpluses.
- (iv) An assessment of impact of recreational activities.
- (v) Formulation of goals and objectives.
- (vi) Policy formulation.
- (vii) Implementation
- (viii) Monitoring

13.4 It is important to note that whilst resources as a whole are finite, recreational supply is not static - new uses for some resources may be found, capacity can be increased and accessibility improved. Demand can similarly be influenced through management and marketing policies, through new provision, new information, substitution of different activities, price mechanisms etc.

13.5 There are various concepts which are relevant to recreational planning.

(a) Carrying Capacity

13.6 There is a large and growing body of literature concerned with the concept of carrying capacity, or the ability of an area to accommodate existing and proposed uses. Distinction is usually made between the physical carrying capacity of an area - or the absolute limits of an area to absorb various activities; the environmental carrying capacity, or the extent to which an area can be used before landscape deterioration sets in, or fragile ecosystems are upset, and the

social carrying capacity, which is the degree of crowding which users are prepared to accept before they go elsewhere. The social carrying capacity obviously varies for different people and each person's own standards may even vary according to his mood, activity etc.

13.7 There are many different criteria for deciding what constitutes over use or what degrades the quality of the resource itself or the recreational experience. The acceptability of a given level of change depends entirely on the management objectives for the site - what is acceptable in a Facilities area in a National Park may be totally unacceptable in a Special Area in a National Park, or in a Forest Sanctuary in State Forests. The carrying capacity of an area can be varied by adopting different management policies and as Beamish (1977) points out: "the recreational carrying capacity of a particular environment (i.e. the balance between environmental cost and visitor benefit) is defined by the proposed level of management on a purely pragmatic basis."

13.8 For each recreational area it is therefore necessary to decide the acceptable level of ecological change, and the type of visitor to be catered for. These decisions will then determine the type and range of activities appropriate to the site, as well as the overall level and intensity of use which can be accommodated.

(b) Resource Management Concepts

13.9 While carrying capacity constraints are central to resource management (Barker, 1977) planners specialising in resource management have developed concepts such as 'multiple use' and 'sustained yield' as more direct tools.

13.10 Multiple use of resources often leads to conflicts and competition between users. However, more efficient resource use is possible if the sum of all the benefits derived from the several integrated uses exceeds the benefit from the single best use.

13.11 Very closely related to carrying capacity notions is the concept of sustained yield. This entails managing a resource in such a way that its yield can be continued in perpetuity. Rate and intensity of use and replenishment time are key concepts to sustained yield.

(c) Zoning

- 13.12 In areas where there are a number of potentially conflicting activities competing for finite resources, it is established practice to zone recreational uses over time and/or space in order to make best use of resources and to provide for as many different recreational uses as possible.
- 13.13 In recreational zoning it is necessary to assess on the one hand the character, quality and scarcity of the resource, its vulnerability and suitability for specific or multiple uses, and on the other hand, the needs of recreational users and whether these needs have to be satisfied in a particular location, or whether they can be accommodated in a number of different locations. The concept of zoning in recreation planning was first suggested by the Outdoor Recreation Resources Review Commission in 1962 and since then it has been used in many areas of the world to ensure that provision is made for various types of recreational uses, that conflicts between uses are minimised and that scarce resources are protected.

(d) Coordination

- 13.14 Coordination of effort between those responsible for recreation planning is essential for efficient provision of outdoor recreational needs. Planning for recreation in New Zealand is currently highly fragmented between a variety of government departments, ad hoc agencies and the private sector. There is no overall coordinating plan or clear set of national goals and objectives to guide regional or district planning. It is therefore hardly surprising that there is duplication of effort in some areas, lack of provision or protection in others and poor integration of recreation with other land uses. The recreational planner's role in New Zealand has largely been to respond to problems rather than to initiate comprehensive and integrated plans to guide development. Fully effective management planning and policy implementation is hampered by the overall lack of coordination.
- 13.15 The need for a national outdoor recreation plan has been emphasised on numerous occasions. The Marlborough Pilot Study was designed as a forerunner to a National Plan but no further work has been undertaken. It is essential that clear priorities are established at

a national level, especially at a time when financial and human resources are limited. Currently, under the Reserves Act, all administering bodies are required to prepare a management plan (within five years of the implementation of the Act) to guide development. Management plans are also being prepared for each National Park, and for State Forest parks - and yet we have no overall national plan guiding these individual efforts. Clearly the sum of each individual management plan will not add up to a unified, coherent and comprehensive "whole" which will satisfy the needs and requirements of all New Zealanders.

14. FINDINGS

14.1 The findings for the second part of this paper reveal that in the recent past there was a growing demand for recreation in terms of the number and types of activities undertaken. This growth in demand has been linked to a number of socio-economic factors but we have no clear understanding of the relative importance of these factors nor of what fundamental human needs of man are satisfied by recreational activities. We know little in detail about why some people engage in certain types of activity and some do not, nor whether (and what kinds) activities can be substituted for each other and give the same level of satisfaction and fulfil the same needs.

14.2 Far less certain is the way that current demand patterns will change in the future with the current fuel crisis, population stability and increasing urbanisation. Several significant gaps in our knowledge are evident from this overview of recreation and these include:

- (i) A need for psychological and social research into man's need for recreation and the role it plays in fulfilling basic needs.
- (ii) A need for information on potential demand (rather than participation) and the relative significance of various socio-economic factors in influencing participation.
- (iii) A need for a comprehensive inventory of recreational resources, their suitability for specific or multiple purposes, their capacity and capability.

- (iv) An assessment of the needs of tourists.
- (v) A need for a comprehensive national outdoor recreation plan or planning guidelines to guide development at regional and district level.
- (vi) A need for recreational planning at a regional level.
- (vii) A need for further assessments of recreational impact.
- (viii) A need for research into the substitutability of recreational activities.
- (ix) A need for coordination and integration between government departments, ad hoc agencies and the private sector in recreational provision.
- (x) An assessment of availability of funding and of priorities in recreational provision.
- (xi) An assessment of recreational opportunities closer to urban centres and accessibility to existing and potential facilities.
- (xii) An assessment of the role of the private sector in recreation planning and provision.
- (xiii) Monitoring of changes in recreational demand patterns.

14.3 We are drawn to the conclusion that much of the recreation planning and reserves management plans that have been done will need to be redone, or augmented and changed so that such plans can reflect demand and their place in an overall national approach, which needs to be determined first. This conclusion reflects the findings listed above, and a rational planning approach that defines what is required of each reserved area, in the national interest, before identifying the possibility of achieving that goal, and management methods that are appropriate.

APPENDIX I - LEGISLATION

The main pieces of legislation which provide for and control land set aside for public use include the following:

Land Act, 1948	Controls Crown land
Municipal Corporations Act, 1954 Counties Act, 1956 (now largely superceded by the Local Government Amendment Act, 1978)	Charge local authorities with the purpose of ensuring adequate provision for public reserves on subdivision of land
Forests Act, 1949 and Amendment, 1976	"Balanced" use of State forests to include protection of indigenous flora and fauna, and provision for recreation as a predominant use in some areas. Setting aside of State Forest Parks, open indigenous State Forests and Wilderness Areas.
Historic Places Act, 1954 and Amendment, 1975	Provides for preservation of features of national or local historic interest.
Harbours Act 1950	Grants powers to create public reserves.
Maori Reserved Lands Act, 1955	Provides for administration of a wide range of Maori reserved lands.
Marine Reserves Act, 1971	Provides for establishment and management of sea and/or foreshore for preservation for scientific study.
Hauraki Gulf Maritime Park Act, 1967	Incorporates reserves of various types on or off east coast of North Island from Whangamata Harbour to Home Point.
National Parks Act, 1952	Provision for establishment and management of National Parks for preservation and recreation.
Wildlife Act, 1953	Provides for establishment of wildlife refuges.
New Zealand Walkways Act, 1975	Provides walking tracks for public enjoyment.
Reserves Act, 1977	Establishes seven categories of reserve, classified according to their primary purpose - recreation, historic, nature, scientific, cultural, government and local purpose.

(At the date of writing a Bill to amend the Reserves Act was before Parliament. This bill would give Regional Authorities significantly greater powers for recreation planning.)

Town and Country Planning Act, 1977	Charges local authorities with direction and control of development in their area.
Queen Elizabeth II National Trust Act, 1977	Establishes Trust to encourage and promote provision of open space.
Wild Animal Control Act, 1977	Controls introduced wild animals, and hunting of same by commercial and recreational interests.

There are also numerous private bills, some of which relate to reserves of various categories.

Much of this legislation provides for the establishment of ad hoc bodies with limited functions in the preservation and recreation field. Under the Town and Country Planning Acts local authorities have responsibility for reserve and recreation facility provision. Private sector involvement lies in provision of commercial facilities including accommodation, skifields, jet boating, etc.

BIBLIOGRAPHY

- ACKLEY, K.A. 1976. The Future of Outdoor Recreation in Tussock Grasslands and Mountain Lands Institute Review 32. Pages 16-19, March 1976.
- ANON., 1977. Conference on Conservation of High Mountain Resources - General Policy Statement in Review 37 The Tussock Grasslands and Mountain Lands Institute December 1978. Pages 87-93.
- ANON., 1970. Human Pressures on the Natural Environment in New Zealand Year Book 1970, pages 1115-1120.
- ANON., 1978. New Zealand Yearbook, Government Printer, Wellington.
- ANON., 1979. Officials Committee on West Coast Reserves Proposals. Report to the Minister of Forests.
- ANON., 1975. Report of the Working Party on Land Use Policy. Forestry Development Conference Proceedings. 6-8 May, 1975. Wellington.
- ANON., 1972. Taupo Basin: A New Zealand Study in Environmental Management. Paper prepared for United Nations Conference on Human Environment, Stockholm.
- APPLIED GEOLOGY ASSOCIATES, 1977. Off Road Vehicle Recreation Study: Characteristics, demands and impact on the social and physical environment, Wellington.
- AUCKLAND REGIONAL AUTHORITY, 1972. A Recreational Resource Area. Kawakawa Bay to Miranda. Auckland Regional Authority.
- AUCKLAND REGIONAL AUTHORITY, 1973. Outdoor Recreation in Auckland: A Survey of Activity Patterns. Auckland Regional Authority.
- AUCKLAND REGIONAL AUTHORITY, 1971. Recreation Patterns in Auckland.
- AUKERMAN, R. & DAVIDSON, J. 1979. (In preparation). Mountain Land Recreation In New Zealand: The Recreationists. Tussock Grasslands & Mountain Lands Institute.
- BARKER, W.H. 1977. Assessing the Carrying Capacity of New Zealand For People. Thesis, M.Sc. in Resource Management, University of Canterbury.
- BEAMISH, S.F. 1976. The Routeburn Track: An Application of Environmental Impact Analysis. Thesis, M.A. in Geography, University of Otago.
- BEAMISH, S.F. 1977. Summary of a Report on the Routeburn Track. Mt. Aspiring National Park Board.
- BIGNELL, A.W. (Ed), 1978. Forest Recreation Workshop. N.Z. Forest Service Forest Research Institute, Economics of Siliculture. Report No. 126.

- BLACK, D.A. 1974. Management of Exotic Forest For Recreation and Amenity. Forestry Development Conference Proceedings. 19-21 November, 1974, Wellington.
- CANT, G. (Ed.) 1976. Canterbury at Leisure: Studies in Internal Tourism and Recreation. N.Z. Geographical Society, Canterbury Branch. Publication No. 4. P. 20-46.
- CHAPMAN-TAYLOR, R.S. 1976. Education and National Parks. Department of Lands and Survey, Wellington.
- CLAWSON, M.R. & HELD, B.R. 1968. Land for the Future. Baltimore.
- CLAWSON, M. & KNETSCH, J.L. 1966. Economics of Outdoor Recreation. Baltimore.
- COAD, N.S. 1975. Practical Policies for Reserves at Local, Regional and Central Levels. Reserves Series 1975/1. Department of Lands and Survey, Wellington.
- CONWAY, M.J. 1977. Management Policy for New Zealand's Indigenous State Forests. New Zealand Forest Service, Wellington.
- CRAWFORD, P. 1969. Trends in Recreation Preference, Palmerston North. Palmerston North City Council Town Planning Office. Report No. 13. 40 p.
- DASMANN, R.F. 1973. Classification and Use of Protected Natural and Cultural Areas. IUCN Occasional Paper No. 4.
- DEPARTMENT OF LANDS AND SURVEY 1978. Arthur's Pass National Park Draft Management Plan. No. 40, June 1978.
- DEPARTMENT OF LANDS AND SURVEY 1977. Guides and Policies in the Exercise of the Reserves Act.
No. 1 Preparation of Management Plans for Reserves.
No. 2 Leasing of Reserves and Other Rights of Occupation.
No. 3 The General Policy for Historic Reserves in New Zealand.
- DEPARTMENT OF LANDS AND SURVEY. 1978. National Parks and Reserves. Extracted from report of the Department of Lands and Survey for the year ended 31 March 1978.
- DEPARTMENT OF LANDS AND SURVEY 1978. New Zealand National Parks Authority General Policy. Edition 1978 National Park Series No. 9.
- DEPARTMENT OF LANDS AND SURVEY 1979. New Zealand National Parks Publications. 9th Edition. February 1979.
- DEPARTMENT OF LANDS AND SURVEY 1979. Otepatotu Scenic Reserve Management Plan. May 1979.
- DEPARTMENT OF LANDS AND SURVEY 1978. N.Z. Council for Recreation and Sport. Outdoor Recreation Planning Symposium Proceedings. Wellington 24-26 August 1977.

- DEPARTMENT OF LANDS AND SURVEY 1977. Outdoor Recreation Planning Marlborough Pilot Study. Wellington.
- DEPARTMENT OF LANDS AND SURVEY 1977. Proceedings of the Conference on the Conservation of High Mountain Resources. Held at Lincoln College Canterbury, N.Z. 9-15 Nov. 1977.
- DEPARTMENT OF LANDS AND SURVEY 1978. The Use of High Mountains of the World. Department of Lands and Survey, Wellington.
- DEPARTMENT OF LANDS AND SURVEY 1978. This Land is Your Land. A guide to our national and maritime parks. Fifth Edition.
- DEPARTMENT OF LANDS AND SURVEY 1979. The New Zealand Walkway Commission.
- DI CASTRI, F. & LOOPE, L. 1977. Biosphere Reserves: Theory and Practice. Nature and Resources. 13 (1): 2-7, 1977.
- DINGWALL, P. 1979. Biosphere Reserves: Global Monitoring of Man's Impact on Nature in Landscape 5 Department of Lands and Survey, May 1979.
- DOWER, M. & DOWNING, P. 1973. Attitudes to Man and the Land. Paper 16 "Work and Leisure" Symposium. University of Salford.
- FITZHARRIS, B.B. and KEARSLEY, A.W. 1977. Recreation and Hydro Development in the Waitaki Valley: Lessons for the Clutha in Proceedings of the Ninth New Zealand Geography Conference. Dunedin, August 1977.
- FORESTRY DEVELOPMENT WORKING PARTY. 1974. Report of the Working Party on Recreational Use of Forest. Forestry Development Conference Proceedings. 6-8 May 1975, Wellington.
- FORREST, D.J. 1977. Recreation as a Regional Resource: The Waitaki Example. Proceedings of the Ninth New Zealand Geography Conference. Dunedin. August, 1977.
- GARRETT, T.D. 1977. National Outdoor Recreation Patterns in Outdoor Recreation Planning Symposium Proceedings. 24-26 August, 1977, Wellington.
- GRESHAM, P.H. (Ed.) 1978. Environment 77. Proceedings 8. Recreational Needs and Conflicts. Environment Centre, Canterbury.
- GRESHAM, P. 1976. The Perceived Recreational Carrying Capacity of the Mount Hutt Skifield. Unpublished paper, Department of Geography, University of Canterbury.
- GRESHAM P. 1976. Wilderness as a Resource. Unpublished paper as part of M.Sc. in Resource Management, University of Canterbury.
- HAMILTON CITY COUNCIL. 1971. Study of Regional Recreation Activity. Hamilton City Council.
- HARRISON, GRIERSON & PARTNERS. 1973. Hobson Bay Marine Park 2 vols. (Environmental Impact Report). Parkdale Department Ltd, Auckland.

- HELLIWELL, D.R. 1976. The Extent and Location of Nature Conservation Areas in Environmental Conservation. Vol. 3, No. 4, Winter, 1976.
- HENDERSON, E. & STAGPOOLE, J. 1974. Regional Recreation & Conservation Study Part 1, Participation Attitudes and Aspirations in Regional Recreation. Wellington Regional Planning Authority.
- HINMAN, D. 1972. Preservation and Planning. Thesis. Diploma in Town Planning, University of Auckland.
- HODDER, R.A.C. 1977. New Zealand Forest Service Input into Outdoor Recreation Planning in Outdoor Recreational Planning Symposium Proceedings. 24-26 August, 1977, Wellington.
- HUGHES, D. 1973. Planning for Coastal Recreation and Conservation in the Auckland Region. Thesis. Department of Town Planning University of Auckland.
- IMBODEN, C. 1979. Conservation - a Problem for the Ecologist?, in N.Z. Forest and Bird, No. 211, February, 1979.
- JOHNSON, W.C. et al. 19 . Management of Experimental Reserves and Their Relation to Conservation Reserves: The Reserve Cluster. Nature & Resources. 13: (1) 8-14.
- JORGENSEN, M. 1974. Recreation and Leisure: A Bibliography and Review of the New Zealand Literature. Ministry of Works and Development, Town and Country Planning Division, Wellington.
- KENNEDY, J.J. & BIGNELL, A.N. 1978. Forest Recreation and Changing Management Attitudes in New Zealand. New Zealand Journal of Forestry. 1978.
- LAILDLER, A. 1977. The Social Need for Recreation in Outdoor Recreation Planning Symposium Proceedings, 24-26 August, 1977 Wellington.
- LOCKER, R. 1979. The Future of the National Parks System, in New Zealand Environment, No. 23, Summer/Autumn 1979.
- LUCAS, P.H.C. 1978. New Zealand National Report on the Environmental Consequences of Tourism: in Tourism and the Environment. Department of Lands and Survey, Wellington. Information Series No. 6.
- MATHIESON R. 1976. Maruia Valley Land Use Report. Part of a Study being undertaken for the Land Use Advisory Council. June 1976.
- MCCASKILL, L.W. 1972. A History of Scenic Reserves in New Zealand. Department of Lands and Survey, Wellington.
- MERCER, D. 1973. The Concept of Recreation Need. Journal of Leisure Research. Vol. 5 (1).

- MIERS, K.H. 1974. Role of Indigenous Forest in Amenity and Recreation For The Session on Indigenous Forest Management. Forest Development Conference. 1974 Meeting, Wellington, New Zealand. 19-21 November.
- MOLLOY, L.F. 1976. An Outline for an Assessment of the Recreational Value of the New Zealand Outdoors. Federated Mountain Clubs of N.Z. (Inc.)
- MOLLOY, L.F. 1977. Red Mountain-National Park or Asbestos Mine? N.Z. Forest and Bird. Supplement, September, 1977.
- MOLLOY, L.F. 1979. Outdoor Recreation on the West Coast. A Conservation Plan. Volume 1. Federated Mountain Clubs of N.Z. (Inc.) 1979.
- MOLLOY, L.F. 1974. The Public Use and Enjoyment of Indigenous Forests, in Forestry Development Conference Proceedings, 6-8 May 1975, Wellington.
- MOLLOY, 1976. Wilderness Diminishing, N.Z. Alpine Journal, 29: 65-75.
- MORRISON, P. The New Zealand Conservation Handbook, Auckland.
- NEAVE, D.S. 1977. Recreation Studies in New Zealand: A Bibliography. Ministry of Sport and Recreation, Wellington.
- NEIGHBOUR, A.M. 1973. Outdoor Recreation in Christchurch: A Survey of Activity Patterns. Department of Geography, University of Canterbury.
- NEW ZEALAND FOREST SERVICE 1978. Revised Zoning and Classification of State Forest Land. Forest Management Information: Number 2, August, 1978.
- NEW ZEALAND FOREST SERVICE 1977. Lake Sumner State Forest Management Plan 1977-1987. November, 1977.
- NEW ZEALAND FOREST SERVICE 1974. Role of the Indigenous Forests in the Preservation of Natural Ecosystems for Scientific Purposes. Forestry Development Conference 1974. Meeting, Wellington, 19-21 November.
- NEW ZEALAND FOREST SERVICE. Tararua State Forest Park Management Plan 1977-1987. November 1977.
- NEW ZEALAND WALKWAY COMMISSION, 1977. Its Functions and Plans. April 1977.
- O'CONNOR, K.F. 1972. An Introduction to the Waitaki. Man and the Biosphere Report No. 1. Tussock Grasslands and the Mountain Lands Institute, Lincoln College.
- O'CONNOR, K.F. 1978. High Country Land Use Planning, in Review 37 The Tussock Grasslands and Mountain Lands Institute. Pages 79-86, December 1978.
- O'CONNOR, K.F. 1978. Mountain Recreation and National Park Management. Tussock Grasslands and Mountain Lands Institute.

- O'CONNOR, K.F. 1972. Planning for Recreation Among Other Uses of Mountain Land and Water Resources. Tussock Grasslands and Mountain Lands Institute, Lincoln College.
- OUTDOOR RECREATION RESOURCES REVIEW COMMISSION. Participation in Outdoor Recreation: Factors Affecting Demand Among American Adults. Report No. 20, Washington.
- PANNETT, P. 1977. Dunedin's Recreational Preferences. Dunedin Metropolitan Planning Authority and Dunedin City Council. Recreation Study Series Report No. 1.
- PHILLIPS, A.A.C. 1970. Research Into Planning For Recreation. Countryside Commission, London.
- ROBB, M. & HOWORTH, H. 1977. New Zealand Recreation Survey: Preliminary Report. N.Z. Council for Recreation and Sport, Wellington.
- ROBERTSON, W.A. 1972. A Guide to a Planning Process for National Parks. Department of Lands and Survey for the National Parks Authority. Reprinted July 1978.
- SERVENTY, V. 1973. The Aims of Conservation. Proceedings of the National Conservation Study Conference. Canberra, 1973. Paper No. 2.
- SHEPPARD, FREDERICK & PARTNERS. 1974. Remarkables Ski Field. (Environmental Impact Report). Mt Cook & Southern Lakes Tourist Co. Ltd, Christchurch.
- THOMSON, A.P. & NICHOLLS, J.L. 1973. Scientific Reserves in New Zealand Indigenous Forests, in New Zealand Journal of Forestry. 18 (1) 17-22 1973.
- THOMSON, J. 1978. Origins of the 1952 National Parks Act. Department of Lands and Survey for the National Parks Authority 1976. Reprint 1978.
- WELLINGTON REGIONAL PLANNING AUTHORITY. 1974. Participation, Attitudes and Aspirations in Regional Recreation. Report 74: 11, February, 1974, Wellington.
- WELLINGTON REGIONAL PLANNING AUTHORITY 1974. Regional Recreation and Conservation Policies. Report 74.57,4 September 1974.

JOINT CENTRE FOR ENVIRONMENTAL SCIENCES

OCCASIONAL PAPERS

1. Corbet, P. S. *A postgraduate programme in resource management.* August 1976. 161 pp.
2. Pearson, R. G. *Energy analysis.* December 1976. 37 pp.
3. Pearson, R. G. *Energy in agriculture: a bibliography.* April 1977. 23 pp.
4. Dawson, S. M. *Energy requirements of inputs to agriculture in New Zealand.* March 1978. 32 pp.
5. McChesney, I. G., Bubb, J. W. and Pearson, R. G. *Energy use on Canterbury mixed cropping farms: a pilot survey.* May 1978. 54 pp.
6. Barker, W. H. and Brown H. J. *Peri-urban land use.* August 1979. 37 pp.
7. McChesney, I.G. *Energy use on hill country sheep and beef farms near Cheviot, North Canterbury.* August 1979. 45 pp.
8. Corbet, P. S. *The Joint Centre for Environmental Sciences: the first five years.* September 1979. 174 pp.
9. Barker, W. H. and Brown H. J. *Preservation and Recreation.* October 1979. 49 pp.