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THE CONSERVATION MOVEMENT IN
NEW ZEALAND

Undergraduate thesis presented in partial fulfilment
of the requirements for the degree of B.A. with
Honours in Geography.

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1967

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ACKNOWLEDGEMENTS

My thanks to Professor C. Duncan for the help and advice he has given during the course of writing my thesis.

I am indebted to Mr. Minhinnick of the New Zealand Herald for permission to use the two cartoons included in the thesis, and to the Forest Service, the Soil Conservation and Rivers' Control Council and Mr. T.I. Oliver for providing photographs.

I would also like to thank my mother for her help in reading through the final draft and Mrs. K.B. Allan for typing the thesis.

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INTRODUCTION.

Over the past 150 years of European settlement of New Zealand, the basis of economic growth has been the exploitation of her natural resources.

The object of this study is to examine the character, motives, and exploitation of the natural resources, and the growth of attitudes to conservation. Because of the scope that such a study could cover, it is necessary to restrict it to the more outstanding characteristics of the movement for conservation in New Zealand.

In the first chapter the conservation movement, particularly that of the United States, will be discussed. This will be followed in Chapter II by an examination of the resource elements of New Zealand in terms of their nature and degree of exhaustibility.

In Chapter III, conservation policies and attitudes towards various resources will be identified, from the early years of European settlement to the end of World War II. The changing attitudes to the utilisation of resources, will be examined to determine their relative importance in deciding how various resources will be utilised.

Contemporary attitudes to the utilisation of utilisation of resources, and to the conservation of those resources will be examined in Chapter IV.

In the final chapter an attempt will be made to

identify a "conservation movement" in New Zealand in terms of the development of attitudes to resource use over the 150 years of European settlement.

This study is made with the aim of highlighting developments in conservation thought at a time when the implications of "conservation" are assuming increasing importance for New Zealand.



Eden Grove

Bond

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I. THE CONSERVATION OF NATURAL RESOURCES.

In attempting to define "conservation" in relation to the natural resources, one is immediately confronted with a problem. If it is accepted that "conservation" implies a special attitude to the utilisation of resources, then the problem derives from the changing values of resources to a society. It involves identifying the stage at which those changing resource values produce a change in utilisation practices. To understand what is meant by "conservation" it is necessary first to understand what is meant by "resources".

Natural Resources.

The term "resource" is a very general concept that has been defined as including all those functions "which a thing or a substance may perform or to an operation in which it may take part, namely, the function or operation of attaining a given end such as satisfying a want." (1) Natural resources may be considered as components in the basic economic concept of "land", one of the three classical factors involved in economic production. Land has been defined as "space equipped with varying kinds and amounts of natural forces, processes, and resources." (2) Natural resources are of vital importance to any society at every stage of economic and cultural development, because their "unique location, . . . varying quality, and . . . limited quantity . . . render them of critical importance in most

economic situations." (3)

In almost every definition of "natural resources" there is the underlying idea that natural resources "exist" only because society recognises them as resources and places a value, usually a monetary value, on them. Thus Held and Clawson define a natural resource as "any quality or characteristic of nature which man knows how to use economically to ends which he desires." (4) Most writers agree in defining "natural resources" as being those elements and combinations of elements occurring singly or in combination, which satisfy the particular wants and needs of a society.

Natural resources may be classified into fund or exhaustible and flow or renewable resources. Basically exhaustible resources are those which can be used only once. That is, the resource is physically limited.

Ciriacy-Wantrup prefers to define resources as "fund resources" if "their total physical quantity does not increase significantly with time with the total stock limited in quantity, each rate of use diminishes some future rate." (5) Imminent diminution of an exhaustible resource will demand critical consideration of utilisation policies, in the light of probable future requirements for the resource.

Flow resources are renewable provided the resource base is maintained and not abused. In the event of abuse, their value as a resource is impaired and usually prompts action by society to change utilisation practices. The two major resource groups may be subdivided on the basis of their

degree of expendability. G. T. Renner (Table 1) classifies resources into six classes ranging from the "inexhaustible and immutable" flow resources, in which the resources are considered as a renewable asset, to the exhaustible one-use fund resources, the wasting asset.

Natural resources have varied in importance depending on the values placed on them by society in response to social, economic or technological changes. In the utilisation of exhaustible resources, the state of technology and the degree of substitutability play a dominant role. In the utilisation of flow resources, economic and social institutions are especially important and will determine the rate and nature of their utilisation. Exhaustible resources are mainly used as raw materials for the production of durable goods and energy. Technological change is of great importance for these end products and for the productive processes leading to them; discovery and transformation of exhaustible resources will be mastered more and more by advances in scientific knowledge.

Resources, then, are a reflection of human needs and wants. E. W. Zimmermann has said: "Resources are not, they become; they are not static, but expand and contract in response to human wants and actions". (6)

The Conservation Movement in The United States.

The difficulty in arriving at a satisfactory definition of the term "conservation" derives from the changes in meaning that the term has undergone over the past 50 years.

TABLE I G. T. Renner SIX CLASSES OF RESOURCES

CLASS I. Inexhaustible and Immutable Resources.

They include the ocean waters, solar power, wind power, sand*, gravel*, clay*, stone*, cement materials*, salt*, lime*, air, climate, gravitation.

CLASS II. Inexhaustible but Misusable Resources.

They include water power, surface water, area and space, geographic location, scenery and land relief⁺, convenience and order in man-made structures.

CLASS III. Maintainable and Renewable Resources.

They include timber, scenic beauty, human numbers, land fertility, ground waters, range grassland, a few fishes, and some wild animals.

CLASS IV. Maintainable but Non-renewable Resources.

They include physical soil materials, human talent, and genius, many forms of fish, wild animals, trees, shrubs, and wild flowers.

CLASS V. Exhaustible but Reusable Resources.

They include gems, some non-metallic minerals, and most metals, such as iron, tin, copper, gold, and silver.

CLASS VI. Exhaustible, One-use Resources.

They include coal, petroleum, natural gas, helium, most non-metallics, and certain metals.

* These materials are, however, exhaustible locally.

⁺ Many minor aspects of scenery are certainly permanently depletable. In most instances, however, it is merely a matter of obstructing, obscuring, and defacing scenic resources, or of misusing resources of land relief.

Source: G. T. Renner, Conservation of National Resources, John Wiley and Sons, 1942, pp.50.

These changes are reflected by the conservation movement in the United States.

The initiation of the conservation movement in the United States had its roots in attitudes that had developed since classical times regarding man's position on earth and his relationship to nature. Thus behind the writings of such men as G. P. Marsh and John Muir lay the assumption of a natural order. All things moved according to natural law, and the most delicate and perfect balance in nature was maintained up to the point at which man entered with all his ignorance and presumption. From that point onward, there was a succession of "disturbed harmonies" in the natural order, with implications of destruction extending ultimately to man himself.

Recognition of the rapid rate of depletion of the resources of the United States led to a divergence as to what should be done about it, a divergence between those who advocated "nature preservation", locking-up of those areas disrupted by man's blunderings, or development, the restoration of the natural resources and their utilisation on a basis of careful management.

Essentially the movement gained in impetus with the closing of the "frontier" in the late decades of the nineteenth century. For the first time the American public became aware that there was a limit to the amount of land available for settlement and that what was already settled was, in many areas, being destroyed or damaged by wasteful

utilisation practices. For the first time a feeling of insecurity, as to the nation's ability to support itself, became apparent. As H. M. Rose says -

"Security, an element which is sought by all men, be it social, economic, physical or spiritual, is not always assured within the time spectrum that an individual or group actually occupies an area or can envision its occupation by their progeny. In the absence of security, men have been led to engage in activity that would result in its initiation or restoration" (7)

The sense of urgency for action to halt the depredations of man was conveyed in writings such as that of G. P. Marsh when he said -

" the vengeance of nature of the violation of her harmonies, though slow, is sure, and the gradual deterioration of soil and climate in such exceptional regions is as certain to result from the destruction of the woods as in any natural effect to follow its cause." (8)

Initially concerned only with the depredations of man on the forest resource, the idea of conservation was extended to the simultaneous conservation of all resources. Gifford Pinchot claimed that this elaboration of the conservation idea was the result of a flash of inspiration that came to him in 1907 -

"Suddenly the idea flashed through my head that there was a unity in this complication - that the relation of one resource to another was not the end of the story. Here were

no longer a lot of different, independent, and often antagonistic, questions. In place of them, here was a single question with many parts. Seen in this new light, all these separate questions fitted into and made up one great central problem of the use of the earth for the good of man." (9)

The three principles of conservation as defined by Pinchot in the early years of the twentieth century continued to be reflected in definitions of "conservation", and they are frequently still expressed today. For Pinchot, conservation was, "development, the use of the natural resources now existing on this continent for the benefit of the people who live here now ... conservation stands for the prevention of waste The first duty of the human race is to control the earth it lives on. The natural resources must be developed and preserved for the benefit of many, and not merely for the profit of the few ..." (10)

During the Pinchot-Roosevelt era, the definition of conservation as "the greatest good for the greatest number - and that for the longest time" (11) was the slogan of the movement. The concepts for which this movement stood are still reflected today in definitions of conservation which stress the need to guard against unnecessary waste, to leave sufficient resources in a usable condition for the future, and to distribute present resources equitably. For example, "conservation means wise use for the proper purpose at the right time." (12)

The contradictions that have appeared in the conservation movement in the United States have made it obvious, however, that such definitions as those outlined above are largely inadequate to convey an accurate idea as to the meaning of the term "conservation". The conservation movement in the United States and also, it appears, in West European countries (13), has lost or has discarded, the early emotional enthusiasm for the simultaneous conservation of all resources, and today consists of numerous groups pursuing their own purposes for the conservation of particular resources. Clashes, as to how particular resources may best be used, mostly derive from the contradictions arising in stressing the necessity for planning resource utilisation and from interest representation. To enable the careful utilisation of resources in order to ensure continued supply for the future, entails the planning of resource use and development both in the present and future. The planner faces the problem of planning without definite criteria for making the decisions involved; basically the administrator must make decisions pertaining to resource use in terms of his own personal values which inevitably gives rise to conflicts amongst sectional interests. Deciding the "best use" to which a resource can be put will also give rise to conflicts. Opposing groups will attempt to press their ideas as to the "best use" of a resource, and conflicts inevitably develop. A satisfactory balance of uses and users of a resource is rarely, if ever, arrived at by the resource planner.

Contemporary attitudes to conservation recognise the need for concern as to the future availability of natural resources and for concern as to the periodic rates of use of a resource rather than concern over the size of a stock from which resource supplies are drawn. A definition of conservation usually mentions the need for constant attention to resource utilisation policies in the light of present and future possible needs: that is, conservation is something that continues and is not static. S. V. Ciriacy-Wantrup defined conservation in terms of "changes in the intertemporal distribution of use. In conservation, the re-distribution of use is in the direction of the future." (14)

A. Scott considered conservation to be "an allocation of resources, by individuals and states, away from the maximising of those ends now served, in favour of the prolongation of the services of particular resources." (15)

Definitions of the conservation of a particular resource, while tending to be rather more specific, still emphasise concern for the future and imply that "conservation" is something that continues or is dynamic. Thus, R. B. Held and M. Clawson defined soil conservation as "effort to change the trend in basic productive capacity upward from what it would otherwise be" (16)

The Concept of a Conservation Movement.

The term "conservation" was first applied to a specific political movement in the United States, but it cannot be regarded as the first expression of a particular attitude to

the utilisation of resources. Development of a conservation "attitude" took place, for various reasons, centuries earlier in the Western European countries. Basically this conservation attitude developed in response to shortages of basic resources. Thus, for example, Germany over the centuries developed a highly complex code for the regulation of the exploitation of the forest resource. In the West European countries, it was the forest resource, basic to the economic life of pre-industrial Europe, that was subject to the most rigorous conservational practices. (17) At no time, however, was there a consciously expressed conservation movement for the simultaneous conservation of all resources such as appeared in the United States.

Generally, the "conservation movement" refers to the development of certain attitudes toward the utilisation of resources on the part of both individuals and the societies to which they belong. These attitudes are expressed in terms of the restraints imposed on the utilisation of resources. A fundamental component in these attitudes is the recognition that resources have been misused in the past, that resources are a part of the "natural heritage" of society, and that, as such, the present generation has a responsibility to ensure that they do not become scarce in the future as a result of present exploitation practices. Inevitably there will be differences in evaluation of the need for the conservation of resources, and of the measures to be taken to achieve conservation. Evaluation relates to a sense of need of a

resource focussed on the present, and extending into the future. A "conservation movement" is essentially an expression of compromises over future utilisation of resources.

The "conservation movement" is an expression of the changes in attitude of a society to resource utilisation in response to changing technology, the changing economic and social wants of society, and the adequacy of resources to meet those demands. Society's attitude to resources and the utilisation policies and practices that are adopted at any particular time are determined by the abundance or scarcity of resources. Thus, Duncan has suggested (18), that changing resource practices can be represented by the concept of the horizontal and vertical frontiers of resource evaluation. Based on the westward movement of settlement in the United States during the nineteenth century, the horizontal frontier represents the early stage of resource exploitation when resources were regarded as being unlimited in their abundance and continued availability. Such abundance encouraged extensive land utilisation practices which concentrated on securing as great an economic return from the natural resources with the minimum expended in terms of effort. In later years these practices inevitably came to be regarded as having been "wasteful". This change in attitude followed the "closing of the frontier", when "land" was no longer available for the taking. The limitations thus revealed in the continued availability of resources, as well as their increasing economic and social values, led to the development

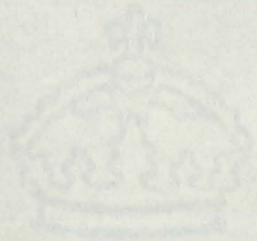
of the "vertical frontier" in resource utilisation; that is, a growing emphasis on more careful and intensive use of resources to ensure their continued availability in the future.

In summary, it is suggested that the aims and ideals of a conservation movement, change through time in response to changing evaluation of natural resources by society. This evaluation is made essentially in terms of the pressure exerted on the natural resource base by the demands of society.

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II. THE NATURAL RESOURCES OF NEW ZEALAND

Natural resources comprise all those elements occurring in the lithosphere and hydrosphere of the earth, which can be used by man to satisfy his needs. In Chapter I it was suggested that the two main resource classes, exhaustible and renewable resources, can be subdivided in terms of their degree of expendability. In the light of this, the natural resources of New Zealand will now be examined. Emphasis will be placed on the quantity of each resource, the uses to which it may be put in New Zealand, and its nature and degree of exhaustibility.

The Land.

Resource components are part of the continuum that is land. Land, the "fabric" in which individual resources are interwoven, will be considered first. It varies in quality as a result, firstly, of the combinations of natural resources and, secondly, of the values placed on it by society.

The total area of New Zealand, exclusive of the island territories, is 193,736 square miles (1). Tables I and II show respectively major uses of land in New Zealand and the alienation of the land. Farming, New Zealand's major economic activity, occupies 44 million of a total of 66.4 million acres. It is therefore to be expected that the renewable resources, in particular the soil, water and

TABLE I. SHOWING GENERAL CLASSES OF LAND USE IN NEW ZEALAND.

	<u>Acres</u>
Grassland	31.4 million
Other farmland	12.6 "
Land in cities	0.4 "
National parks, reserves	5.1 "
State forest land	9.8 "
Other land - waste land, roads, water surfaces	7.1 "

Total land	<u>66.4</u> million acres.

TABLE II. LAND ALIENATION

	<u>Acres</u>
Crown land (including leases and licences)	18,256,493
Freehold (including all land held on deferred payment)	22,335,285
Leasehold	<u>3,427,119</u>
Total occupied area	<u><u>44,018,897</u></u>

Source: (N.Z. Official Yearbook 1966)

vegetation resources, have major economic importance for New Zealand. The largest single landowner in New Zealand is the Crown which also controls all unoccupied land and Maori land. As available land is taken up, competition for land contributes to increasing intensity of land use. This has resulted in an increase in the unimproved value of land, from £62,500,000 in 1878 to £1,300,000,000 in 1965. These figures are not, however, strictly comparable because of the changing criteria for land evaluation.

The Renewable Resources.

The resources examined in this section are subject, by cultural abuse, to impairment in quality or diminution of quantity. With careful use the resources may be renewed and maintained.

Air.

Air has resource value. It supplies oxygen and carbon dioxide essential for plant and animal life, and is a reception medium for waste fumes. In an industrialised society the level of pollution of air by waste fumes may reach serious proportions, and require remedial action to be taken. But in New Zealand air pollution is rarely a serious problem because urban centres and industrial concentrations are small. However, larger centres, such as Auckland and Christchurch, may have local pollution problems which demand remedial action.

Water.

Water is available in New Zealand as surface flow in

rivers and lakes and as groundwater. An average annual rainfall from 25" to 60", spread evenly throughout the year with marked seasonal fluctuations only in local areas, maintains the flow of major rivers at a fairly constant level. Table III gives the average discharges in cubic feet per second for two main rivers - the Waikato and the Rangitaiki - for January, July and November, as an indication of the steady annual flow of both rivers.

On many of the larger rivers, hydro-electric installations will tend to spread river flow more evenly throughout the year. Groundwater occurrences are to be found in most areas; but supplies will vary in terms of the demand, and seasonal shortages may occur in dry seasons where groundwater is needed for irrigation.

Water is a basic resource and its uses include public water supplies, industrial supplies, recreation, agriculture, irrigation, wildlife habitat, power production, navigation and for waste disposal.

It is estimated that domestic urban water consumption in New Zealand is approximately 80 to 100 gallons per head a day (2). The demand on water-supplies increases in proportion to increasing urbanisation and industrialisation. With a steady rise in the standard of living, the demand for water will increase for all users.

Water of natural quality is usually satisfactory for all uses. But it may be impaired through misuse by man. Pollution by sewage and industrial wastes is a major factor

TABLE III. AVERAGE DISCHARGES FOR THE WAIKATO AND
RANGITAIKI RIVERS FOR JANUARY, JULY AND
NOVEMBER IN CUBIC FEET PER SECOND.

<u>River</u>	<u>January</u>	<u>July</u>	<u>November</u>
Rangitaiki*	2,294	3,326	2,688
Waikato+	4,704	4,584	4,936

Source: Hydrology Annual No.11, 1963.

* Figures averaged over the years 1953 - 1963.

+ Figures averaged over the years 1906 - 1963.

in lowering the quality. The most serious water pollution problems will occur at urban centres with heavy domestic and industrial demands for water. In New Zealand the primary industries require the most water and cause the greatest pollution problems. For example, a meatworks may require over one million gallons of water per day, and will produce considerable quantities of wastes. At older works, these wastes may be emptied into the nearest stream.

Soil.

Soil is the medium for plant growth, and is therefore the basis of the agricultural industry in New Zealand. The soil varies in nature of development and quality throughout New Zealand in terms of the parent material from which it was weathered, the climate, the vegetation cover and the type of topography. The accompanying map, Figure 1, shows the general distribution of soils throughout New Zealand in terms of the three major soil groups - zonal or mature soils, intrazonal or less well developed soils, azonal or recently developed soils.

In their natural state, many New Zealand soils lacked important minerals which tended to limit their value for agricultural purposes. For example, in the central North Island the pumice soils, deficient in cobalt, initially limited the spread of settlement. Without improvement by artificial fertilisers, many of the soils deteriorate in structure and fertility under intensive utilisation, and become prone to accelerated erosion. This applies

Figure 1. The Soil Resource.

Reference

Zonal soils



Intrazonal soils



Azonal soils

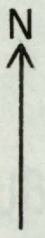


Alpine soils, bare rock



Source: A Descriptive Atlas of New Zealand.

Distribution of
the soil resource



0 miles 100

particularly to the steep-land soils which cover approximately half of New Zealand, and are most extensive on the axial ranges, in north-west Nelson, and east Taranaki. These steepland soils are shallow, relatively unstable, and subject to severe erosion under abusive land practices. The soil, particularly in steepland areas, may be damaged irreparably if erosion proceeds unchecked. Under conservation management most New Zealand soils can sustain intensive exploitation without serious deterioration in stability and fertility.

Grassland.

New Zealand grasslands cover a total area of 31.4 million acres. Native grasses make up 13 million acres, mainly on the axial ranges of the South Island. Improved grasslands make up 18.4 million acres of the total grassland, and largely occupy hill country and lowlands covered originally by native forest.

The native tussocks in their unmodified state are unpalatable for grazing animals. However, controlled burning and application of artificial fertilisers can improve the grazing value of the tussock.

The improved grasslands form the basis of the pastoral industry in New Zealand. They consist of high quality grasses such as perennial rye grass (Lolium perenne), and subterranean clover (Trifolium subterraneum), which are capable of sustaining intensive utilisation and of improving soil fertility. Without careful management,

improved grasses may deteriorate in value for grazing and as a surface cover (3)

Tussock and improved grasslands provide the raw material for the pastoral industry. The significance of this industry to the New Zealand economy is shown by the figures of farm income for 1964-65 for wool, £86.4 million; mutton and lamb, £80.9 million; beef, £40.5 million; and dairying £108.5 million. These made up 23%, 21%, 11% and 28% of the total farm income respectively.

Forest.

The forest resource covers 23.1 per cent of the total area of New Zealand. It consists of indigenous and exotic forests. Table IV indicates the areas covered by each major type of forest, and the ownership classes grouped on the basis of whether or not the forests are accessible for exploitation, in terms of their physical location; and whether or not they are merchantable in terms of species composition, or forest condition.

The accompanying map, Figure 2, indicates the general distribution of the indigenous and exotic forests in New Zealand. Much of the indigenous forest today is confined to the axial ranges of both islands and to National Parks and reserves. The exotic forests are mainly located in areas accessible to economic exploitation. The largest areas of exotic forest, for example, the Kaingaroa forest, were planted on poor land thought unsuitable for agriculture in the 1920's and 1930's.

TABLE IV. DISTRIBUTION OF INDIGENOUS AND EXOTIC FORESTS
IN TERMS OF OWNERSHIP.

<u>Class of Forested Land</u>	<u>Indigenous Forests</u>	<u>Exotic Forests</u>	<u>All</u>
	Acres (thousands)		
<u>Accessible and/or Merchantable Forest:</u>			
State forests	1,570	580	2,150
Unoccupied Crown land	180	-	180
Freehold and leasehold	450	580	1,030
Maori land	280	-	280
Reserves	180	-	180
Totals	<u>2,660</u>	<u>1,160</u>	<u>3,820</u>
<u>Inaccessible and/or Unmerchantable Forest:</u>			
State forests	5,290	-	5,290
Unoccupied Crown land	1,400	-	1,400
Freehold and leasehold	1,600	100	1,700
Maori land	800	-	800
Reserves	2,400	-	2,400
Totals	<u>11,490</u>	<u>100</u>	<u>11,590</u>
Totals - all forested land	<u><u>14,150</u></u>	<u><u>1,260</u></u>	<u><u>15,410</u></u>

Source: (N.Z. Yearbook 1966, p.438)


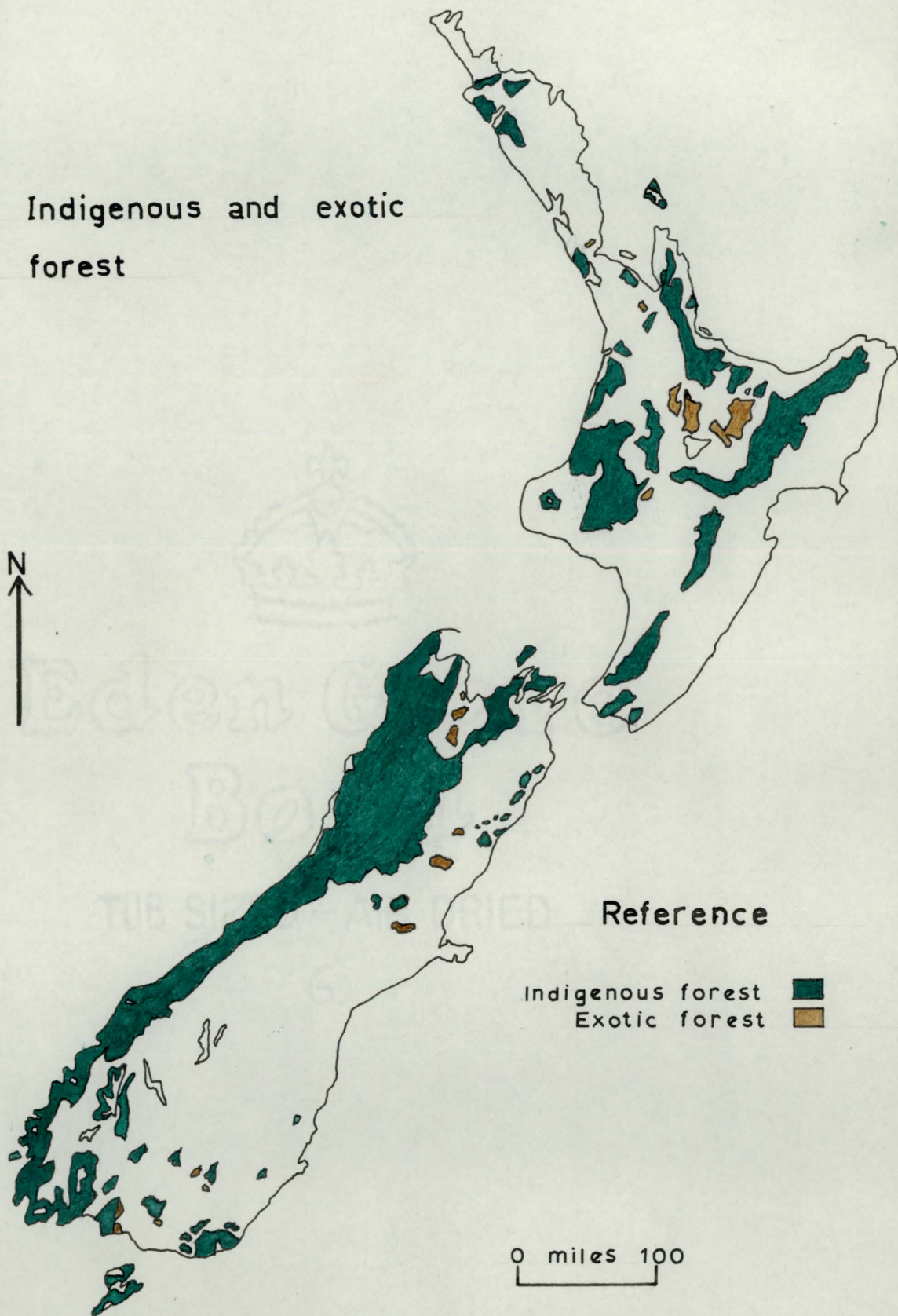


Figure 2. Indigenous and exotic forest.



Source : A Descriptive Atlas of New Zealand.

Eden Grove
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6

Indigenous and exotic
forest



Reference

Indigenous forest 
Exotic forest 

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The indigenous forest consists of two major forest types - the mixed broadleaf podocarp and kauri forest, and the beech forest. Of these two types the mixed broadleaf podocarp and kauri forest is commercially most valuable, supplying indigenous hardwood timbers, such as rimu (Dacrydium cupressum) and miro (Podocarpus ferruineus) for building purposes.

The exotic forests were planted in the 1920's and 1930's to meet the demand for softwoods and to relieve pressure of exploitation on the indigenous forests. Since the 1930's the exotic forests have been of increasing economic importance, both to the forest industry and to the general New Zealand economy. Of the total exotic forest area of 1,133,000 acres, Pinus radiata is the most important species, covering 706,000 acres, and making up 93% of the total cut of exotics. With a growth rate of 30 to 60 years to an economic size, suitable for exploitation, the exotic forests form the basis of the forest products industry, which, in 1963-64, had an output valued at £116,900,000 and provided employment for 25,065 people.

In its undisturbed condition the indigenous forest consists of a finely adjusted biotic community of tall dominants and dense undergrowth. As such, it is most valuable as a protective cover on watersheds, although this is seriously damaged by browsing animals which destroy the undergrowth. Continued browsing prevents regeneration and the indigenous forest will gradually disappear to be

replaced by scrub or open ground. Destruction of the indigenous forest also deprives native fauna of habitat. Forest conservation, based on sustained-yield management, aims at the constant renewal of indigenous and exotic forests to maintain their protective and productive values.

Wildlife and Scenery.

The native fauna developed in a habitat undisturbed by man. But the disruptive effects of European settlement depleted the native fauna until it can now only survive in its original condition on islands from which man is excluded. The scarcity of many species of native fauna has made them of considerable scientific and aesthetic interest.

The mainland habitat has been largely taken over by a wide range of introduced fauna. While these have aesthetic interest, they are more highly valued for sport. This recreational value has had to be balanced against the damage done to the forests and grasslands by browsing animals.

As a society becomes more urbanised, the recreational and aesthetic importance of scenery increases. Scenery in its natural state, as in the ten National parks, the scenic reserves and domains, is the most highly valued. Conservation of native wildlife and scenery demands the exclusion of all uses that would threaten their destruction or would prevent their renewal to their original condition.

The Exhaustible Resources.

Exhaustible resources consist of metallic minerals, non-metallic minerals, and fossil fuels. Levels of

exhaustibility may be identified in terms of whether a particular mineral may be used again, and for how long. Many of the metallic minerals - for example, gold, copper and iron - may be re-used frequently. Combinations of minerals as alloys may preclude further use. The fossil fuels, on the other hand, are truly exhaustible. They may be used once only. The map, Figure 3, shows the distribution of these three classes.















Metallic Minerals.

The exploitation of gold and silver resources in the 1860's reached an annual value of approximately £8.5 million which, in the initial stages of development of the country, made a very significant contribution to the economy (4). Diversification of the economy through the development of other natural resources reduced the significance of metallic minerals, and intensity of their exploitation declined. Generally, economic demand has not been sufficient, and technology not advanced enough, to warrant exploitation of the small, generally low-grade, deposits of metallic minerals. Those that have been exploited in a small way include copper, iron ore and tungsten ore. Recently, demand in New Zealand for iron and steel, and improved technology, have resulted in moves to exploit 650 million tons of west coast beach sands with a titano-magnetite ore content varying from 5% to 90% iron. (5).

Industrialisation will increase demand for any

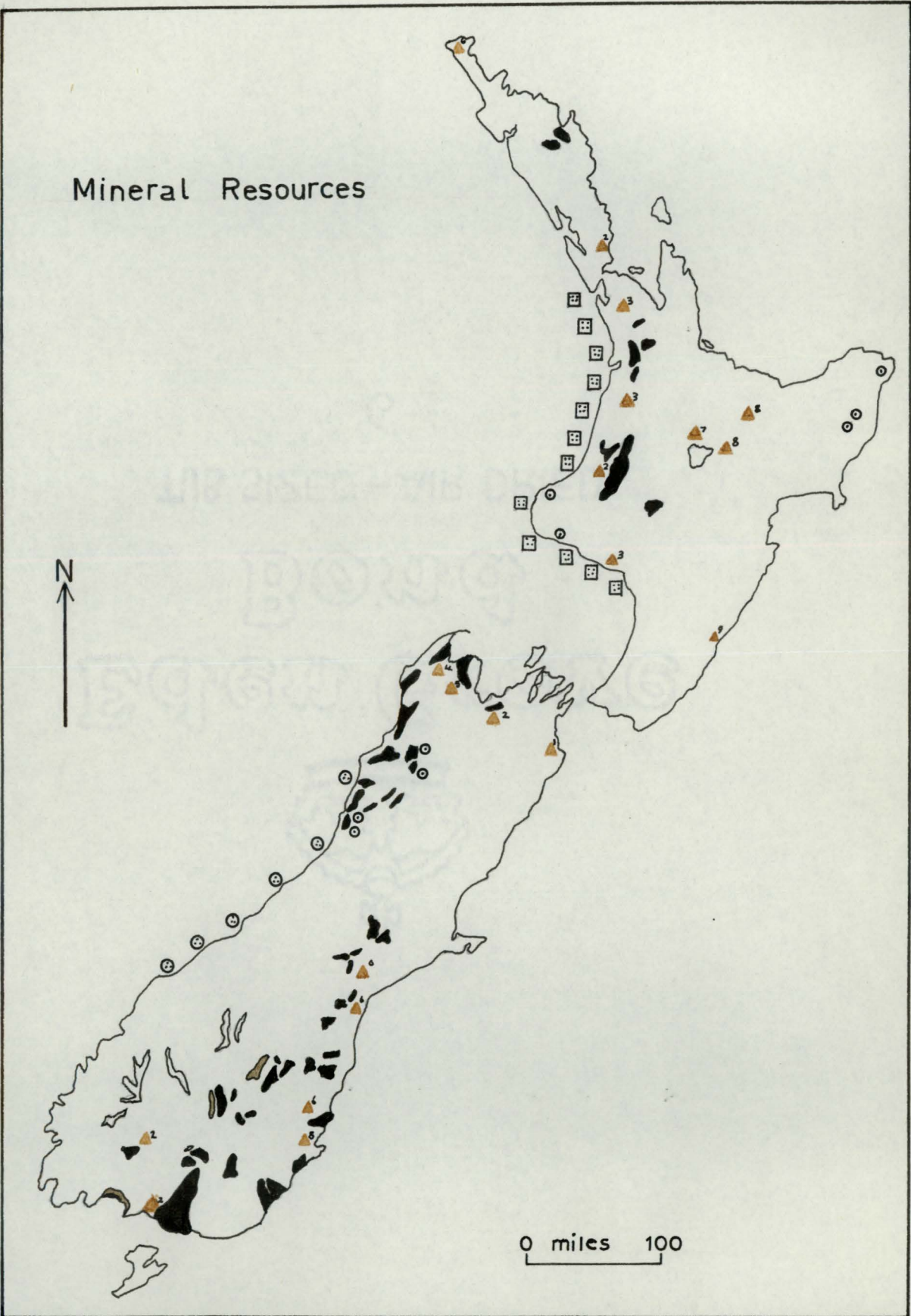
Figure 3. Mineral Resources.

Reference

-  Coal
-  Oil shale
-  Oil and gas seepages
-  Iron sands (Titanomagnetite)
-  Ilmenite sands
-  ¹ Salt
-  ² Serpentine
-  ³ Pumice
-  ⁴ Dolomite
-  ⁵ Asbestos
-  ⁶ Silica sand
-  ⁷ Perlite
-  ⁸ Diatomite
-  ⁹ Bentonite

Source: New Zealand Official Yearbook 1966

Mineral Resources



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metallic mineral occurrences found in New Zealand. Metallic mineral occurrences with possible future resource potential include bauxite in Northland (6), uranium in the Buller Gorge, manganese, mercury and antimony (7). In the event of the price of metallic minerals increasing overseas, these occurrences may yield sufficient metal to make their exploitation worthwhile, if only on a temporary basis.

Non-metallic Minerals.

The resource value of the non-metallic minerals lies in their role as industrial minerals: their significance to the economy grows with the increasing complexity of modern industry. In terms of value to the economy, the non-metallic minerals are the most significant mineral resources today, as can be seen in Table V.

The most important non-metallic minerals are the clays used for bricks, tiles, pottery and fillers; limestone for agriculture and industry; rock, sand and gravel for construction work, and other non-metallics the occurrence of which is rather more localised - for example, salt from Lake Grassmere, silica sand from Northland beaches and pumice from the central North Island. Occurrences of non-metallic minerals fluctuate in economic importance depending on demand and accessibility for exploitation.

Fossil Fuels.

The fossil fuels - coal, oil and natural gas - have resource value in energy production. In this role, coal is

TABLE V.

<u>Mineral</u>	<u>Total Value</u>	<u>Men Employed</u>
	£.	
Coal	8,119,254	3,631
Gold and silver	117,269	101
Other metallic ores	19,554	16
Other fuels	21,467	10
Quarries	<u>12,887,043</u>	<u>3,977</u>
Total for 1964	<u>22,174,487</u>	<u>7,735</u>

Source: New Zealand Official Yearbook 1966.

the single most important mineral resource in New Zealand.

New Zealand coal consists of three main grades - bituminous, sub-bituminous and lignite. The bituminous coals vary from weakly coking to strongly coking, and are located on the West Coast of the South Island at the Greymouth, Westport and Reefton fields. Because of their coking and steam-raising qualities, they are used mainly by industry, railways and gasworks. Estimated recoverable reserves of bituminous coal are 78,454,000 tons. The sub-bituminous coals are mined at the Huntly fields, Kaitangata, Ohai and Reefton. The coals have low-ash content, high reactivity and freedom from caking properties. They are especially well-suited to gasification, and are used mainly by households, hospitals, factory industry, and for electricity production at the Meremere coal-fired station. The lignite coals, poorest in quality, with a high moisture content, are used mainly for small local industries such as lime burning. Total recoverable reserves of all grades of coal are estimated at 752 million tons (8).

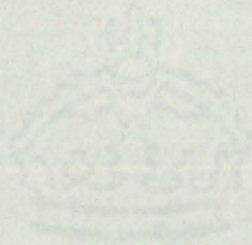
The only commercially significant oil and natural gas field is near New Plymouth. It began production in the middle of the last century, and by 1964 had produced a total crude oil output of 7,121,840 gallons. The Kapuni oil field has been proved capable of producing 60,000,000 cubic feet of natural gas a day, for approximately 30 years (9).

Conclusion.

For New Zealand, the renewable resources are of the greatest importance as they supply the basic necessities of life while forming the basis of New Zealand's prosperity. Because they are renewable resources, their continued availability for use has usually been accepted; methods of use are rarely questioned while the flow of the resources continues uninterrupted. Increasing pressure from population growth, economic diversification and competition for available resources, reaches a point where the flow of a resource to society is interrupted by depletion of supply, or by impairment in quality. The attitude to resource use - "everybody's business is nobody's responsibility" - is superseded by social action to change resource use practices in order to restore "flow" of the resource. Some resources, because of their nature, their location or their importance to the economy, show the effects of reckless use sooner than others.

The exhaustible resources are physically limited in terms of the amount of mineral that may be extracted from an occurrence. Where a resource, such as gold, is of particular value, exploitation may go through increasing stages of intensity, as the higher-grade ores are worked out. Eventually the effort and expense involved in recovery will exceed the value of the metal and production ceases. When a mineral is of considerable significance to the economy the prospect of scarcity may lead, either to

measures to ensure greater efficiency of recovery and use, or to a search for substitute minerals. The exhaustible resources will assume increasing significance with economic development and the establishment of secondary industries.



Eden Grove
Board

TUB SIZED - AIR DRIED

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III. DEVELOPMENT OF CONSERVATION ATTITUDES IN NEW ZEALAND.

In this chapter the development of the concept of conservation will be examined, covering the period from the commencement of systematic European settlement of New Zealand to World War II. During this period of 100 years definite changes in attitudes to resource use can be identified. The nature of the economic development of New Zealand during these years was such as to place dominant emphasis on the utilisation of the renewable resources. The exhaustible resources were not of basic significance to the general trend in economic developments, except for a brief but important period in the early decades of New Zealand's settlement.

THE RENEWABLE RESOURCES.

Three phases in the development of conservation attitudes to renewable resources in New Zealand are identified. From the 1840's to the turn of the century, the general attitudes to resource use were careless and wasteful. The land and its resources were abundant. Labour and capital were the scarce commodities, and were conserved by utilising, as extensively as possible, the resources available. Towards the turn of the century - 1890-1900 - the last remaining extensive areas of forest covered land, suitable for agriculture, were cleared by burning. The recognition of impending scarcity of the

forest resource led to a transitional period of widening recognition that a change was necessary in attitudes to resource use from extensive "wasteful" exploitation to increasingly efficient and intensive exploitation. From 1900 to the end of World War II, the idea of conservation was gradually extended from the forest resource to other resources.

1840 - 1900 Emergence of the Conservation Idea.

In the early decades of settlement most settlers were solely concerned with ensuring their survival in an environment that, prior to 1840, had been only slightly disturbed by man. The settlers proceeded to modify the environment to their needs. The first requirement was for land for settlement and cultivation. The dense bush of the North Island slowed down expansion of settlement considerably. On the other hand the eastern South Island with its open grassland areas suitable for extensive pastoralism and later for arable agriculture, attracted many settlers. Pastoralism, gold mining and wheat farming all took their roll in "mining" the natural resources of the South Island. The pastoralists gave little thought to the possible effects of the continued burning of the native tussock cover. The tussock, unmodified, was merely an obstacle to land use: burning, however, converted unpalatable tussocks into suitable feed for sheep.

To most settlers the forests were more of a liability than an asset; only the sawmiller utilised the forests for

commercial return in those areas accessible for exploitation. Increasing pressure for land, and technological developments in the 1870's and 1880's provided an incentive to clear the dense forests of the North Island for the establishment of pastures for dairying. The Government accelerated destruction of the forests by making land leases and sales to settlers conditional on clearing and settling the land. Burning was the quickest means of clearing the forest, and from 1840 to 1900 millions of acres of native bush were thoughtlessly fired. For the early settlers, "waste" held no meaning when related to destruction of the forest. The land existed to be used for their benefit.

The Forests.

It was during this period that there emerged the first expressions of the concept of conservation. Concern was mainly with the wholesale destruction of the native forests and the resulting consequences. Early warnings were made about the consequences of destructive land clearance policies. In the 1850's Dieffenbach warned Wellington settlers that "the earth would slip from the hills if the trees were exterminated." But this was dismissed as being "about 9/10 mere fudge." (1)

Members of the Royal Society of New Zealand deplored the rapid destruction of large areas of native forest, especially by widespread and indiscriminate burning. They held to the view that - "Man himself is a part of Nature,

and a part charged with very great responsibility for the welfare of the whole." (2) The Royal Society, throughout this period, called for restraint in clearing and settling the land, and continued to voice its alarm at the reckless destruction of the native forests and its fauna and flora communities.

The increasing scarcity of timber in the South Island, resulting from the demands of the goldfields, gave rise to concern at the condition of the native forest. In 1869 a motion that the "Government should take steps to ascertain the present condition of the forests of the colony, with a view to their better conservation" (3) led to an assessment of the forest being made by Dr. Hector of the Royal Society. He claimed that between 1830 and 1868, 25 per cent of the North Island forests had been destroyed. Alarmed members of the Royal Society prophesied the "almost total destruction of the forests of the North Island" as being "but a question of time unless stringent measures are taken to conserve them." (4)

In 1874 Vogel introduced the Forests Act in which provision was made for the setting aside for forests of three per cent of the land of each province in return for the Central Government assuming responsibility for the major burden of railways construction. Those who advocated forest conservation emphasised the utility of the forests. For Vogel "the subject forcibly presented itself ... how very large was the demand for timber which arose from our

railway works and our telegraph construction ... "(5). From America, such authorities as G. P. Marsh repeatedly warned of the disastrous consequences of the destruction of the forests. These warnings were cited as being of significance for New Zealand.

Despite the warnings of impending scarcity of the native forest and of the dangerous consequences of the removal of the forest cover, the attempt to set aside a portion of the colony's forests as "a magnificent property which will more than pay the liabilities we have devolved upon future generations"(6), was unsuccessful. This was the first definite expression of the conservation motive at an official level. During the debates surrounding the Forest Act, the spectre of a scarcity of a natural resource, was raised for the first time. The suggestion was made that conservation should be the responsibility of the Central Government. In commenting on this in 1879, Campbell Walker said that "whatever is done must, of necessity, be done in the interests of the colony at large ... the only reason for State interference and direct action is that damage to forests cannot be repaired in a day ... "(7).

Vogel's public works and immigration policy during the 1870's, the Government's prerequisite of land clearance as a condition for granting leases of Crown Land for settlement, and in the 1890's the development of refrigeration, enabling meat and dairy products to be shipped to European markets, ensured that the native forest continued to be destroyed at

a steady rate despite the growing body of conservation opinion. Protests over the destruction of a valuable resource continued. Lecoy warned that bush clearance operations, "if continued, will, in the course of a few years, completely alienate the most valuable portion of the public estate. Thereby a source of State income, by nature made lasting and abundant, will be dried up for ever ... "(8).

The general lack of concern over the extensive destruction of the forest was due to the inability of the settlers to appreciate the consequences. For most settlers the native forest was so abundant, the burning of a few thousand acres was regarded as being "neither here nor there." Few queried the statement that, "there is no prospect of a dearth of timber, or injurious effects from clearing for the present or in the immediate future" (9).

Native Fauna and Acclimatisation.

The burning of the native forests destroyed, not only a potentially valuable supply of timber, but also the habitat of a unique native fauna. Few settlers were concerned at the disappearance of the fauna, except those few naturalists who recognised its value as one of the few remaining examples of a fauna that had adjusted to its habitat in the absence of man. To most settlers the native fauna was merely another facet of an alien environment which they sought to modify to resemble conditions in Britain.

Part of the process of modification was the "craze" for acclimatisation. A wide range of plants, birds and mammals was introduced to provide for, "the same sports and studies that make the remembrance of our former homes so dear." To ensure that the introduced birds and mammals survived, such measures as the Protection of Certain Animals Act, 1861, were introduced, which protected or stringently regulated the taking of these species. The only native species to be accorded similar protection were those birds valued for sport and food.

Inevitably some acclimatisation experiments got out of hand. Of these, the rabbit posed the most serious problem. Rabbit infestation became so serious a threat to the pastoral industry upon which the colony already depended for much of its livelihood, that the Rabbits Nuisance Act of 1875 was passed, declaring it to be a pest that was to be eradicated. The establishment of a profitable export industry based on rabbit skins, aggravated the problem rather than assisting to solve it. Few settlers were willing to embark on a campaign of extermination against an animal that brought a valuable supplementary income.

Early concern expressed at the wasteful nature of land use practices, and at the harmful effects of those practices, was disregarded. Concerned with the day to day problems of obtaining a living from the land, there was little incentive

for settlers to consider the future needs of the country for timber, when timber was to be had in abundance. They did not consider the effects of heavy grazing practices, rabbit infestation, and forest and grassland destruction on the stability of hill country soils. To most settlers, one growing blade of grass was worth two trees.

1900 - 1920 Changing Attitudes to Resources.

During the period 1900 to 1920, general attitudes to land use practices began to change. The period of transition could in reality be said to begin in the 1890's as the last major areas of land in the North Island considered suitable for settlement were cleared of their forest cover, and it became increasingly obvious that land suitable for agriculture would not be as readily available in future. With growing pressure of population, improved transportation opening up forest areas for economic exploitation, the increasing value of timber for internal use and export, despoliation of scenic attractions by forest fires, the forest becomes increasingly worth conserving.

Between 1890 and 1900 some 14,000 acres of forest were destroyed. It was to the Government that those who felt alarm at the rate of destruction of the forest and its results, looked for a lead in changing exploitation practices. Because "the exigencies of individual interest ... demand more immediate returns for capital or labour ..." (10), individual resource users would exploit

the native forest for what it was worth with little thought or concern as to supplies in the future. The Government, however, ruled the country not only for the present generation, but held it in trust for future generations and for the Government to "permit squatters or others to burn timber off the hilltops and above the headwaters of rivers is a crime against the nation."

Scenery Preservation.

In 1903 the Scenery Preservation Act was passed, consolidating previous measures which set aside areas of forest for watershed protection, and as scenic reserves. This move came in response to "a growing feeling throughout the colony that we were fast allowing to slip by the opportunities of saving to this colony the beauty-spots which were, alas, now not very common ... "(11).

Land for agriculture still took precedence over the preservation of any area of forest. Care was taken to reserve only "those areas which cannot support more than a comparatively sparse population, and from their general character are not well suited for agricultural or pastoral purposes ... "(12). Allowance was made for the removal of reserves from protection, should they prove valuable for settlement.

When it came to a conflict between maintaining an area of forest in its natural condition or clearing it for settlement, to most settlers the land was more valuable than the scenic, protective or commercial value that the

forest might offer. The idea of preserving a "priceless heritage" for the enjoyment of future generations had gained recognition but not general acceptance.

State Forests.

Opposing the sentiments of the "preservationists" who advocated complete removal of areas of the native forest from man's destructive attentions and "reservation ... with a barbed wire fence"(13), were those who preferred to emphasise that the forests existed to be utilised for the benefit of the nation with a minimum of waste, while ensuring a continued supply of timber for future requirements. This attitude developed as a result of a series of reports by foresters during this period - by Kirk and Perrin in the 1890's, by Cockayne in 1909, by Phillips-Turner in 1918 and by L. McIntosh-Ellis in 1920. These reports deplored the burning that destroyed millions of pounds worth of valuable softwoods.

Emphasis was placed on more efficient control and exploitation by the Government of a commercially valuable resource - control, that is, of the exploitation of the State Forests. It was accepted that individuals with more immediate economic interests in utilising the forest could not be expected to undertake long-term conservation plans to perpetuate the forest resource. A "central administration" was declared to be "essential" for proper forest conservation. The farmer, the sawmiller, local government, all had their special interests in land

utilisation and could not be relied upon to sacrifice those interests for the good of the State. A laissez-faire policy was declared to be dangerous and "true patriotism, concerning itself more with the future of the country than with the present, demands the application of such measures as will ensure a sustained supply for ourselves and those that will succeed us." (14)

Increasing demand for native softwood and hardwood timbers for export resulted in a rapid increase in the commercial value of native timbers. A series of forest fires, culminating in the Raetihi fire of 1918, destroyed large areas of forest during this period. At the same time, the phenomenal consumption of timber during World War I accelerated the depletion of the forest. These factors combined to increase pressure for a change in the laissez-faire policy of forest exploitation.

Wildlife.

The Royal Society of New Zealand had constantly expressed concern at the destruction of the native flora and fauna. Their continued pressure and the possibility of extinction of some of the native fauna led the Government to declare Little Barrier and Resolution Islands as reserves for the protection and preservation of the native flora and fauna, and to provide for the absolute protection of most of the native fauna in the Animals Protection Act of 1907.

While most of the introduced wild-life were still carefully protected or their use strictly regulated, Acts

consolidating and strengthening measures against rabbits and small birds in 1902, recognised that "most of the attempts at acclimatisation that have been made in this country have been unfortunate."(15) The Fisheries Conservation Act of 1902 sought to provide protection of the habitat of the introduced fresh-water game fish by "preventing the pollution of streams by sawdust or sawmill refuse, lime, sheep-dip, flax-mill refuse, or any other matter or liquid noxious, poisonous, or injurious to fish."(16)

The absolute protection of much of the native fauna resulted from a realisation that many species were disappearing as a result of habitat destruction and reckless killing by many settlers. It was one thing, however, to secure legal protection; it was another to secure the willing co-operation of the general public to respect such protection. Many settlers persisted in regarding native fauna as over-abundant and even a threat to valued introduced game animals in competing for habitat.

During this period the effects of destructive land utilisation practices became increasingly apparent. The effects were most obvious in the altered landscape. The final large areas of forest-covered land were cleared and sown in grass. With the widespread disappearance of the forest, the native fauna also became increasingly scarce and retreated before the spread of settlement into more inaccessible, less disturbed areas. In many areas, places

Plate 1. A landscape of blackened stumps. The only feasible method of clearing the land for agricultural settlement was by firing the forest and sowing grass between the stumps that remained. The stumps were gradually removed at the cost of much expense and effort. At the turn of the century most settlers regarded this as a sign of progress. A growing number, however, were beginning to protest against the indiscriminate burning.

Photo: T.I. Oliver.



well known for their scenic beauty were converted into a landscape of blackened stumps. Increasingly the natural, undisturbed landscape became appreciated as representing something more than potential value as agricultural land. As the native fauna, forests and the natural scenery disappeared before the spread of settlement, there was growing concern that a heritage would be lost forever.

1920 to 1945-6 Extension of the Conservation Concept.

Forest Conservation.

In 1920 L. McIntosh-Ellis, estimating a considerable population growth in the near future, predicted that the annual timber consumption would be one thousand million super feet, and that to meet this demand a radical change in forest policy was required. He declared that a forest policy should involve far more than economies in utilisation; a conservation policy directed by the Government should aim at "placing the forest industry of New Zealand on a sound and permanent footing. It ensures to the people, the manufacturer, and the consumer a fair and just management. In short, it means the greatest good to the greatest number in the long-run."(17)

Based on this report, the 1921-22 Forests Act established the Forest Service to administer the State Forests on the basis of this multiple-use concept of conservation. This was a direct adoption of the conservation policy developed in the United States by Theodore Roosevelt

and Gifford Pinchot which sought to provide a solution as to how a democratic government could regulate the exploitation of a whole range of natural resources, in the interests of the people, to ensure "use without abuse".

Multiple-use forest conservation was based on scientific principles of forestry. While a forest was recognised as fulfilling many functions as a source of raw material for industry and commerce, as wildlife habitat, as protective cover on watersheds and as scenery, each forest was managed according to its dominant function. A production forest would be managed to yield raw materials for industry and commerce. Other uses were not excluded, however, provided they did not interfere with this dominant function and the aim of multiple-use forestry was to prepare working plans for each forest, setting out its range of functions and how these were to be co-ordinated for efficient conservation.

Immediate concern over the condition of the forests was confined largely to the prospect of a "timber famine". Taking advantage of the ample labour available during the Depression, both the State and private companies undertook an extensive planting programme. Between 1925 and 1935 some 600,000 acres of exotic softwood forests were established on land regarded as too poor for agricultural use. The Kaingaroa State Forest which was established during this period on the cobalt-deficient pumice soils of the Volcanic Plateau, central North Island, is an example. These forests were intended for one main purpose - the

Plate 2. The Kaingaroa State Forest was established during the 'boom' in afforestation in the 1920's and 1930's. The aerial photo of the forest shows the operation of sustained-yield management, the block in the foreground being composed of young trees and surrounded by blocks varying in age and maturity.

N.Z. Forest Service Photo by J.H. Johns, A.R.P.S.



supply of timber for industrial and commercial needs. Initially the exotic forests were managed with that object in view and other uses which threatened to disrupt management plans were excluded.

Nature Preservation.

In its application by the State the multiple-use concept of regulating forest use revealed inherent difficulties. The Forest Service found difficulty in formulating working plans for particular forests, especially indigenous forests. The demands of scientific forestry conflicted with those groups that opposed any interference with the indigenous forest. A growing appreciation of the scientific and aesthetic values of the undisturbed natural environment led to the establishment of a number of organisations interested primarily in the preservation of nature as it had been prior to man's arrival in New Zealand. Whether the societies were essentially scientific - for example, the Ecological Society - or emotional in character - for example, the Forest and Bird Protection Society, they had a common interest in the preservation of nature for posterity.

The conflict over the future of the Waipoua State Kauri Forest illustrates both the difficulties of a Government department in planning for use of a resource on the basis of multiple-use conservation, and the basic divergence between the two streams of conservation thought - the Nature preservationists and those who seek to provide for a variety of demands placed on a resource.

In 1909 it was declared that the Waipoua Forest, one of the last remaining extensive areas of kauri forest, was "set aside, to remain in a state of nature for all time."(18) In 1939 when the Forest Service was given power to cut and sell timber from any forest area, an assurance was given that the Waipoua Forest would be left alone. The Forest Service, however, opposed the "locking-up" of such an extensive area of native forest and stressed that the kauri forest would be maintained in better condition if it was managed on scientific forestry principles. This would enable not only the removal of dead trees and older trees to maintain the forest in healthy condition, but also would yield valuable hardwood timber. At the end of World War II the Forest Service announced its intention of restricting the undisturbed area of Waipoua Forest to 4,000 acres, and of placing the remaining 32,000 acres under scientific management. Such a move was strongly opposed by those who wished to see the kauri forest remain in its undisturbed state. The pressure placed on the Government to declare the kauri forest inviolate was expressed in statements in publications such as Forest and Bird. In this it was stated that, "Nature has entrusted these wonders of the world to our charge We must safeguard them for the admiration and wonder of the people."(19). The Government responded to this pressure by declaring the Waipoua Forest a sanctuary in 1952.

Wildlife.

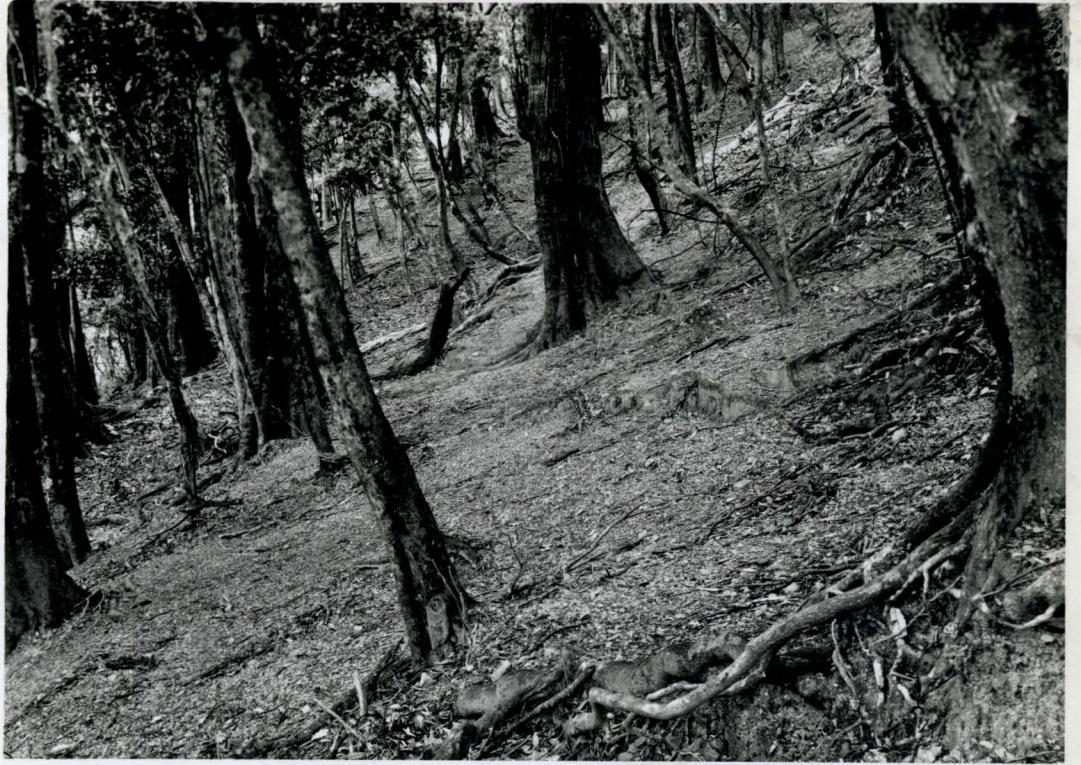
Conflicts between different interest groups over the management of the wildlife resource, also began to develop during this period. While there was general recognition of the desirability of protecting the native fauna for posterity, the major conflict of interest came over the question of control of introduced wildlife. Increasingly such animals as deer and opossum, which were of considerable recreational importance and had been partially protected since their introduction, were proven by the Forest Service and nature preservation and scientific societies to be major threats to the forests. It was declared that "there is only one policy that can be pursued in the national interests ... the aim must be to completely exterminate the deer."(20) In 1930, in the absence of any agreement of control of deer and other such pests, the Government, strongly opposed by the acclimatisation societies, lifted protection from the deer and adopted a policy of complete extermination. The value of many introduced species of game for recreation could not compensate for the damage they caused to other natural resources, particularly the forest.

Soil Conservation and Rivers Control.

The increasing inability of the land to support intensive land use practices and its consequent deterioration, led to a steady decline in productivity in many areas of New Zealand, and accelerated erosion on most hilly areas. This, together with the frequent floods which became more

Plate 3.a and b. Plate 3a shows an area of protection forest on the Haurangi Range and the damage that has been caused to the forest floor by deer, goats and pigs. 3b shows indigenous forest at the head of Stokes Valley, near Wellington, which has been protected from animals.

N.Z. Forest Service Photo by J.H. Johns, A.R.P.S.



3 a



3 b

devastating as settlement expanded on floodplains and lowlands, led to awareness of the need for action to combat the deterioration of the land.

Early warnings were not lacking of the results of reckless land utilisation practices, developed by the early settlers and carried into the nineteenth century. Engineers soon tired of seeing their river control works swept away by every flood, and looked for causes of this increasingly serious problem.

Initially the problems of river control and soil erosion were regarded as being entirely separate. The damage from floods brought the problem of river control to general notice in the 1920's and separate Government departments, Public Works and Internal Affairs in particular, made their own investigations. At the same time the Agriculture Department investigated the problem of land deterioration and soil erosion. The development of the soil conservation movement in the United States, and the writings of conservationists, such as H.H. Bennett, pointing out the results of land use practices that abused the land, highlighted the implications of soil erosion and its effect on agricultural prosperity. In the 1930's a series of disastrous floods and accelerated soil erosion, culminating in the Hawke's Bay floods of 1938, prompted many people to assess the damage caused by the extensive clearing of forest cover from steep hill country, and by grazing practices.

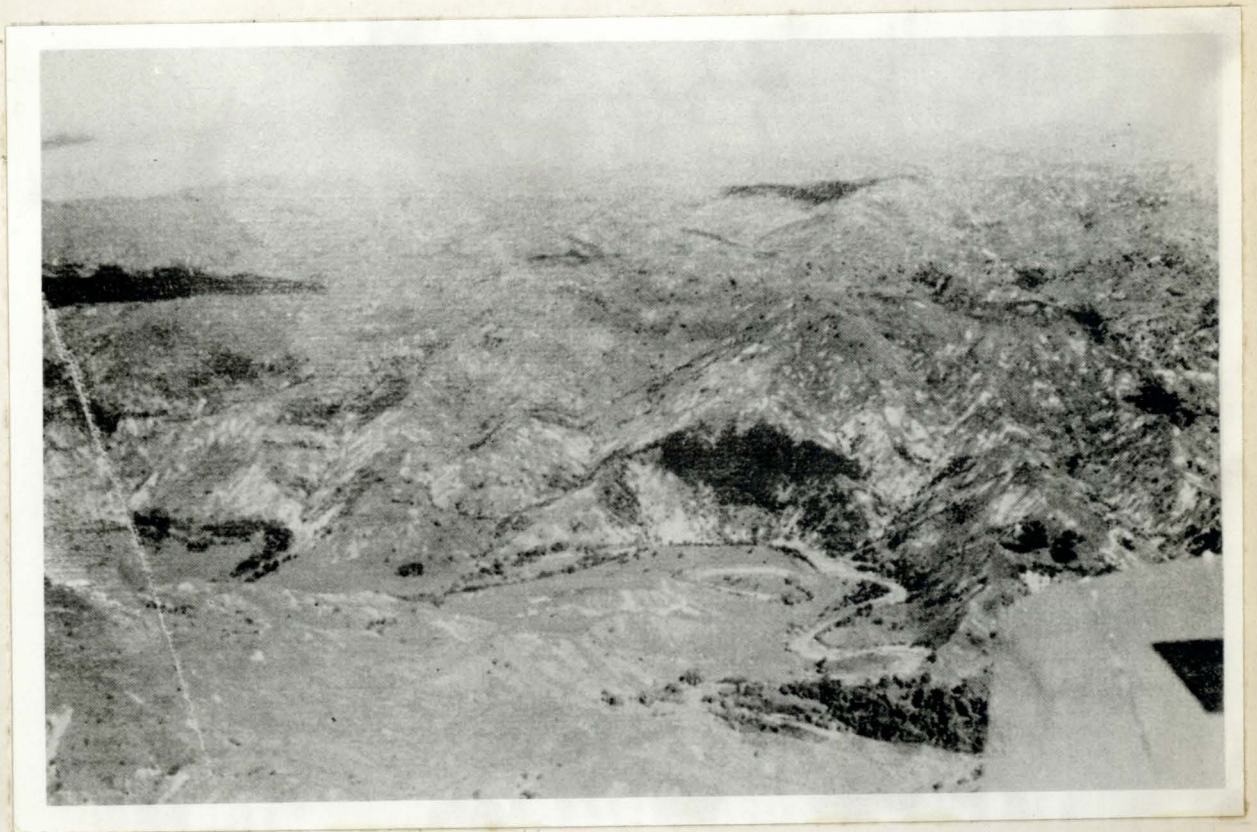
The real scope of the problem was not appreciated until the Government responded to pressure to investigate the whole question of flood control. An investigation committee produced a preliminary report that pointed to an interrelation between soil erosion and flooding, and suggested that the problem lay with the methods of land utilisation. A Rivers' Control Committee in 1941 considered evidence presented by farming organisations, local government, and Government departments to establish the causes of flooding and land deterioration. The conclusion was that the destruction of plant life by excessive burning, over-grazing, and damage by deer and rabbits, had resulted in increased runoff, flooding and accelerated erosion.

The problem was considered to be so serious and widespread that in the national interest the Government should undertake to direct remedial measures and to bear much of the cost. A scientific survey of the extent of soil erosion in New Zealand, undertaken at the same time, revealed that approximately 60 per cent of the area of the North Island was subject to erosion of varying intensity. A similar situation existed in the South Island, particularly on areas classed as grazing lands.

In 1941 the Soil Conservation and Rivers' Control Council was set up as a central co-ordinating authority for Government Departments concerned with soil conservation and flood control. The Council recognised that success in soil conservation depended on making "the people of this country

Plate 4. This aerial photo of the east coast, North Island shows a typically erosion-scarred landscape. Such a sight aroused increasing concern in the late 1930's. This photo was originally published in the Soil Conservation and Rivers' Control Council Bulletin, The Sky's the Limit, under the caption, "Down to the sea in slips."

Photo: Soil Conservation and Rivers' Control Council.



aware of the problems confronting them."(21) Virtually no research had been done into the nature of soil erosion, and how soil conservation techniques could best be applied to New Zealand conditions. As a result, the general statements made by the Council to draw attention to soil erosion, alienated the farmers who based their evaluation of pasture capability on practical experience and regarded the scientist's assessment of soil erosion problems as exaggerated, if not deliberately inaccurate.

The report of the Sheep Industry Commission, 1949, expressed alarm at the approach of the soil conservationists, and at the refusal of the Council to compensate farmers forced, in the interests of soil conservation, to take part or all of their land out of production. It was considered that erosion was not a factor of national consequence to the sheep industry, and that where a problem existed, it could be safely handled by local authorities.

To the farmers, soil conservation was a matter of economics. Before most farmers were prepared to undertake expensive soil conservation measures, it had to be proved that these would result in greater productivity than traditional land use practices.

EXHAUSTIBLE RESOURCES.

Gold.

During this period the most intensive land exploitation took place with the recovery of alluvial gold. In terms of the population attracted by the gold discoveries, and of the

Plate 5. Erosion problems in the South Island hill country have been centred around over-grazing, indiscriminate burning of the tussock cover, and rabbit infestation. This photo shows severely depleted, sheet, scree, and gully eroded native tussockland typical of the drier rabbit-infested mountain lands of the South Island.

Photo: Soil Conservation and Rivers'
Control Council.



export income earned, gold was an important resource in the early development of New Zealand. The gold rushes of the 1860's increased the population of the South Island by approximately 100,000. This figure excludes the natural population increase for the same period.

Several phases in gold exploitation can be identified. In 1861 Gabriel Read's discovery of gold in Otago initiated a series of major gold rushes - to Otago fields, 1861-1864; to Marlborough in 1864; to Westland between 1864 and 1867; and to the Hauraki fields from 1867 to 1869. The South Island gold rushes concentrated on recovering gold from river gravels. Rich quartz veins were ignored because of the greater effort and expense in working the veins. Initially alluvial gold deposits were "panned" by hand, and sluicing was used as the more easily recovered gold was worked out. The rapid rise and decline of these gold rushes was due to the very high concentration of prospectors working fields. For example, up to 6,400 diggers prospected the Arrow and Shotover rivers, and the more readily recoverable alluvial gold was worked out in a very short time.

Working quartz reefs required expensive machinery to crush the quartz, and early claims were worked by mining partnerships. The cost of recovering gold from quartz reefs was too high to enable small concerns to remain economic for long, and larger joint-stock companies took over as the more easily worked reefs were exhausted.

In the 1880's the working-out of richer alluvial gold deposits and quartz veins led to a steady decline in gold production, but it was revived in the 1890's and 1900's by new technological methods. The introduction of the cyanide process in 1889, made possible the development of low-grade gold and silver ores in quartz reefs in the Waihi fields. In 1898, sluicing was replaced by the bucket dredge in Otago and the West Coast. Two peaks in gold production resulted. In 1866, the gold rushes produced 740,000 ounces of gold. In 1891 gold production dropped to 170,000 ounces, but in 1907 with the development of the cyanide process and bucket dredging, it revived to a peak production of 550,000 ounces(22).

The development of gold production in New Zealand illustrates the nature of metallic resource exploitation. Due to the high unit value of metallic minerals, efficiency of utilisation is encouraged. A metallic mineral occurrence will be worked to the limits of available technology. Increasing scarcity of the metal encourages development of more sophisticated methods of recovery. These are usually more expensive and the effort required to recover the metal is greater. In each stage of recovery a point is reached when it is either uneconomic to continue to exploit the metal, or the methods available are not sufficiently sophisticated to recover the lower-grade ones. When this point is reached, production of the metal ceases or becomes negligible.

Coal.

The history of the coalmining industry points to the more valuable grades of coal being worked first in areas which were either in close proximity to large populations or to ports to enable export shipments. The mining of high-grade steam raising bituminous coals began on the West Coast of the South Island in the 1860's to supply fuel for the goldfields, and later for shipping. In 1865 the discovery, by kauri-gum diggers, of coal in Northland led to the development of the Kawa Kawa field - for a short time the biggest producer in New Zealand. All coal seams were worked underground by the "bord" and "pillar" system, and methods of mining did not change much over this period. (23).

Virtually all the early development of the gold and coal resources was due to private initiative, the role of the Government being largely confined to controlling mining and prospecting. The Coal Mines Act of 1925 and the Mining Act of 1926 specify the conditions of mining leases and prospecting licences. Because of the potential value of minerals for economic development - whether metallics, non-metallics, or fossil fuels - the emphasis has been on stipulating efficient operation of leases. With the exhaustion of early gold fields, mineral production declined in the period from 1900 to World War II and this contributed to the belief that New Zealand lacked valuable minerals.

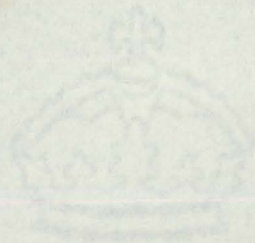
Conclusion.

Attitudes to conservation have developed with the spread of settlement and the economic development of New Zealand.

Dominant emphasis has been on renewable resources. Three phases in the use of these resources have been identified. During the early phase of destructive exploitation the settlers strove to modify the environment to their needs. Because the resources were renewable in nature, they were regarded as being unlimited in availability. This attitude encouraged misuse. The widespread burning of native forests was criticised as wasteful, but the criticism was ignored. At the turn of the century moves toward conservation were made as the effects of misuse became apparent. In the third phase action was taken to restrain use and restore the damaged resources or prevent their further depletion. Economic and social development had caused a change in attitude. Recognition that short-sighted exploitation was not in the interests of a developing country led to Government action to instil a sense of social responsibility in resource use.

Indirectly, conservation measures were also applied to the exploitation of the more valuable exhaustible resources. Emphasis was laid on the development of sophisticated methods of recovery and use, particularly by the gold industry, to enable the exploitation of low-grade ores. Conservation

was directed not at restraining use, but at increasing the efficiency of recovery and use to postpone the exhaustion of mineral occurrences being worked.



Eden Grove
Bond

TUB SIZED - AIR DRIED

6

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IV. CONSERVATION IN THE LAST TWO DECADES.

During the last two decades, a rapid expansion in population, and economic diversification have been of importance in the development of conservation policies and attitudes. The population of New Zealand - 1,759,526 in 1946 - almost doubled to 2,676,919 by 1966. At the same time, urban to total population increased from 69.6 per cent in 1951 to 73.9 per cent in 1961(1). During the same period, there has been a rapid development of secondary industry. These trends have led to changes in conservation policies to renewable resources. Exhaustible resources have increased in significance to the economy and mineral potentiality has, consequently, been reassessed in the light of future mineral needs.

THE RENEWABLE RESOURCES.

Under pressure of population growth, urban development and economic diversification, renewable resources were increasingly recognised as valuable national assets which should be conserved to allow their constant renewal and continued availability for use. The range and intensity of demands placed upon available resources prompted the Government to assume increasing responsibility for co-ordinating resource use in the national interest.

Opposing this "progressive" conservation idea of developing resources while maintaining a fair balance

between uses and users, is the "orthodox" idea of conservation - nature preservation. National planning for resource use must base decisions on the utility of resources and the monetary value they hold for the country, while nature preservationists base their evaluation of resource development on aesthetic, recreational and scientific needs that frequently cannot be directly assessed in monetary value.

The Role of the Government in Conservation.

Anticipated problems in resource use.

The rapid pace of industrial and urban expansion during the late 40's, brought the first indications that restraints on the use and abuse of water and air resources were insufficient to ensure that the "flow" of either resource was not damaged or diminished. The problem of water and air pollution experienced by more industrialised countries, and the costs of processing effluent and seeking knowledge of acceptable discharge volumes, caused administrators to control the problem before it became serious by imposing regulations on resource users.

Early warnings came from Auckland and Christchurch, where local administrators were prompted to urge immediate national action. Until the 1950's waste materials had been emptied into the nearest stream. But the urban population was small, and the level of industrialisation low. The abuse of water supplies did not present serious problems. However, in 1953 it was noted that "the population is

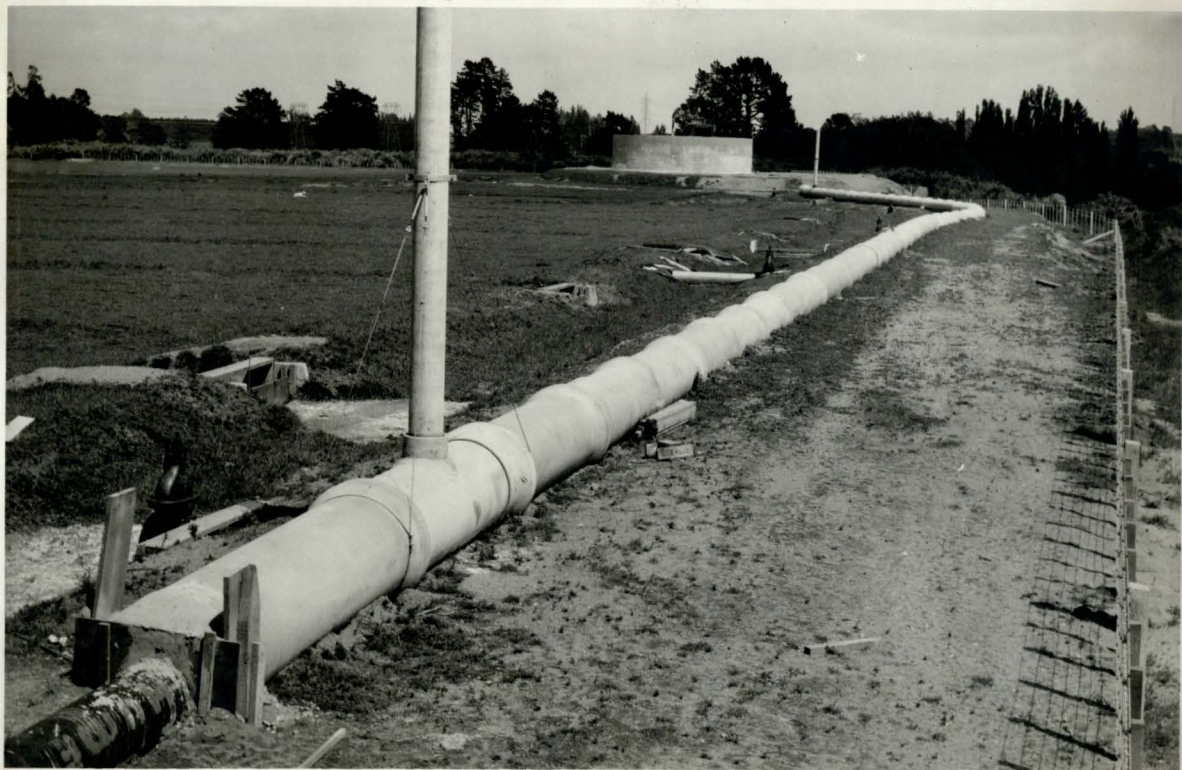
steadily increasing and, if this matter of maintaining the purity of waters is not taken hold of, the trouble will gradually become considerably worse than it is today The main thing will be to have adequate time in order to cause as little upset as possible."(2)

Under the 1953 Waters Pollution Act, an Advisory Board was formed with a wide representation of water users, particularly local authorities and representatives of industry. It hoped to prevent further pollution by securing the co-operation of water-users. A potential problem of water pollution was recognised, but industry, in particular, did not have an incentive to go the whole way in nuisance abatement. Its principal purpose is production and profit-making, and any expenditure that cannot be balanced by income is to be avoided unless necessitated by law.

The emergence of local problems of air pollution caused measures to be taken to prevent it reaching a serious level. In 1956 provision was made for the establishment of air pollution criteria for "problem" industries. Under the Health Act chemical inspectors were appointed to inspect industries, and to lay down procedures to control the discharge of pollutants. While W. A. Damon reported in 1956 that smoke pollution in New Zealand was "not such as to justify national legislation"(3), the experience of overseas countries and air pollution problems at Christchurch and Auckland, prompted the Government to formulate "Smoke Regulations" in 1964. The application of these by local

Plate 6. Pollution control regulations now being enforced on the Waikato River have led to many industries, particularly food processing industries, installing waste treatment equipment. In the case of the meat processing works at Cambridge, this equipment is elaborate and expensive. The photo shows a view of the partially completed installation. The concrete pipe will carry wastes from the factory. Beyond the pipe to the left can be seen concrete ducts through which the wastes will be channelled into ponding areas. The effluent, after treatment, will be channelled into the Waikato River.

Photo: P.D.H. Allen.



authorities was to be optional.

As population growth increased pressure on the land, serious problems became apparent in the Government's multi-purpose approach to forest, soil and water conservation. Conflicting demands on resources revealed inadequacies in existing conservation measures. Government departments could no longer assume that conservation policies were adequate, and the Government was urged to revise these to meet the needs of a more urbanised and industrialised society.

Forest conservation.

Forest conservation policies administered by the Forest Service since 1921-22 were intended to meet future timber needs by establishing exotic forests, and to maintain indigenous forests as watershed protection. Although they met with no initial opposition, the intense demand for land after the War resulted in a serious conflict between farming and afforestation. Inferior land that had been planted with forests could, now, due to the application of artificial fertilisers, be farmed. In the 1950's pressure to allow forested land, once cut-over, to revert to agriculture increased due to the drive for increased primary production. Public interest in forestry as a viable alternative to farming has, however, increased with the development of a large and growing forest products industry and with the uncertainties surrounding traditional export markets for agricultural products.

Increasingly, the Forest Service had been able to co-ordinate and direct efforts towards forest conservation. It has assumed responsibility for the control of noxious animals, and has developed the multi-use concept of forestry to meet the diversifying economic and social demands placed on the forests.

Soil and water conservation.

In 1941 the Soil Conservation and Rivers Control Council was formed with the following objects:

- (a) The promotion of soil conservation.
- (b) The prevention and mitigation of soil erosion.
- (c) The prevention of damage by floods.
- (d) The utilisation of the land in a manner tending towards the attainment of these objects.

A survey of erosion and its effects by a Committee of the Department of Scientific and Industrial Research in 1939, revealed that the most serious land and soil erosion problems occurred on the steplands of New Zealand - those areas formerly covered by a protective forest or grassland cover. It was recommended that "a soil conservation programme concentrate on the preservation and establishment of a stable vegetative cover in which forest land, shrub land, and grass land have most important parts."(4).

The Council ignored this recommendation. Recognising that soil conservation would not be accepted by the farmers until it was proved to be an economic proposition, it concentrated on the lowlands and pastoral hill country - the

areas most intensively farmed - where greater impact would be made for time spent.

During the 1950's concern was expressed that research into conservation problems was inadequate and should consider the catchment area as a whole. Early criticism pointed to the multiplicity of Government departments and local bodies involved in soil conservation and rivers' control work, and to the frequently conflicting priorities for soil conservation. In 1956 the Institute of Foresters declared the Soil Conservation and Rivers' Control Council had "instead of leading the way ... buried its head in the lowlands", and that a direct result of this faulty leadership had been chaos in the research field. "Objectives have been imprecisely defined; there has been no firm allocation of research responsibilities; there is duplication of effort in some directions and complete neglect of fundamental problems in others." (5)

Criticism was directed at State legislation which did not require the Department of Lands and Survey, or the Forest Service, to acquire and develop land for the purposes of soil and water conservation. Criticism was also directed at the Ministry of Works and the Department of Agriculture for concentrating principally on lowland problems.

A need for resource planning was stressed to "avoid conflict in supplying the needs of agriculture, industry, business and recreational interests. Planning for soil and water conservation can be completely effective and justify

such a resource use plan."(6)

Increasing conflicts between resource users and overseas trends towards co-ordination of soil and water conservation at a national level emphasised the inter-relation of these problems. The Government was urged to assume greater responsibility for balancing the conflicting demands placed upon these resources by individual users. In 1963 an Inter-Departmental Committee was formed to examine the deficiencies in existing legislation controlling water-use.

The following year a Symposium on the use and control of water also examined the problems in the light of estimates of future population growth and economic development. The implications of resource conservation to the State were fully analysed. The legitimate uses of water included public water supplies, industrial supplies, recreation, agriculture, irrigation, wild-life, power production, navigation, and waste disposal. It was accepted that water of inferior or poor quality could restrict, or at times completely inhibit, these uses. This, in turn, could restrict national growth and impose a severe economic burden with a consequent redistribution of activity. The primary task was considered to be "education of the public, water users, industrialists, State Government and local authorities to realise that water is a national resource and that individual attitudes when summated affect the national product."(7)

The days had passed when water was locally in sufficient quantity to meet all possible demands. It was agreed that water was a national asset and should be "appropriated and controlled to the national use, and co-ordinated for the benefit of the whole community."(8)

Increasingly those concerned with resource use were realising that separate Acts could no longer deal satisfactorily with the various demands placed upon the water resource. They should be replaced by an overall system of control.

A lack of co-ordination was regarded as the basic cause of problems in soil conservation work in a report, in 1964, by Dr. D. A. Williams on soil conservation and rivers' control organisation and administration. At the same time progress in conservation could be achieved only if every member of society recognised a personal and social responsibility in using resources. Conservation could succeed only through "co-operative effort, neighbour with neighbour, community with community, State and local body with individual."(9)

In recognition of these problems a bill is at present being drafted to set up a National Water and Soil Conservation Authority, co-ordinating the operations of the Soil Conservation and Rivers' Control Council, the Pollution Advisory Council and a new Water Allocation Council.

Nature preservation.

During this period the movement for nature preservation

strengthened. Those advocating "progressive" resource development, based their evaluation of resources on economic grounds and the need to meet the demands of an expanding population. They failed to appreciate the value of undisturbed Nature to a society with a rising standard of living and increased leisure time. They were often supported by the Government, which in planning development, tended to favour those needs contributing directly to the country's prosperity. But they were opposed by a large section of the population which recognised the aesthetic, recreational and scenic value of an unmodified natural environment.

The Government tended to ignore the mounting concern as it involved itself in meeting the immediate demands of progress. Rivers were dammed for hydro-electric power; swamps drained by catchment boards for flood-control purposes; forests damaged beyond repair by browsing animals. Above all, the natural scenery was cluttered up by buildings and electric power lines - the signs of progress.

The neglect of two growing needs in modern society - outdoor recreation, and the cultured awareness of nature conservation as a responsibility of civilisation - led to an alliance of those interested in outdoor recreation and those who loved nature for nature's sake. It was an extremely powerful alliance - a blend of idealism and altruistic need. During the 1950's it placed pressure on

Plate 7. The head of Lake Rotoiti, Nelson Lakes National Park. Such scenery constitutes a major part of the aesthetic-scenic value of these parks. However, the Nelson Lakes constitute a potential supply of water for hydro-electric generation. Should there, in future, be serious pressure on the country's hydro-electric resources it is possible that a conflict of resource values might develop, such as has already occurred over the Fiordland National Park.

Photo: P.D.H. Allen



the Government to follow the example of such countries as the United States, and provide for the recreational needs of an urbanised society. As a result the Government passed the National Parks Act of 1952. This provided for the setting-aside of areas of "such distinctive quality or natural features so beautiful or unique that their preservation is in the national interest." All forms of exploitation or modification were to be excluded and the Parks were to be used by the people for recreational, scientific and aesthetic purposes. Fiordland, Westland, Mount Aspiring, Nelson Lakes, Mount Cook and Urewera National Parks were added to Egmont, Tongariro, Arthur's Pass and Able Tasman - all within approximately ten years, and covering 6 per cent of the total area of New Zealand. The Forests Act, 1949, and the Reserves and Domains Act, 1953, further provided for sanctuaries and reserves. This legislation recognised the special nature of the wildlife and scenic resources. The special value of Nature lay in its unmodified state, free from cultural interference. Provided this interference was excluded, the wildlife and scenic resources could be successfully preserved. Serious interference, however, would destroy or modify these resources beyond hope of restoration to their original condition.

Some doubts were expressed about the wisdom of preserving areas merely to prevent them being "civilised". In 1956, the Institute of Foresters, concerned that the

locking-up of large areas of indigenous forest in National Parks prevented their management on scientific forestry principles, analysed the nature preservation movement in order to bring out the ecological, financial and administrative problems that underlay the concept of preservation. It was considered that as the primitive condition of the flora could not be maintained, many of the reserves were of little value for scientific study.

The extension of protection over all native fauna, and the declaration of deer as noxious animals to be exterminated, in the Wildlife Acts of 1953 and 1956, roused little opposition, except from those societies which valued them as game. While public opinion attached the greatest importance to the protection of native birdlife it realised that "there are animals which, though no doubt beautiful in themselves, unfortunately wreak a tremendous amount of damage." (10) Attempts at control had previously been unsuccessful. The payment of bounties on rabbit skins and the establishment of a rabbit export industry, were recalled as the major factors perpetuating the rabbit problem. It was not until the Rabbit Destruction Council introduced a policy of complete extermination that any success was had in controlling the problem. Without any satisfactory criteria for control, the Government introduced a campaign which was to lead to the total extermination of deer as the only satisfactory way to solve the problem.

In the mid 1950's, when enthusiasm for the National

Park movement was at its height, concern was expressed at "the dangerous fashion for converting State forests under multiple-use management into national parks devoted to a limited group of uses." The question was asked, "Can we afford this?"(11) With the continued pace of development in the 1960's, the Government was forced to revise its support for excluding all forms of economic exploitation from National Parks. Some of the parks contained resources, of water power particularly, that assumed increasing value as the limits of available resources were reached elsewhere. In 1962 the Government decided that, in view of the State policy of encouraging economic growth and diversification, it could not ignore the prospect of attracting an aluminium industry to New Zealand. Lakes Manapouri and Te Anau in Fiordland National Park contained good sites for hydro-electric development, and the Government decided these should be developed to attract the aluminium industry. The decision aroused growing suspicion and criticism. It was felt that it had become Government policy to place the economic before the aesthetic and recreational needs of society.

To establish closer liaison and greater trust with Nature preservation groups, the Nature Conservation Council has been formed. This is intended to co-ordinate scientific and technical information on nature conservation matters, and to act as an expert advisory body to the Government on matters affecting nature preservation. To this extent the need for nature preservation has been recognised as deserving of

Plate 8. This Minhinnick cartoon reflects the distrust of the Nature preservationists to the forces of 'progress' typified in the Government. The cartoon has the caption, "What upsets me is you'd almost think they didn't trust us." The revision of policy with regard to the Fiordland National Park has been sufficient to awaken suspicion and unease at the possible future intentions of the authorities concerned with resource planning and development with regard to the National Parks.



consideration in planning for development. The Government, however, places the economic needs of development first, and has sought to "persuade the public that what it is doing is right ... we have to make a compromise to keep a balance of all the needs of society."(12) In making this compromise the Government must favour those needs which it estimates are most important to society.

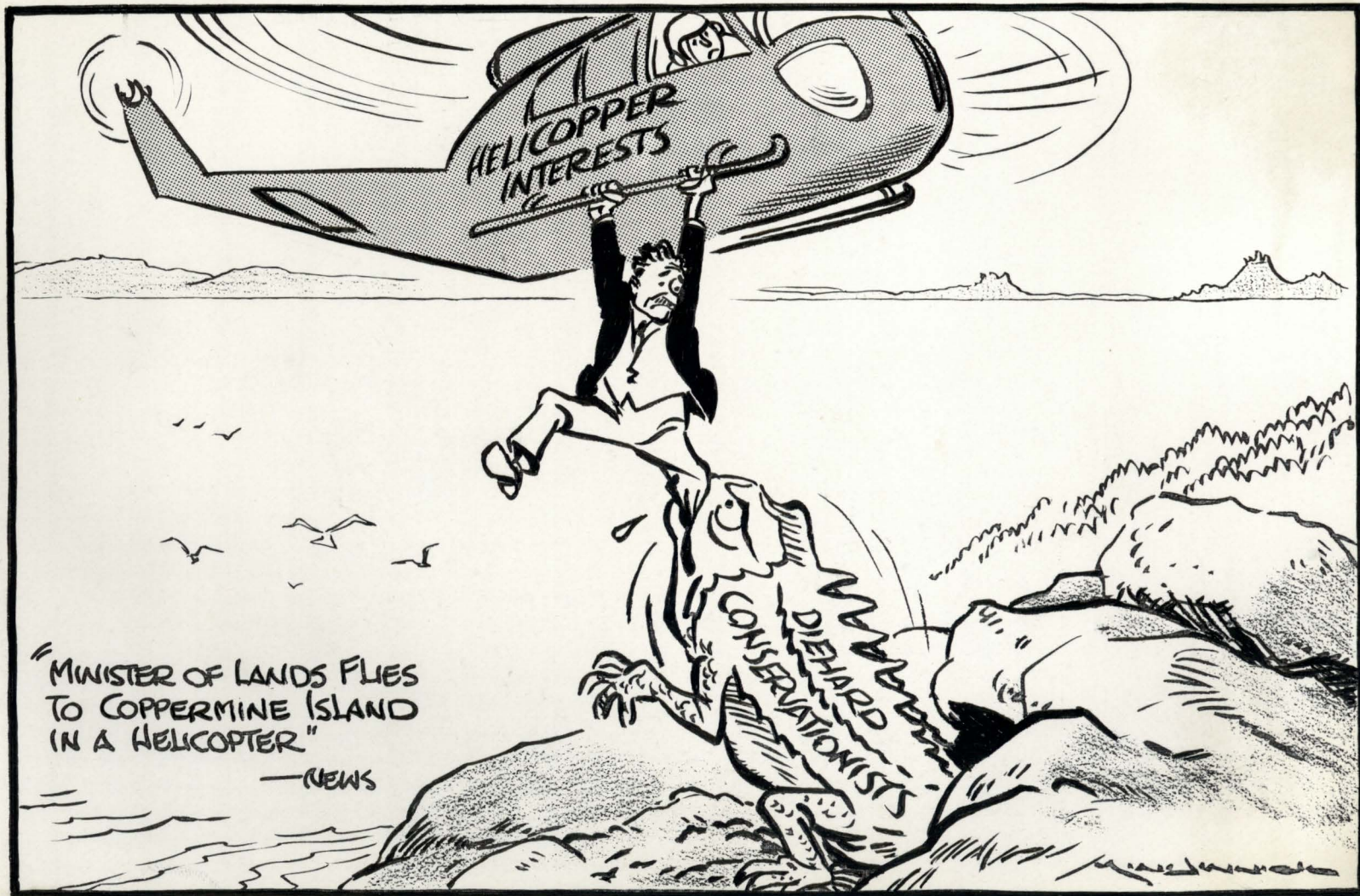
EXHAUSTIBLE RESOURCES.

The increasing complexity of industry in the two decades following World War II created a demand for a wide range of primary and ancillary raw materials. The growing significance to the economy of minerals - particularly industrial minerals - has led to a re-assessment of the country's mineral potentiality. This was carried out by the Mineral Resources Committee formed in 1962. The scope of the problem led to the recommendation that the Government should co-ordinate and direct a national mineral research programme to develop new minerals and methods for more efficient recovery and use.

In New Zealand the discovery and exploitation of metallic deposits would result in overseas sales, while the discovery of industrial minerals would lead to domestic consumption and replacement of imported materials. It is these considerations that have given impetus to the search for minerals.

The most direct contribution to the conservation of

Plate 9. This cartoon entitled "Two-way stretch" reflects the difficult task for the Government in deciding on the 'best use' for a particular resource. In the case of the Coppermine dispute, the Government is faced with having to decide whether to favour the aesthetic and scientific values of the native flora and fauna found on the island and to leave that flora and fauna in its undisturbed state, or to favour prospecting for copper on the island in the hope of the discovery of an exploitable deposit of copper ore.



"MINISTER OF LANDS FLIES
TO COPPERMINE ISLAND
IN A HELICOPTER"

—NEWS

minerals in New Zealand has been made by Government and private encouragement of research into improved methods of exploitation and processing. Developments in mineral beneficiation or "dressing" have been of crucial importance in enlarging the quantity and variety of minerals available for exploitation. An example is the development of the beneficiation of dolomite and wollastonite.(13)

Advances have also been made in improving efficiency in extraction and use of resources already being exploited. The most noticeable advances have been made by the coal industry in response to inroads into traditional markets by electricity and fuel oil. Research into improvements in quality and efficient use of coal by the Coal Mining Research Committee, the Fuel Technology Service, and the Coal Advisory Services Association has increased the total quantity of coal available for use. An example is the development of briquetting as a means of converting the excess slack coal into a fuel for domestic and locomotive use. At the same time, new mining techniques, both underground and opencast, have increased the range of workable deposits. Coal seams worked out by underground methods are re-worked by opencast methods to recover coal left in the ground, amounting at times to almost 50 per cent of the total deposit.

These developments have been complemented by a search for substitute minerals for imported materials, or for minerals threatened with exhaustion. The threatened

Plate 10. An open-cast mine near Huntly. As the more accessible seams are worked out by the underground 'bord' and 'pillar' method and with the development of modern earth-moving machinery, open-cast mines have been opened-up in the Huntly area. Such developments are 'conservational' in that they allow for more efficient and cheaper extraction of the coal.

Photo: P.D.H. Allen



exhaustion of good quality sulphur led to the development of techniques by Government scientists for the manufacture of phosphate fertilisers without sulphur.

Conclusion.

In the two decades following World War II, important trends in conservation emerge.

As population expanded and urban and industrial development accelerated, the attitude that renewable resources should be used according to individual needs, became increasingly unacceptable. The complexity and pressure of demands forced the Government to introduce conservation measures that co-ordinated resource use on a national level to ensure a fair balance of users and uses. The costs of renewing a resource after misuse, led the Government to anticipate problems in resource use and to restrain users before problems developed.

The development of an urbanised, industrialised society has increased the range of demands on renewable resources. As a result, problems have arisen in applying multi-use conservation policies to the satisfaction of all users. The tendency of the Government to favour the economic rather than the aesthetic and recreational needs of society in planning development, has resulted in a strengthening of the Nature preservation movement.

Economic diversification has increased the significance of the exhaustible resources to the economy. Conservation

measures have been concerned, not with restraining use, but with more efficient methods of recovery and use. These are directed at postponing the exhaustion of known mineral occurrences, preferably until new occurrences can be developed or substitutes be found.



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V. THE CONSERVATION MOVEMENT IN NEW ZEALAND

Throughout the 150 years of European settlement of New Zealand, attitudes to the utilisation of renewable and exhaustible resources have changed in response to changing economic and social conditions. In this chapter the emergence and development of conservation attitudes will be considered in terms of whether a conservation movement can be identified.

The Conservation Movement Overseas.

In Chapter I it was shown that the term "conservation movement" was applied to a popular political movement in the United States at the turn of the century. The term has, however, a more general meaning as an expression of changing social and economic attitudes to resource use. As the movement first developed in the United States, it had its roots in the expansion of the frontier across the American continent. Early concern at the destructive nature of settlement expressed the idea that man could not abuse Nature and escape the consequences. It was held that man had a moral and social duty to use Nature's benefits responsibly. The "conservation movement" developed by Gifford Pinchot adopted this emotional and mystical regard for Nature's resources and introduced a new sociological aspect. Man not only had a responsibility to use resources wisely, but also a responsibility to ensure that the needs of others both in the present and future were adequately met.

As it developed, the movement for conservation consisted of two main streams of thought. One was essentially negative in its approach to resource management. It was a reaction against the disruption of Nature's harmony by the demands of progress. The other was positive in its approach. Natural resources were to be efficiently managed "for the greatest good of the greatest number - and for the longest time." Both these attitudes were an expression of the economic and social changes that were taking place in the United States. As resources became more intensively used with economic development and the growth of population, it was increasingly recognised that misuse and waste of natural resources could no longer be tolerated.

The concept of conservation was initially applied to the utilisation of the renewable resources - those resources which, with intelligent use, could be intensively used, but which were depleted when over-exploited. Conservation of these resources was directed at regulating use to maintain the "flow" of resources. With economic development and industrialisation the conservation concept was extended to the exhaustible resources. Conservation policies were directed at postponing the exhaustion of resources for the longest possible time by developing increasingly efficient methods of extraction and use.

With economic and social development and increasing demands on resources, the conservation movement in the

United States lost its early idealism and cohesion. Federal and State agencies took over responsibility for conservation to ensure efficient use and a fair allocation of users and uses of resources. With the development of urbanisation and the growing recreational and aesthetic needs of society, the Nature preservation movement strengthened in its opposition to the demands of economic development.

THE CONSERVATION MOVEMENT IN NEW ZEALAND.

Unlike the early movement in the United States there was no popular political movement in New Zealand to gain early support for the concept of conservation. The emergence and development of the conservation concept in New Zealand has been closely connected with the economic and social development of a small colony into a modern industrial nation with intense, often conflicting demands upon natural resources.

In considering the development of the conservation movement in New Zealand, three phases in changing attitudes to the utilisation of resources can be identified. These are termed, the phases of destructive exploitation, re-evaluation, and intensive utilisation.

Destructive Exploitation.

The settlers who came to New Zealand in the 1840's were confronted by an environment alien to that to which they had been accustomed. In the succeeding fifty years, with the

spread of settlement over most of New Zealand, the environment was modified to the requirements of a pastoral economy. During this period thousands of acres of forest were cleared by burning and the land was sown in grass. Tussock grassland was burned to permit grazing, and wildlife introduced to recreate the atmosphere of the Mother Country, Britain, where few of the settlers would have been privileged to enjoy the sports they sought to encourage. The few who criticised the destructive modification of the landscape were prompted to do so, either because they valued the aesthetic attractions of undisturbed Nature as highly, or higher than, the demands of progress, or because they were sufficiently far-sighted to see the future dangers of a reckless "mining" of the natural resources. To most settlers, criticisms of "waste" held no meaning. The widespread burning of the forest was a sign of progress.

Re-evaluation.

Settlers were forced to re-evaluate their attitudes to resource exploitation when it became gradually apparent that renewable resources were not without limits to their abundance. This re-evaluation took place with the concluding phases of settlement. As population began to grow and the economy diversified, and as renewable resources began to show the effects of the early phase of destructive exploitation, there was a realisation on the part of many settlers that modification had been taken too far. A more responsible approach to the use of natural resources was a

necessity if the resources were to continue to be available in abundance and without deterioration in value. It was the forest resource that at an early stage showed the effects of destructive exploitation, and it was in relation to the forest resource that the concept of conservation began to gain general acceptance as the ideal approach to the management of resources.

Conservation involved the task of both renewal and preservation. There emerged a divergence of attitudes as to how the forest resource could best be conserved. As a negative reaction to the early methods of land clearance, the Nature preservationists sought to lock-up areas of aesthetic values as the only means of ensuring that they would remain undisturbed. A positive reaction to the destruction of the forests was that expressed in the "dynamic" conservation idea. The early wastefulness of land clearance policies was recognised, but conservation of the forest involved restraining misuse and managing the forests so that they could meet the increasingly complex demands placed upon them.

As the effects of landuse practices became apparent in accelerated soil erosion and flooding, moves were made to change attitudes to the land and to conserve the soil to maintain fertility.

This phase was one of re-evaluation of attitudes to natural resources in the light of the reckless destruction that had accompanied the process of settlement of New

Zealand. The adoption of conservation measures for the forest and soil resources was a recognition that attitudes to resource use had to change in the light of the future needs of a country that was still in the early stages of development.

Intensive Utilisation of Resources.

The third phase in the development of the conservation movement coincided with a rapid expansion in population and economic growth during World War II and the following two decades. The increasing intensity of demands placed upon renewable and exhaustible resources demanded positive action to conserve resources before crises in resource use occurred.

Those concerned with planning for development, sought to anticipate problems in resource use. Not only did they seek to restrain reckless use of resources, but also to instil into each resource user a sense of social and personal responsibility in using resources. The demands upon basic renewable resources led to co-ordination of measures for conservation at a national level. It was recognised that such a basic resource as water was a national asset, and the conflicting demands placed on the resource made national water conservation a necessity. The increasing significance of the exhaustible to the economy, led to an extension of the conservation idea to encouraging the development of increasingly efficient methods of extraction and use. The emphasis here was on

postponing the exhaustion of valuable mineral resources, especially the industrial minerals.

The development of large urban centres brought with it a growing appreciation of the aesthetic values of the natural landscape. In seeking to conserve these values against the demands of economic development, the Nature preservation movement broadened to include those who placed the aesthetic and recreational needs of society on an equal footing with material needs.

During this period, developments in conservation thought have been influenced by the growing intensity of demands on resources. Because of conflicts over resources, the freedom of the individual to decide how he will use a resource has had to be severely restrained in the national interest. The responsibility for resource conservation has been distributed among numerous government departments and local authorities which frequently have conservation policies that conflict in terms of how they evaluate the resource needs of society.

The movement for conservation in New Zealand is an expression of changing attitudes to resources. The developments that have taken place in the conservation movement have, therefore, closely resembled similar developments overseas, particularly in the United States, and to a lesser extent in Great Britain. The early critics of the destructive nature of settlement in New Zealand,

cited warnings from American writers such as George Perkins Marsh who had witnessed similar destruction with the advance of the frontier west across America. The seriousness of the soil erosion problem was highlighted by soil erosion problems in the United States during the 1930's, and by the writings of prominent soil conservationists. In the 1950's the National Parks movement derived much of its emotional enthusiasm from a similar movement in the United States where large urban populations overtaxed existing parks. Similarly recent moves in the United States and Britain to co-ordinate water conservation at a national level, have partly influenced moves in New Zealand to introduce a National Authority to co-ordinate water conservation.

The conservation movement also, however, shows differences in development. These differences appear in the relative importance of the renewable and exhaustible resources to the New Zealand economy. Economic development has been such as to place dominant emphasis on the exploitation of the renewable resources - particularly the forest, soil and grassland resources. It has been only in the last two decades that the exhaustible resources - the minerals - have begun to assume sufficient importance to the economy to warrant conservation. The United States, however, basing much of its wealth on the exploitation of its exhaustible resources, developed conservation measures at an early stage to ensure maximum efficiency in extraction

and use, and to develop new methods for recovering low-grade ores that would postpone the exhaustion of valuable mineral reserves.

Three phases have been described in changing attitudes to resource use, which represent the progressive development of a small colony establishing itself in an alien environment, to a modern industrialised nation with a complex of intense and often conflicting demands on its resources. The conservation movement began as a recognition that the forest resource had been misused, and developed with the changing economic and social wants of society into a recognition of a responsibility to ensure that resources did not become scarce in the future as a result of present exploitation practices.

The Present Status and Future of the Conservation Movement.

The conservation movement in New Zealand today consists of numerous Government departments and agencies, local authorities, private organisations and societies, each working for conservation, but differing in their interpretation of the term "conservation" and how it should be applied. The problems of the conservation movement are a reflection of the complex needs of society and the intense and often conflicting demands placed on resources by different social groups. Conservationists may agree that conservation implies the balanced use of all resources. It is, however, difficult to decide how the uses of a resource should be balanced. The problem of planning the balanced

use of a resource is essentially that of evaluating what are the most pressing needs of society, and it is the differences in resource evaluation which have produced conflicts within the movement for conservation.

As it originally developed from a reaction to the excesses of settling an alien environment, and from a concern for future consequences of destructive exploitation of resources, the conservation idea has been adopted by a wide range of interest groups.

The two main streams of conservation thought continue to be represented in the conservation movement. With the development of large urban centres, the remaining areas of natural scenery, the small remnants of native fauna and the lakes and swamps - have assumed considerable aesthetic and recreational value. In seeking to preserve these areas, the Nature preservation movement has strengthened its opposition to the "civilising" of the wilderness. This movement has broadened to include those generally concerned that the recreational and aesthetic needs of a society, now dominantly urbanised, are being ignored in favour of meeting the immediate demands of economic development. An example of this concern is the move to establish a regional council for reserves in the Waikato. The object of this council is to highlight the aesthetic and recreational needs of the Waikato region both in the present and for the future.

Those who advocate that conservation implies the balanced use of resources, tend increasingly to emphasise

the immediate rather than the long term resource needs of society. The Government has assumed responsibility for directing the conservation of many resources. This has been an essential development in the conservation movement. If the increasing intensity of demands placed upon resources with a growth in population and industrial and urban development are to be met, the co-ordination of resource management and planning at a national level is essential.

This trend applies particularly to the basic renewable resources such as water and air which must meet with increasing abuse as urban and industrial areas continue to develop. The development of urban and industrial centres has been so rapid that the implications of this development in terms of the conservation of a basic renewable resource such as water, are frequently not appreciated. The demands upon the water resource have become so great that the successful conservation of water depends upon co-ordination at a national level of water management and its allocation amongst users.

The move to co-ordinate soil and water conservation at a national level may indicate a significant development in the conservation planning of natural resources. The Government cannot, however, be said to hold a comprehensive view of natural resource management. In planning for the needs of development there is always a tendency to favour the immediate economic needs of development over the less easily evaluated, but equally as important, non-material

needs of an urbanised society.

The basic ideals that were originally implied in the term "conservation" are no less important today than they were when the idea of conservation was first expressed. With the complex and intense demands of society for resources, the dangers in misusing resources are considerable. Conservation, however, implies more than restraint in resource use. It implies a balanced approach to the use of all natural resources and there is an increasing need for those who are responsible for planning for the future to place the non-material needs on an equal footing with the more easily evaluated, economic needs of society.

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