

## THE VICTORIAN ENVIRONMENT\*

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### ENVIRONMENT MANAGEMENT

#### **Historical perspective**

The resources available to a community reside in the land and water systems under its control. In some environments the community does not need to expend much effort to obtain what it needs for survival; in others, considerable effort is required.

Some environments provide all resources for the simple needs for survival; others do not, and so trade or barter develops between nearby communities. Exchange or transfer of resources from one place to another has become more common and more of a necessity as a result of the rise of technology and the changing demands of present day communities.

In Australia, the resources provided by the natural environments throughout the continent were not great in relation to the needs of human beings. For this reason there were relatively few people occupying a large area and their survival depended on considerable skill and understanding of the ecology of the systems that supported them. Furthermore they expended much personal energy in moving over relatively large distances to make use of different places, at different times of the year, and in different kinds of seasons from year to year. These people, the Australian Aborigines, demonstrated a capability for survival under difficult conditions. Their whole culture, their family and tribal cohesion, their ethic of mutual assistance, and their respect for various environmental features, provided the basis for their survival within that environment.

When Europeans settled in Australia, they were confronted by an environment quite different from that to which they were accustomed. It was so different that they had some difficulty in surviving. The country itself and its native plants and animals did not provide the kinds of food to which they were accustomed nor in sufficient quantity even if they could have become accustomed to them. The introduced plants and animals the settlers brought with them to provide their food were not suited to the different environmental conditions. For biological reasons these plants and animals did not thrive and for some decades the colony was maintained only because foodstuffs were imported from England.

Attempts were made to use the country for agricultural production but success was slow in coming, depending on the development of more suitable strains of domesticated plants and animals.

When exploration opened up new areas and more suitable plants and animals were used, the country began to produce, first enough for survival, and later more than enough; thus there was an excess for export. Some export income was earned in the early days of settlement by harvesting and selling

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some of the natural resources : whale products, seal skins, mutton bird oil, and later, gold. The harvesting of seals for their skins almost caused the extinction of the species in Bass Strait. Later, income was earned by exporting products such as merino wool and wheat, the production being the harvesting of an annual increment produced from the land and not the natural resource itself.

In the harsh reality of making land productive, the bushland and its inhabitants were considered the enemy. The natural environment was something to be modified or changed for agriculture or grazing. Because production was achieved only by overcoming fire, flood, drought, and the native bush itself, the defeat of nature and the change of the natural surroundings for productive purposes was regarded as "success". The destruction of the flora and fauna became a basic part of the Australian pioneering way of life.

It was not until after the Second World War that there was any perceptible change in the attitude to the environment. This change in attitude resulted from an appreciation that some of the supposed successes in developing land for productive purposes were in fact mistakes. Sometimes the new found productivity was short lived. The developers had not understood the intricate relationships and interactions between soils, plants, animals, and climate. They were unable to perceive situations in which certain kinds of change or manipulation would inevitably lead to instability of the new system of use, and consequently the destruction of the productive capability of the land.

Irrigation of some land without provision for drainage produced excessive amounts of salt and loss of production. Overcultivation of some lands produced conditions conducive to erosion of the soil by wind. Clearing of forests and then excessive grazing of the native pastures caused loss of vegetative cover, increased run-off after rain, and erosion of the watercourses, as well as other forms of soil erosion such as tunnels and dry land salting. These mistakes were caused by a lack of understanding of the nature of land and an inability to determine its capabilities and devise systems of use and management to provide a level of productivity that would last year after year. The results of some of these mistakes were obvious after a few years ; some took several decades to manifest themselves.

Various kinds of mistakes in land-use and resource management were perceived mostly as isolated problems rather than as several manifestations of a single problem. Legislation was passed and organisations established to deal with particular problems as they arose and evoked sufficient concern to warrant attention. Separate organisations had responsibilities for land settlement, fisheries and wildlife, water, forests, and soils. There was no total environmental concept for the management of resources, nor an understanding that proper resource management can only come from an understanding of the nature of the different environments and whether or not they can be manipulated safely for productive purposes.

However, since the Second World War, people engaged in resource management and, later, some interested members of the community began to realise that a new approach to resource management was necessary. The pioneering stage had passed and the time had come to look at the land and its resources in a different kind of way.

The development of this attitude in the community was hastened by the revelation that some of the other effects of man's manipulation of environments in many parts of the world may be a possible threat to human health. Except to those members of the community intimately associated with their use, the destruction or impairment of the land or water resources is of only passing interest, but threats to human health are more frightening and evoke an emotional response from the majority. The potential threat to human health of pesticides, nuclear processes, and more recently, air and water pollution, was of intimate concern to the whole community and generated more widespread interest in the use and management of the environment to provide for the community's needs.



The public interest, created by those talking and writing about such threats, stimulated thinking among people who were formerly only concerned about matters falling within the narrow confines of their own particular facet of technology and its use. They began to see that the optimal use of their technological contribution to the management of environments was dependent on many other factors, and could be quite different from that which they had originally perceived. The development and use of pesticides provides an example.

During the Second World War and in the immediate post-war period, pesticides were regarded as one of the wonders of the world. Their use was responsible for preventing widespread disease and famine in many countries, although in some, their success in preventing death from disease created other crises due to insufficient food.

The early pesticides were produced by technologists so as to have what they perceived to be desirable properties for pesticides. They were cheap, toxic to a wide range of insects, and chemically stable. Thus, they were effective for a long time after a single application. Biologically, their effectiveness against a wide range of insects and their persistence are great disabilities. Pesticides having these characteristics kill both the predator insects and the pests. They sometimes create pests, because if they are ineffective against a minor member of the insect community but remove its predators, it becomes abundant. Persistent pesticides allow several generations of an insect to be exposed to its effects continuously and so a resistant strain of the insect is the only one likely to survive through these generations. As a consequence, the resistant strains become a major proportion of the population more quickly with persistent than with non-persistent pesticides for which there are periods when the pesticide has lost its effectiveness and the sensitive strains can reproduce.

It is for these kinds of reasons that technological inputs to environmental management need to be biologically and ecologically oriented.

Publicity about some of the apparent mistakes of environmental management, arising from unilateral thinking by technologists, helped to develop an awareness in the community. At first this developed among people, both professional and amateur, who were interested and concerned, and understood that solutions were being found. Later, the awareness came to those to whom the whole field of resource use and management was new.

Environmental matters became both emotional and political and volubility was sometimes mistaken for knowledge. The attention of those who had worked unremittingly for some decades to develop a new approach and a new philosophy towards the use and management of resources was diverted from the task of getting things done to the necessity of explaining to the community what had

already been done and what was in fact being done. Both types of explanations were needed as a defence against criticisms of ignorance and inactivity, and to allay unnecessary public fears.

### **Present situation**

#### *Introduction*

More people now understand that the resources of any country, and of the world itself, are finite. Because they are not unlimited, resources must be used with care and without waste. The present life-style of technological societies such as Australia's involves the use of large amounts of resources even to an extent which many would consider to be prodigal. Furthermore, people know that in the past the capability of some land and water systems to continue to serve a useful purpose was destroyed because of wrong use and management.

Because there is now more general acceptance and recognition of these facts, the study of land and water systems, the assessment of their capability for being used and managed to provide for the various needs of the community, and the institutional arrangements for decision making about the planning, development, and use of resources are under review.

There is increasing awareness that demands for the use of land and water systems and their resources for different purposes often compete, and that this conflict should be resolved on a rational basis. The rational basis for resolving the conflict lies in an understanding of the capability of the land and water systems to be manipulated and used for different purposes, not just for a short time but from one generation to another, and on the relative priorities for satisfying the various needs of the community.

#### *Victorian Government agencies*

The individual statutes existing at present provide separate organisations with the responsibility for the management of particular resources or for the provision of particular services for the community. This does not facilitate an integrated approach to resource use and management; unilateral and independent action in the past has often been the reason for serious problems related to resource management. For example, electric energy generation requires the use of water, sometimes for cooling and sometimes for power generation itself. The community's need for electric energy and for alternative uses of the water must be considered together if prudent decisions are to be made.

For these reasons the Victorian Government has reviewed the overall arrangements for administration of resource use and management and introduced new procedures for decision making about proposals for the development and use of resources.

A Ministry for Conservation has been established to bring into a single policy-making unit a group of separate organisations responsible for fisheries and wildlife, national parks, soil conservation, coastal management, pollution control and waste management, recommendations about the future use of public land, multi-disciplinary and inter-disciplinary environmental studies, conservation planning, assessment of environmental effects of projects, and environmental education.

A Ministry for Water Resources has been established to ensure that Victoria's water resources are considered in totality and not on the basis of specific requirements for particular sections of the community.

A Ministry for Transport and a Ministry for Fuel and Power, in their respective fields, seek to develop consistent and co-ordinated policies, that relate to the total government policy for other needs and other resource uses.

A Ministry for Planning has been established to ensure that town and country planning is carried out within the constraints imposed both by the nature

and capability of the land and water system in different parts of Victoria, and by the policies determined by the Victorian Government to reflect community needs both now and in the future.

The State Planning Council, formerly limited in its charter to advise the Town and Country Planning Board, has become the State Co-ordination Council, with an enlarged membership, a full-time support staff, and a widened responsibility for advising the Victorian Government about all kinds of proposed developments. It is to have several working groups of which the most significant is to be the Policy and Priorities Review Group. The major task of the Council will be to ensure that the Victorian Government can make decisions about various proposals for planning, development, and use and management of resources on the basis of much more complete information. Not only will the facts about economic and physical feasibility of proposals be available, but also the environmental effects and their significance, the nature of the options for the use of ancillary resources which would be denied the future community by such development, and the social effects of the proposal (including the justification of the need for the services resulting from the proposed development) will be set out.

The task of the State Co-ordination Council is to develop a more complete system for advising the Victorian Government than that which has previously existed. There has always been a degree of co-ordination between various agencies; the Council will formalise and ensure more complete co-ordination and the availability of a broader base of information for the decision makers when requested.

Government action in relation to the environment and conservation of natural resources is not the same as preservation, a difference of concepts not yet widely understood. It is a concept of understanding the resources available to the community and of making the best possible use of those resources for the benefit of present and future communities.

## FORMULATING ENVIRONMENTAL DECISIONS

### **Environment assessment**

#### *Introduction*

In Victoria the "environment effects statement" technique is the major environment assessment procedure used by the Ministry for Conservation. It requires that at the start of a project the proponent shall prepare a document which identifies and quantifies the effects that the proposed works may have on the environment. This document, accompanied by the Ministry's assessment report, can then be considered by decision makers in conjunction with economic and technical information and should ensure that decisions are taken with a full knowledge of their environmental consequences. In this way the technique influences decision making in relation to specific projects. However, it has educational effects, especially for those members of the community concerned with developmental or works programmes.

The environment effects statement documents physical, chemical, biological, social, and aesthetic effects that the proposed works may have on the environment, and also examines: (1) the need for the project; (2) alternative methods of carrying it out; and (3) public opinion concerning the project. The document also considers short-term, long-term, beneficial, and adverse effects of projects.

#### *Preparation of environment effects statements*

Although the Victorian Government, as a matter of policy, requires departments to prepare environment effects statements, not all projects will warrant this and in practice the following procedure is followed:

(1) The proposer seeks advice from the Ministry for Conservation as to whether

or not a proposal could require an environment effects statement. Works which will affect sensitive ecosystems such as alpine areas, wetlands, coastlands, estuaries, and unique fauna and flora assemblages, for example, would require an environment effects statement. Major works such as large power stations, power lines, pipelines, sewerage plants, railways, freeways, new development centres, ports, tourist resorts, piggeries, and feedlots would also require an environment impact statement.

(2) In cases where the need for a statement is not clear cut the proposer is requested to prepare a brief environmental report for the Ministry's consideration to enable a definite decision to be made as to whether or not an environment effects statement is required. This report documents the proposed works and the environment to be affected.

(3) If an environment effects statement is necessary, the proposer prepares a draft statement. In Victoria, the Environment Assessment Group of the Ministry for Conservation is responsible for preparing guidelines for each specific statement, delineating the areas of significant concern, and finally assessing the statement. It is recommended that public opinion on the project be sought at this stage. Although a flexible approach towards the content of an environment effects statement is necessary, because of the diversity of projects and environments, the general form of the statement can still be specified. Normally, an environment effects statement includes the following sections:

(i) *Statement of objectives.* This discusses the reasons for a proposal and should be broad and in general terms so that the various alternatives can be assessed objectively.

(ii) *Justification of need.* The need for the project should be demonstrated.



(iii) *A description of the proposal.* Usually the proposer in developing the plans will commence with a scheme for a single course of action which would have been included in the environmental report. Full details of the proposal, technical data, diagrams, maps, etc., should be provided and any other relevant information necessary to assess its environmental effects.

(iv) *Alternatives.* A discussion of alternatives should be provided. Where it is considered that some alternatives are not practical, or that there is only one practical means of achieving the objectives, details and reasons should be provided. The discussion of alternatives should be as objective as possible. "Do nothing" is one alternative that should always be considered.

(v) *Description of the existing environment.* This provides a general description of the characteristics and condition of the physical environments peculiar to each feasible alternative.

(vi) *Environmental effects.* For each alternative the probable effect of the proposed action (physical, social, and aesthetic) should be considered, including a statement of: (a) immediate short-term effects, (b) long-term effects, (c) adverse effects, (d) beneficial effects, (e) irreversible and irretrievable commitment of resources, and (f) safeguards taken to avoid, minimise, or ameliorate adverse environmental effects.

(vii) *Comments on the proposed action.* A review of objections, comments, or submissions should be set out. Major contributions, from organisations such as government departments and conservation groups should also be included, as received, in the form of an appendix.

(viii) *A summary of the various alternatives.* This would normally set out the reasons for selecting a preferred scheme, including an economic analysis. Where environmental effects, including the social and physical, are significant, there may be difficulty in applying cost-benefit techniques and in this case the proposer may summarise the environmental effects using a ranking system.

(ix) *Relationship to future options.* There should be a brief discussion of the extent to which the proposed action involves trade-offs between short-and long-term effects, and the extent to which the proposed action forecloses future options, or narrows the range of beneficial uses of the environment.

(x) *Consultant's comments.* Where the proposer has employed a consultant to prepare a statement and the consultant's opinions differ from those of the proposer, these should be included.

(xi) *Summary document.* Where the statement is, by necessity, of considerable length a separate summary document should be provided. This can be used as a basis for wider distribution.

(xii) *Confidential information.* Where it has been necessary for the proposer to provide confidential information in order to satisfy the requirements of a statement, e.g., details of a process for waste standards to be evaluated, then the proposer should decide whether or not to provide a detachable supplement, to enable this information to be withheld if the statement is made public.

(4) The final environment effects statement is submitted to the Ministry for Conservation and is generally made available for public comment. Public submissions are considered and an assessment is prepared. The assessment report is available to both the decision makers and the general public.

The procedures outlined ensure that the environmental effects of works are considered in the planning stage, together with technical and economic criteria.

#### *Examples of environment effects statements*

The practice of preparing environment effects statements for proposed major works within Victoria has now become widely accepted. Two cases will now be considered to illustrate application of the technique and its eventual outcome.

*Mitchell River proposed storage (25,000 ML capacity)*

In 1972 the Victorian Parliamentary Public Works Committee, acting on recommendations made to it by the State Rivers and Water Supply Commission, recommended that the Mitchell River Dam should be built at Billy Goat Bend in the Mitchell River Gorge, 7 kilometres north of Glenaladale. The State Rivers and Water Supply Commission had conducted conventional engineering and economic feasibility studies of 23 potential dam sites in the Mitchell River basin and had concluded that the Billy Goat Bend site was the most suitable.

However, when an environment effects statement was prepared by an inter-departmental committee it revealed that the recommended site was an "undisturbed gorge of considerable scientific, scenic and recreational value, containing unusual native flora and the western most occurrence of 'rain forest' in Victoria, providing habitat for rare invertebrates and possibly other rare fauna".

As a result of this study, the Victorian Government did not follow the advice of the Parliamentary Public Works Committee and did not allow the construction of a dam at Billy Goat Bend. The environmental study had recommended an alternative site at Tabberabbera where native ecosystems had already been disrupted by human activities, and the Victorian Government directed that the dam be constructed at Tabberabbera.

*Yarra Brae-Sugarloaf project*

The Yarra Brae-Sugarloaf project involved the construction of a 39,864 ML capacity water storage on the Yarra River, approximately 4 kilometres upstream from Warrandyte, which would be connected via a pumping station, rising main, and treatment facilities to an 86,000 ML capacity reservoir on Sugarloaf Creek.

In January 1973 the Victorian Government, on the advice of the Standing Committee on Water Supply, directed that this project begin immediately. However, there was considerable public reaction against this decision and in June 1973 the Victorian Government decided that the scheme would not proceed until an environment effects statement had been prepared.

Subsequently the Melbourne and Metropolitan Board of Works prepared the Yarra Brae-Sugarloaf Environmental Study which examined not only the environmental effects of the project, but also the environmental effects of five alternative schemes. One of these alternatives involved not building the Yarra Brae dam, but rather providing a small pumping weir on the Yarra River at Yering Gorge, and this alternative was eventually adopted by the Victorian Government. The environment effects statement showed clearly that this alternative minimised adverse environmental effects and also had substantial economic advantages over the original proposal.

*Conclusion*

As these two cases show, the environment effects statement technique is having a direct influence on decision making in relation to specific projects in Victoria. Not only does the technique directly affect decisions on major projects, but it also acts as a community educational device by involving the public in the environmental aspects of developmental or major works programmes. This indirect "educational effect" could ultimately have a substantial influence on the community and be seen as the major advantage of the environment assessment procedure.

**Environmental education***Introduction*

An understanding of natural systems and the effects of man's activities on these is a pre-requisite to the planning and management of resource use. This, in turn, is an integral part of the maintenance of the quality of the environment for living.



Apart from the management of those resources which have the potential to continue, much of the debate on the planning and management of resource use is subjective, including the sense of responsibility exemplified by the concept that no one generation can be given the authority to prevent the exercise of choice by future generations.

However, it is necessary to recognise that values change; there is little that is static in the concept of "quality of the environment for living". Planning and subsequently management is a matter for continuing review and reassessment.

Environmental education is concerned with land-use, water use, resource use generally, pollution prevention, and the aesthetics of landscape. It is linked with the social framework and the capacity to implement man's changing values to accept a social responsibility extending beyond the present. It is also subject to continuing review and reassessment.

Although the whole community has a role to play in this process, the formal educational institutions have direct and special responsibilities. As yet, however, there is no general agreement on environmental education among teachers, administrators, and academics nor about definition and concepts, curriculum structures and content, or even the overall departmental organisation appropriate to the task. Indeed, interest in environmental education is a recent phenomenon.

#### *Primary schools*

The aims of the current science course in primary schools embrace the development of environmental observation and awareness. The incidence of environmental education in prescribed courses of study is not known.

#### *Secondary schools*

A number of trends can be identified which have assisted the development of environmental education. These are: the Australian Science Education Project (ASEP), central to whose concept is the environment and man; its more recent, upper secondary counterpart, the Social Education Materials Project (SEMP) funded by the Federal Curriculum Development Centre; the ecologically-based Web of Life course in biology (also at upper secondary level); the development of active outdoor recreation pursuits associated with the use of school and departmentally-operated camp sites; and the provision of educational experiences (e.g., excursions) beyond the boundaries of the school classroom.

In State secondary schools, some sixty high schools taught environment science or environmental studies and/or agricultural and environmental science in 1976. More than half the number had courses available at junior secondary level in the inter-disciplinary based subject, general studies. The new Higher School Certificate agricultural and environmental science course, introduced in 1975, was being taught a year later in about thirty schools in Victoria.

#### *Tertiary institutions*

With the exception of Monash University (which has a two year post-graduate Master of Environmental Science degree course), Victorian universities have tended to graft environmentally-oriented elective subjects onto their traditional courses. Several of the State Colleges of Victoria offer an integrated environment studies diploma course as part of their teaching training programmes, and there has been an increasing number of in-service environmental education-type seminars and courses in recent years.

#### *General public*

Environmental education opportunities outside the formal system have been expanding. This field is serviced by educational organisations such as the Environment Studies Association of Victoria, a membership-based body which

operates about 25 field work courses a year, and which is developing a site for a residential environment studies centre near Launching Place, 66 kilometres east of Melbourne. The Council of Adult Education provides various lecture series and some field excursions in environmental and natural history topics, and the Natural Resources Conservation League, through its publications, seminars, and field days is another active body. At government level, the Ministry for Conservation is supporting the extension services which have been developed by some of its component agencies and is initiating an extension service which will be concerned with more broadly based environmental issues.

## ENVIRONMENTAL LEGISLATION

### Legal framework

#### *Ministry for Conservation Act 1972*

The basic purpose of the *Ministry for Conservation Act 1972* was to constitute the Ministry for Conservation. This was achieved, first, by the establishment under the Act of a Department of State called the Ministry for Conservation consisting of a Minister for Conservation, a Director of Conservation, and such other officers and employees as are necessary for the purposes of the Act and, second, by transferring and vesting in the Minister the administration of a number of Acts of the Victorian Parliament known as the "Conservation Acts".

The Conservation Acts are, essentially, those Acts of Parliament under which all the agencies and divisions of the Ministry operate, with the exception of the Victoria Archaeological Survey (formerly the Archaeological and Aboriginal Relics Office). This agency was not transferred to the Ministry until 1975.

The objects of the Ministry for Conservation Act are:

- (1) The protection and preservation of the environment; and
- (2) the proper management and utilisation of the land and living aquatic resources of Victoria.

Section 5(2) of the Act requires the Minister, as soon as practicable after the commencement of the Act, to review the Conservation Acts with a view to securing their amendment to the extent necessary or desirable to enable the objects of the Act to be achieved.

#### *Conservation Acts*

Eight Acts of Parliament are defined in the Ministry for Conservation Act as the Conservation Acts. These are: the *Clean Air Act 1958*, *Game Act 1958* (since replaced by the *Wildlife Act 1975*), *Soil Conservation and Land Utilization Act 1958*, *Port Phillip Authority Act 1966*, *Fisheries Act 1968*, *Land Conservation Act 1970*, *Environment Protection Act 1970*, and *National Parks Act 1970* (since replaced by the *National Parks Act 1975*).

The following is a brief summary of the main provisions of these Acts as they affect use and management of natural resources and the environment in Victoria.

#### *Clean Air Act 1958*

This Act is administered by the Environment Protection Authority and prohibits the emission of dark or dense smoke from industrial chimneys. It also requires new industrial fireplaces to be smokeless so far as practicable and new fireplaces to be fitted with equipment for arresting air impurities.

#### *Game Act 1958*

This legislation was essentially prohibitive in intent and sought to control or prevent specific deliberate acts considered detrimental to wildlife.

In conjunction with the ministerial review of the Conservation Acts, the Game Act has now been repealed and is replaced by the *Wildlife Act 1975*.

This Act introduces into Victoria new techniques for the management of native fauna and provides for measures to meet the needs of birds and animals in terms of the increasing demands and pressures created by modern society.

The Act does not stringently protect all wildlife, but it does enable some protection to be given to nearly all vertebrate animals native to Victoria. These include amphibians and reptiles. Under the Act, wildlife may be classified into categories, each of which has a different degree of protection or control. These are endangered wildlife, which comprises the very small number of species threatened with extinction; wildlife which are notable because of their rarity, special beauty, or other significant quality; and protected wildlife which consist of those species which require some protection, but not to the extent envisaged by the other categories.

Provision is made in the Wildlife Act for the expansion and adequate care of land within the State wildlife reserves system and particularly for the establishment of different classifications where modern wildlife conservation techniques can be developed and practised without being compromised by other ancillary objectives.

Wildlife reserves may be classified as :

- (1) State Game Reserves, which will be developed as hunting areas in which hunters may take game during the prescribed open seasons.
- (2) State Game Refuges—areas in which work will be carried out to preserve, restore, or create game habitat. Hunting will be prohibited absolutely.
- (3) State Faunal Reserves—areas which will be reserved for the preservation and propagation of species of wildlife other than game. The taking of wildlife in these localities will be prohibited.
- (4) Game Management Stations, which will be regional research centres where intensive management studies, research, and pilot schemes for wildlife management will be developed and assessed.

The Act provides for the development of wildlife co-operative areas and for the creation of wildlife sanctuaries. Among other things, the Director of Fisheries and Wildlife, who is appointed under the Act, is required by the legislation to carry out research and management designed to serve the needs of wildlife conservation. Provision is made in the Act for the issue of various types of licences to regulate activities which make use of the wildlife resources or which have implications for the conservation of wildlife or which affect the discharge of laws relating to wildlife.

#### *Soil Conservation and Land Utilization Act 1958*

This Act constitutes the Soil Conservation Authority which is charged with the :

- (1) Prevention and mitigation of soil erosion ;
- (2) promotion of soil conservation ;
- (3) determination of matters relevant to the use of all lands including Crown lands, in such a manner as to attain the above objects ; and
- (4) promotion of efficiency in the use and development by landholders of water resources available to them.

The Authority, after consultation with the Land Conservation Council, is also vested with the responsibility of determining the most suitable use in the public interest of all lands in catchment areas, which of such lands may without deterioration of, or detrimental effect to, water supply catchment be used for forest, pastoral, agricultural, or any other purpose or for any one or more purposes, and the conditions under which various forms of land-use may be permitted.

Provision is made for the establishment of Soil Conservation Districts and for the appointment of District Advisory Committees to consider and report

to the Authority upon any matter relating to land utilisation or soil erosion or conservation within its district or referred to it by the Authority.

The Authority is empowered, among other things, to make grants or loans for the purpose of carrying out specific projects in pursuit of the objects of the Act.

At the request of two or more persons occupying land in the area, and with the approval of the District Advisory Committee, and following a resolution approving the proposal by a meeting of owners and occupiers of land, an area may be declared a Group Conservation Area for the purpose of undertaking a project for erosion control and conservation. Owners and occupiers in a Group Conservation Area have obligations to perform certain work.

#### *Port Phillip Authority Act 1966*

This short Act creates the Port Phillip Authority of five members which is responsible for advising the Minister on methods of co-ordinating development in the Port Phillip area, preserving the existing features and natural beauty of the Port Phillip area, preventing deterioration of the foreshore, and improving facilities in the Port Phillip area for the benefit of the community.

The consent of the Authority is required before any structure is erected, or works undertaken on, or vegetation removed from any land in the Port Phillip area. The area is defined as meaning the foreshore and the inshore waters.

#### *Fisheries Act 1968*

Administered through the Fisheries and Wildlife Division, this Act regulates commercial fishing and inland angling in Victoria. It provides for the issue of licences for commercial fishermen and for the licensing of registered fishing boats. The Act also provides for the issue of amateur fishing licences which entitle the holder to angle in any inland waters and to take fish of any species in open season.

Under the amended Act, fish culture permits may be issued to farm or create a fish habitat for breeding, raising, or growing fish in any Victorian waters or on any Crown land or on private property.

The legislation makes it an offence to keep or release noxious fish, particularly European carp, and empowers the Minister to take any action necessary to prevent the spread of noxious fish. Any person who takes a noxious fish and immediately kills it is not liable to any penalty under that part of the Act dealing with noxious fish.

The Act creates a number of offences including the use of explosives in taking fish, taking or having undersized fish, using prohibited equipment, poisoning of waters, and so on.

Under the Act the Director of Fisheries and Wildlife is required to carry out experimental or research activity or field studies in respect of various matters affecting fisheries.

A Commercial Fisheries Council of four persons is appointed under the Act, including representatives of the interests of professional fishermen and the interests of wholesale and retail traders of fish. This council advises the Minister on all matters concerning the development and management of commercial fisheries and on the welfare of the fishing industry and reports on any matter of a like or allied nature referred to it by the Minister or Director.

Amendments made to the Fisheries Act by the *Fisheries Act 1975*, among other things, create a Commercial Fisheries Section and also a Fisheries Management Committee for the better management of commercial fisheries. Within the Commercial Fisheries Section, a Commercial Fisheries Licensing Panel is constituted together with a Licensing Appeals Tribunal.

The basic function of the Fisheries Management Committee is to recommend to the Minister the number of persons to be licensed in each particular fishery,



the management of such fishery, and the number of licences to be held in reserve against the allowing of appeals by the Licensing Appeals Tribunal.

The Commercial Fisheries Licensing Panel is responsible for considering applications for commercial fishing licences and registrations having regard to the recommendations of the Fisheries Management Committee and to make recommendations to the Director as to whether such applications should be granted or refused. It is also responsible for conducting a review of such licences and registrations at least once every three years, for preventing licences and registrations from becoming inactive, and having regard to conditions in the fishing industry from time to time and to report thereon to the Director.

Appeals against the refusal of the Director to grant applications for commercial fishing licences or for their renewal may be made to the Licensing Appeals Tribunal. This replaces the former system whereby licences were issued by the Minister.

#### *Land Conservation Act 1970*

This Act containing thirteen sections, constitutes the Land Conservation Council, which consists of twelve persons. The main function of the Council is to carry out investigations and make recommendations to the Minister concerning the use of public land in order to provide for balanced land-use in Victoria.

It is also responsible for making recommendations to the Governor in Council about the constitution and definition of water supply catchment areas under the *Soil Conservation and Land Utilization Act 1958* and for advising the Soil Conservation Authority concerning policy on the use of land (whether public land or any other land, however vested) in any water supply catchment area.

Before any recommendations are made to the Minister about the future use of public land, the Council is required to carry out an investigation of the particular study area and to publish a report of its investigation. Notice of publication of a report must be given in the Victorian Government *Gazette* and in a newspaper circulating throughout Victoria, and in a newspaper circulating particularly in, or in the vicinity of, the area or district investigated, and submissions invited about the report.

After consideration of these submissions, the Council publishes its Proposed Recommendations and further submissions are invited. The Council then formulates its Final Recommendations and these are submitted to the Minister. Copies of every recommendation must be presented to the Victorian Parliament for consideration and determination.

*Environment Protection Act 1970*

This Act is directed towards controlling the discharge into the environment of substances which constitute a danger or a potential danger to the quality of the environment. It constitutes an Environment Protection Authority, an Environment Protection Council, and an Environment Protection Appeal Board.

The Environment Protection Authority has a number of powers, duties, and functions under the Act including co-ordinating all activities relating to the discharge of wastes into the environment, preventing or controlling pollution, improving the quality of the environment, issuing licences to control waste discharges and emissions, undertaking surveys and investigations into pollution, and promoting and co-ordinating research in relation to any aspect of pollution.

The Act prohibits any person from discharging, emitting, or depositing wastes into the environment without a licence. The discharge or deposit of wastes into Victorian waters, the discharge or emission of wastes into or on the atmosphere, the discharge of wastes into or the deposit of wastes in or on the soil, and the emission of noise are required at all times to be in accordance with the State's environment protection policy which may be declared by the Governor in Council on the recommendation of the Authority. The State's environment protection policy is required to establish the basis for maintaining environmental quality sufficient to protect existing and anticipated beneficial uses in the area.

Any person who feels aggrieved by the grant, amendment, or removal of a suspension of a licence may appeal to the Authority. Appeals against determinations of the Authority in respect of licences may be made to the Environment Protection Appeal Board. The decision of the Board is final but the Board may refer any question of law to the Supreme Court and any parties to an appeal may appeal to the Supreme Court on a question of law.

Under the Environment Protection Act, the Authority may delegate to protection agencies, that is, any person or body having powers or duties under any other Act with respect to the environment or any segment of the environment in any part or parts of Victoria, all or any of its powers or functions with respect to the issue of licences, the investigation of offences, the enforcement of the Act, and research.

The Environment Protection Council is an advisory body with the function of generally advising the Authority on matters pertaining to its responsibilities, powers, duties, and functions, and upon any matter referred to the Council by the Authority.

Legislation enacted in 1975 amended the Environment Protection Act to make it an offence to create unreasonable noise by using vehicles, appliances, or musical instruments on any residential premises. Offences are also created in respect of noisy motor cars on a public highway and motor boats used on Victorian waters. The Environment Protection (Noise Control) Act empowers the Authority to require a vehicle or ship to be made available for testing.

*National Parks Act 1970*

This Act, which was formerly one of the Conservation Acts, was repealed by the *National Parks Act 1975*. The new Act introduces into Victoria a number of new policies and broadens the scope of the National Parks Service in national parks management and, in addition to the traditional form of national parks, provides for the development of different types of parks to meet differing community needs.

The Act is administered by a Director of National Parks, subject to the general direction and control of the Minister, and provision is made for the appointment of a National Parks Advisory Council with the main function of advising the Minister generally in relation to the administration of the Act and on particular matters on which its advice is sought by the Minister. The Act

also enables the Minister to appoint advisory committees in respect of a park or parks for the purpose of making recommendations to the Director relating to the care and control of the park or parks in respect of which it is appointed.

The legislation provides for zones to be declared within parks and also enables permanent works to be carried out and maintained to provide facilities for visitors.

A National Parks Fund is established under the Act which provides, among other things, that money may be spent on the purchase or acquisition of land which is bought for the purposes of a park, or for the payment of the costs and expenditure incurred in administering the Act.

Mining leases and licences for operations in a park may not be issued without the consent of the Minister who must first obtain the advice of the National Parks Advisory Council. Any lease, licence, or consent may be revoked by either House of the Victorian Parliament. The Minister may grant long-term tenancies for the purpose of providing various services and selling commodities to the public in national parks and other parks.

### **Ministry for Conservation and its agencies**

#### *Ministry for Conservation*

In January 1973 the Ministry for Conservation was constituted under the *Ministry for Conservation Act 1972* and became responsible for promoting the following objects :

- (1) Protection and preservation of the environment ; and
- (2) proper management and utilisation of the land and living aquatic resources of Victoria.

These responsibilities for environment protection and land-use management had previously been undertaken in a largely unco-ordinated way by separate Victorian Government instrumentalities and were in some cases regarded as secondary to their other responsibilities.

The 1960s witnessed a change in public attitudes in Victoria, as, following overseas trends, conservation and the environment became issues of increasing significance. The rise in interest was reflected in a series of changes among the governmental structures in Victoria responsible for environment management, culminating in 1973 with the formation of the Ministry for Conservation. The Ministry brought together six conservation organisations which were previously located in several separate departments under the jurisdiction of a number of different Ministers. These were the Fisheries and Wildlife Division, the National Parks Service, the Soil Conservation Authority, the Land Conservation Council, the Port Phillip Authority, and the Environment Protection Authority. Later, in 1975, the Archaeological and Aboriginal Relics Preservation Office (later renamed the Victoria Archaeological Survey) became part of the Ministry. The central co-ordinating section of the Ministry, which has developed since the Ministry was constituted in 1973, includes four specialist branches whose activities supplement those of the agencies : Environment Assessment, Environment Studies (Port Phillip Bay, Westernport Bay, and Gippsland Lakes), Conservation Planning, and Information and Extension. It also contains a personnel and training section, a library, and a central drafting section.

Other bodies closely associated with the Ministry include the Melbourne Zoological Gardens, the Sir Colin Mackenzie Fauna Park at Healesville, and the Victoria Conservation Trust.

#### *Agencies*

To understand the responsibilities of the Ministry as a whole, it is useful to examine the background of its agencies, a number of which have their origins in the latter part of the nineteenth century, such as the Fisheries and Wildlife Division, and a number of which are relatively new, such as the Environment Protection Authority.

### *Fisheries and Wildlife Division*

Victoria's first legislation to preserve wild animals—the Game Act—received Royal Assent in 1862, and was designed primarily to protect the game which colonists introduced from the northern hemisphere. Consequently, the Fisheries and Wildlife Division is the oldest of Victoria's conservation agencies, a Fisheries and Game section being part of the Department of Trade and Customs before Federation. From 1901, the Fisheries and Game Section was administered by the Department of Public Works ; in 1909 these activities were transferred to the Department of Agriculture, and in 1913 a separate office for the Fisheries and Game Branch was established under the control of the Chief Secretary.

The activities of this branch were mainly centered around stream stocking and enforcement work until the 1940s. After this time, however, increasing emphasis was placed on research, the first biologist being appointed in 1941. Over the next twenty years progress was made in research and management programmes. In 1946, the Snobs Creek Hatchery and Research Station was built at Eildon. In 1948, research was extended to cover mammals and birds and, in 1953, game research began with the appointment of a biologist (game birds). In 1959, the wildlife reserves system was established and the Serendip Wildlife Research Station was developed at Lara.

Since the 1960s, increasing emphasis has been placed on a broad ecological approach to environment management. In 1963, an environment studies section was formed within the Division and in 1970, research facilities were opened at the Arthur Rylah Institute for Environmental Research at Heidelberg. The increasing emphasis on environment management for fish and wildlife was further borne out by the Division's participation in the Port Phillip Bay Environment Study and the Westernport Bay Environment Study.

The Fisheries and Wildlife Division is responsible for administering the *Wildlife Act* 1975 and the *Fisheries Act* (substantially amended in 1975). The Division administers the State wildlife reserves and operates fisheries and wildlife officer stations throughout Victoria.

### *National Parks Service*

The National Parks Authority was formally established in 1956, although the history of reserving areas as national parks dates back to 1866, when Tower Hill was reserved under the Land Act. In 1898, Mt Buffalo and Wilsons Promontory National Parks were declared and, in 1908, the National Parks Association was formed, but replaced in 1914 by the Town Planning and National Parks Association. From 1926 to 1930 several national parks were acquired ; however, progress was slow as there was little public interest in them and finance was not available to manage them.

In 1949 a sub-committee of the Town and Country Planning Association approached the Minister for Lands requesting the Victorian Government to establish a constituted authority for the control of Victoria's national parks. This led to an investigation by the Parliamentary State Development Committee resulting in the recommendation of the formation of a National Parks Authority. In 1956, the National Parks Act was passed and the Authority was established. Following the passing of the *State Development Act* 1970 and the *National Parks Act* 1970, control of national parks came under a special division of the Department of State Development known as the National Parks Service. The Service was transferred to the Ministry for Conservation in 1972 and, under the *National Parks Act* 1975, is now responsible for the development and management of national parks and other parks throughout Victoria. Areas under the control of the National Parks Service are being significantly expanded, as the Land Conservation Council reviews land-use of Crown lands throughout Victoria.



### *Soil Conservation Authority*

The Soil Conservation Authority was created in 1950, to replace its predecessor, the Soil Conservation Board. Like the two agencies discussed above, however, its origins date back to the nineteenth century when, in 1887, a committee of inquiry was formed to examine problems of river siltation arising from mining operations. This resulted in the formation of a Sludge Abatement Board in 1905. In 1917, the Minister for Public Works called for the setting up of an Erosion Enquiry Committee which resulted in the formation of a River Erosion and Flood Protection Branch of the State Rivers and Water Supply Commission. In 1930 a Sand Drift Central Committee was formed which presented a report on erosion in 1938. In 1940 the Victorian Government appointed a sub-committee to inquire into the problems of erosion. This led to the passing of the Soil Conservation Act administered by the Soil Conservation Board.

In 1945, a Bogong High Plains Committee was established and in 1946 a Royal Commission was held into the grazing of forests. This led to the passing of the *Soil Conservation and Land Utilization Act* 1949 and the formation of the Soil Conservation Authority and the Land Utilisation Advisory Committee in 1950, to administer the Act.

In 1960, the Authority initiated a broadscale programme to control erosion in the catchment area of Lake Eppalock. The significant success of this programme led to amending legislation being introduced in 1962, allowing the Authority to undertake similar group conservation projects throughout Victoria.

The Authority, as well as being responsible for erosion control and prevention is also responsible for land-use management in all alpine areas above 1,200 metres and provides an advisory service in land-use planning. These responsibilities are set out under the consolidated *Soil Conservation and Land Utilization Act* 1958 and associated legislation.

### *Land Conservation Council*

The Land Conservation Council was established in 1971 to replace the Land Utilisation Advisory Council, formed in 1950, at the same time as the Soil Conservation Authority. The Advisory Council's functions were to define catchment areas and advise the Minister and the Soil Conservation Authority on land-use in any catchment area. In 1966, the Council was charged with recommending the best use of Crown lands in Victoria. There was no provision for public participation on the Council, however, and as a result of public interest in land-use management and the controversy over the future of the Little Desert, the Land Conservation Act was passed and the Land Conservation Council established to carry out investigations and make recommendations to the Minister for Conservation on the balanced use of public land throughout Victoria.

### *Port Phillip Authority*

The Port Phillip Authority was formed in 1967 following the passing of the *Port Phillip Authority Act* 1966. The Authority was created to advise the Victorian Government on methods of co-ordinating development and improving the condition of the Port Phillip Bay area. A consultative committee consisting of the Authority and ten other members advises and reports to the Minister on all matters referred to it by the Minister or the Authority.

### *Environment Protection Authority*

As public awareness and concern about pollution of the environment had increased during recent years, by the late 1960s there was considerable discussion in Victoria on the adequacy of government machinery available to deal with environmental problems. Pollution control responsibilities were spread

among numerous State and local government agencies with the result that many problems received inadequate and unco-ordinated attention. A need was seen for comprehensive and effective administration of pollution control and subsequently the Environment Protection Act was proclaimed in March 1971, formally establishing the Environment Protection Authority, and the Environment Protection Council, whose function is to advise the Authority. In July 1971, the first members of the Authority were appointed, and by March 1973 the Act had been fully proclaimed.

The Authority is essentially a pollution control agency, with responsibilities for the control of air, water, and noise pollution, solid waste management, and the control of litter. Control of pollution is achieved essentially through a licensing system for wastes discharged into the environment. To help with licensing and enforcement work throughout Victoria, the Authority has the assistance of five delegated agencies: the Commission of Public Health, the Dandenong Valley Authority, the La Trobe Valley Water and Sewerage Board, the Melbourne and Metropolitan Board of Works, and the State Rivers and Water Supply Commission. Closely allied with the Authority but independent of it administratively is the Environment Protection Appeal Board, whose function is to determine appeals on waste discharge licensing issues.

#### *Victoria Archaeological Survey*

The Archaeological and Aboriginal Relics Preservation Act was declared in May 1972 in recognition of the need to locate and preserve Aboriginal relics throughout the State and to build up a body of information on Victoria's prehistory. Proclamation of this Act led to the formation of the Archaeological and Aboriginal Relics Preservation Office under the Chief Secretary's Department. In November 1975 the Office, now renamed the Victoria Archaeological Survey, became part of the Ministry for Conservation.

The Survey is responsible for administering the Act and carries out archaeological investigations and research throughout Victoria which is the main means by which new relics are located. The Act provides for the creation of archaeological areas, to which public access may be restricted where necessary, as a means of protecting significant archaeological discoveries.

## RESOURCE-USE PLANNING AND MANAGEMENT

### **Organisational framework**

The breadth of issues involved in conservation and protection of the environment is such that the Ministry for Conservation cannot achieve all of its objectives, acting alone. Other government departments, organisations, statutory bodies, and individuals all have an effect on the environment through their daily activities and the establishment and implementation of policies. In the long-term, conservation of resources can only be achieved if the community as a whole adopts an attitude of care and concern for its environmental assets, and recognises that rational ways must be sought to protect as well as use these resources, for the benefit of both present and future generations.

Everyone in the community is at one time or another involved in some form of planning; it may be the apportionment of time for daily tasks, or it may concern the long-term planning of one's career or lifestyle. There are, however, statutory organisations, which have been specifically set up to carry out the task of planning and managing of resources, such as land.

In Victoria, land-use planning is carried out by three distinct yet inter-related tiers of government. At the apex of the hierarchy is the Town and Country Planning Board, with responsibilities for the preparation of broad planning guidelines for resource use in this State. The Board acts as an independent advisor to its Minister and the Ministry for Planning. Regional

planning bodies such as the Melbourne and Metropolitan Board of Works and the Western Port Regional Planning Authority constitute the second tier, and have been established in order to achieve a comprehensive approach to the planning of those areas which have a high degree of physical, social, and economic unity. The detailed planning is carried out by municipal councils—forming the third tier. The task of each tier is to work within previously determined constraints, on the basis of the natural characteristics of the land and along lines determined by the interplay between government, the people, and the various resource-use agencies.

Although the Ministry has no direct responsibilities in the implementation of these policies, it has a significant contribution to make in the early planning stages. It is at this point, before binding decisions are made and finances committed, that environmental implications of proposed developments can be most effectively evaluated.

Planning, however, does not involve land-use allocations alone. The more fundamental questions of social need, resource availability and distribution, and problems of management must first be determined. Sometimes where these fundamental considerations have been neglected, it becomes necessary for planning organisations, the Ministry, and individuals to resolve differences of opinion through the formal planning appeals procedure.

Some of the Ministry's agencies have planning responsibilities and the National Parks Service and Fisheries and Wildlife Division, for example, prepare master plans and management strategies for their parks and reserves. These agencies are not planners in a statutory sense, however, and their role—which can be substantial—is to provide advice to outside planning bodies, generally on the environmental constraints that apply to specific planning proposals. For example, the Soil Conservation Authority has prepared maps and descriptions of all the various land systems throughout Victoria and this basic information can be interpreted for planning bodies so that they can plan land-uses appropriate to the area's natural capability.

There are two sections within the Ministry specifically set up to advise on planning resource use. The Environment Protection Authority has a planning branch which provides advice and expertise to planning authorities and individual persons. Pollution control criteria are developed by the Authority's air, water and noise control, and land waste management branches, and these are used to



develop criteria for land-use planning. In this way, it is expected that potential pollution problems can be pinpointed and overcome before development occurs. The Conservation Planning Section plays a similar role, concentrating on the wider aspects of environmental planning and the co-ordination of inputs from the agencies into the State planning and decision-making process.

Land-use determination thus requires the consideration of a range of environmental factors—the allocation and use of resources and their distribution, the control of pollution, soil capability, conservation concepts, aesthetic considerations, and so on. Although professional advice can be given to planners on environmental constraints, it is recognised that where conflicts arise in land-use planning, the ultimate decision must depend on the weighting of different planning concepts. This responsibility rests with the appropriate statutory planning bodies.

### **Land-use**

#### *Historical background*

Historically, land management has changed in purpose and intensity, with changes in public interest and economic circumstances. Initially, the emphasis was on the expansion of agricultural settlement. Crown lands were first occupied by unauthorised squatters. In 1860, the Victorian Government began regulating the sale and occupation of Crown land. In the period of rapid alienation that followed, allotments were surveyed and sold, often with little assessment of the capability of different land types for agriculture.

In later years, governments began research and extension services to overcome the spread of vermin and noxious weeds, soil erosion, and other problems associated with pasture establishment and agricultural productivity. Attempts to improve productivity on existing cleared land were generally more successful than alienations of Crown land for farming, because Crown lands were mostly too mountainous, too dry, or too infertile for agriculture. Also, there is considerable potential for increased agricultural productivity from existing private lands and the alienation of Crown lands for this purpose has now virtually stopped.

Little thought was given to the management of Crown lands until it was realised that forests were being heavily exploited. Valuable forest areas were surveyed and dedicated as reserved forest in the 1920s. Forests on unoccupied Crown lands were also protected, but it was not until after the disastrous fires of January 1939 that the intensity of fire protection and forest management was increased. The public interest in significant landscapes and the conservation of flora and fauna has been growing rapidly. This is reflected in the growing numbers of national parks and other Crown reserves set aside in recent years and the intensity with which they are managed for these purposes. A large number of small public reserves are currently managed by local committees of management in the public interest. Recently, steps have been taken to provide greater technical support to these committees.

The public interest in the management of private lands has also increased, particularly where major changes in land-use are proposed. In the preparation of planning schemes, consideration is now being given to all the resources that may be derived from the land and not just the primary use to which it may be put.

#### *Present practices*

The use and management of land and the resources from land is a major part of the management of total resources. In general terms, the Soil Conservation Authority advises on and sets constraints on the use of land. The National Parks Service and the Fisheries and Wildlife Division also provide advice, but directly manage land set aside for their control.

The Environment Protection Authority is concerned with the protection of land by managing waste discharges. The preservation and protection of particular

environments is mainly the role of the National Parks Service and the Fisheries and Wildlife Division while the proper and balanced management and utilisation of land for various purposes is mainly the concern of the Land Conservation Council, the Soil Conservation Authority, and the Ministry for Conservation's Assessment, Planning, and Studies Sections. Conservation includes the preservation, protection, and balanced utilisation of resources.

The planning and management of land-use includes the following stages :

- (1) Collection of bio-physical and socio-economic data to characterise the land and understand the inter-relationships between elements of the environment ;
- (2) evaluation of the suitability of the land for various purposes ;
- (3) evaluation of the current and future needs of people for land for various purposes at the local, regional, and higher levels of government ; and
- (4) preparation and implementation of management plans.

The involvement of the Ministry for Conservation in these four stages depends upon the detail of planning and the responsibilities of the particular agency under its own Act. These responsibilities usually vary with the status of the land, i.e., whether it is public or private land.

### *Soil Conservation Authority*

The Soil Conservation Authority began the study and characterisation of land in rural areas to determine how land should be managed to prevent soil erosion and achieve stable production. The Authority's Land Studies Section has published ten study reports covering about two thirds of Victoria's land area. These studies identify and classify various kinds of land according to their natural features, erosion hazard, and productivity after an assessment of the ecological relationships involved. The basic and smallest mapping unit, called a land component, has conditions uniform for a particular form of land-use within defined limits. Larger units are mapped from recognisable patterns of land components which are based upon features considered to be the most important for the purpose in mind. They are called land units, land systems, and land zones, with increasing size.

The Soil Conservation Authority is currently preparing a map of land systems for Victoria based on information from earlier studies and more recent field surveys. These studies provide a basis for the Authority and other organisations, for example, the Land Conservation Council, to assess the capability of the land for various uses. Thus, land studies have helped the Authority to understand the changes in the hydrological balance from particular types of land-use which has resulted in soil salting, tunnel erosion, and other forms of land deterioration. With this understanding it is possible to manage the land, restore the hydrologic balance, and increase productivity.

Land-use planning and management have been very successful with organised groups of farmers in what are called Group Conservation Areas. Whole catchments or areas of concern are studied, characterised, and planned. Assistance is provided to control erosion which has arisen from past mismanagement, provided the landholder agrees to modify the use and management of land according to a prepared farm plan. Advice can also be given on request to any landholder at a more detailed level, for example, on how individual components of land should be managed and fenced from other components.

In a proclaimed water supply catchment the Soil Conservation Authority may prepare a plan called a Land-use Determination in the interests of the public and the water supply. The uses which are determined must be compatible with the primary use of the catchment for water supply. The Authority's policy of co-operation and education is usually sufficient to manage land-use under the Determination. Where this is not so, land-use conditions can be applied with the approval of the Minister for Conservation.

### *Land Conservation Council*

In planning the use and management of public land in Victoria, the Land Conservation Council carries out investigations and makes recommendations to the Minister for Conservation on the balanced use of public land.

For each study area the Council collates information on the nature of the land and its resources, the existing uses, and the capability of land to meet the likely demand for various resources. Consideration is also given to the influence that the main environmental, social, and economic features of the region could have on public land. Information is supplied by government departments, universities, and other groups as well as from research commissioned by the Council itself.

A descriptive report on the natural resources is published as a basis for interested people to make written submissions within 60 days to the Council. All submissions are carefully considered before the Proposed Recommendations are published and made available to authorities and persons with an interest in the area. Submissions are again invited within 60 days so that the future needs of people for land for various uses can be considered by the Council before making its Final Recommendations.

The Council must take into account the present and future needs of the people of Victoria in relation to:

- (1) Preservation of ecologically significant areas;
- (2) conservation of areas of natural interest, beauty, or historical interest;
- (3) creation and preservation of areas of reserved forest, areas for leisure and recreation, and reserves for the conservation of fish and wildlife;
- (4) preservation of species of native plants; and
- (5) land required by government departments and public authorities in order to carry out their functions.

The study areas for which descriptive reports and Final Recommendations have been published to mid-1976 are shown in Figure 1 on page 23.

The Council has recommended the creation of various types of parks with some to be managed by the National Parks Service. Reserves for wildlife and areas for reference and education have also been recommended. There are recommendations for areas for which the primary uses are for the production of water, wood, and agricultural products. Because the needs of the community may change with time, it is important that not all public land is committed for the future. Areas of uncommitted land have been set aside for this reason.

Where several land-uses are compatible, land should be available for the most beneficial combination of such uses, i.e., multiple use. Primary uses are defined and the levels above which secondary uses are unacceptable assessed. The Council considers the desired combination of uses when recommending the management body for a particular area.

### *National Parks Service*

The National Parks Service manages land in a system of parks to represent fully and protect adequately Victoria's many diverse habitats, scenery, and features. National parks have significant natural features such as wilderness areas, and are managed to preserve and protect these features of scenic and scientific interest for the use, enjoyment, and education of the public.

Other parks are also managed for recreational and educational purposes. These parks may be areas that are not suitable for national parks because of their limited size or limited significance for natural features, but are still valuable for the protection of flora and fauna and for their scientific interest. They may be areas that can demonstrate the effect of man's activities, such as agriculture, on the countryside.

Management plans must be prepared for each type of park. Such plans must include measures to protect the park from fire damage and measures to

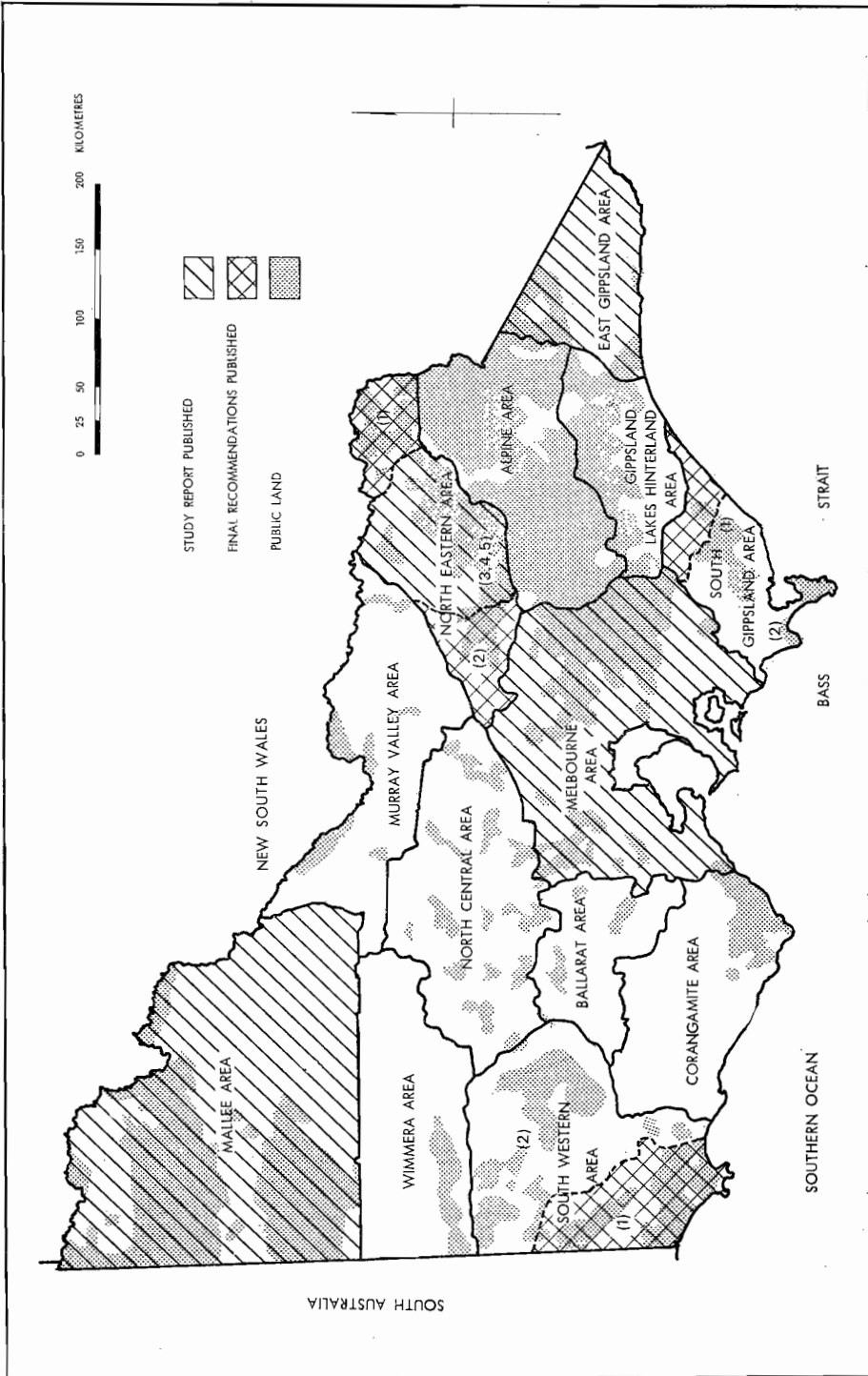


FIGURE 1. Victoria—Land Conservation Council study areas.

eradicate or control exotic flora or fauna. Parks are managed to promote their use and enjoyment where this does not threaten features which must be protected. The location of parks under the control of the National Parks Service by mid-1976 is shown in Figure 2 below.

#### *Fisheries and Wildlife Division*

The Fisheries and Wildlife Division manages land for the conservation of wildlife. The wildlife reserve system permits the physical management of land and habitat so that the carrying capacity of wildlife can be controlled. The location of reserves under the control of the Fisheries and Wildlife Division by mid-1976 is shown in Figure 3 on page 28.

There are 33 State Game Reserves where hunters may take game during the open season, three State Game Refuges which are sanctuaries for game, and sixteen State Faunal Reserves to conserve the habitat of wildlife other than game. The *Wildlife Act 1975* provides for Wildlife Management Co-operative Areas on private land or on Crown land vested in other authorities. For these areas, the Division assists with the preparation and implementation of a management plan.

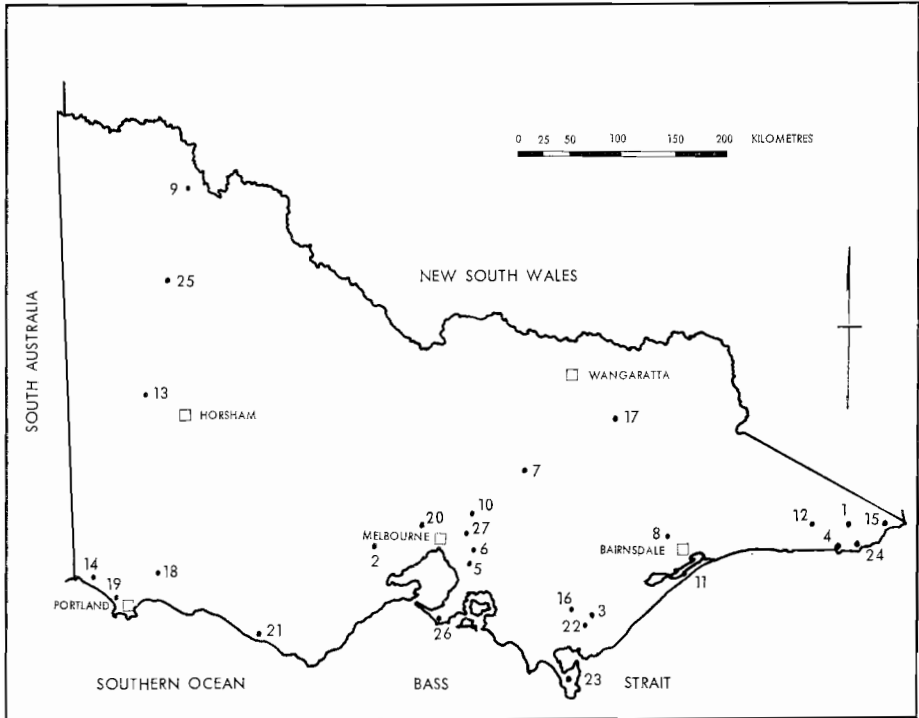


FIGURE 2. Victoria—location of parks under the control of the National Parks Service.

LEGEND. Names of parks, followed by area in hectares, corresponding to numbers in above figure :

- |                              |                             |                                |
|------------------------------|-----------------------------|--------------------------------|
| 1 Alfred (2,300)             | 7 Fraser (3,100)            | 18 Mount Eccles (400)          |
| 2 Brisbane Ranges (1,132)    | 8 Glenaladale (163)         | 19 Mount Richmond (1,700)      |
| 3 Bulga (36)                 | 9 Hattah Lakes (17,800)     | 20 Organ Pipes (65)            |
| 4 Captain James Cook (2,750) | 10 Kinglake (5,700)         | 21 Port Campbell (700)         |
| 5 Churchill (193)            | 11 The Lakes (2,100)        | 22 Tarra Valley (140)          |
| 6 Fern Tree Gully (450)      | 12 Lind (1,166)             | 23 Wilsons Promontory (49,000) |
|                              | 13 Little Desert (35,300)   | 24 Wingan Inlet (1,900)        |
|                              | 14 Lower Glenelg (27,322)   | 25 Wyperfeld (58,500)          |
|                              | 15 Mallacoota Inlet (5,250) | 26 Cape Schanck Park (900)     |
|                              | 16 Morwell (140)            | 27 Warrandyte Park (135)       |
|                              | 17 Mount Buffalo (11,000)   |                                |



It is hoped that the Wildlife Reserve system will ultimately include a sample of each physical environment and associated fauna found in Victoria as a system of reference areas. Private land with a high value for wildlife is being purchased to add to the reserve system.

The largest proportion of natural habitat remaining in Victoria is on public land. It is the general policy of the Land Conservation Council that wildlife and fish habitats on public land be conserved and restored if practicable, especially in the case of wetlands and water frontages.

#### *Conclusion*

Land studies were an important part of the Westernport Environment Study which was directed by the Environment Studies Section of the Ministry for Conservation. A mathematical tool called a Land Activities Model has been developed and used to investigate the relationships between alternative patterns of land-use, various waste water management alternatives, and water quality in Westernport Bay. The model has been developed for computer techniques which enables various future patterns of land-use to be evaluated quickly for their environmental effects. With the information available from this study, decisions on land-use and management can be made so that a balanced use of the region's resources can be achieved while, at the same time, maintaining or enhancing environmental quality.

Authorities that are directly involved in the planning of future land-use, councils and the Town and Country Planning Board, can obtain advice from the agencies of the Ministry. Its Conservation Planning Section is co-ordinating this advice and developing guidelines and principles for planners to use so that future land-use will enhance the environment. Major works can directly or indirectly affect land-use. The Environment Assessment Section helps the Victorian Government and private developers to identify the environmental effects of proposed works before such works are approved and assists the developer to prepare an environment effects statement where this is considered necessary.

#### **Water**

Water is one of the most significant and basic natural resources. It is essential to the maintenance of life in all its forms and furthermore it is a fundamental contributor to the beauty of rural and urban surroundings, to recreational opportunities, and to the economic viability of primary and secondary industries. Care of water resources, with respect to quality as well as quantity, thus becomes a subject of great significance to any community, and one which must be effectively provided for to ensure long-term stability.

The overall planning, management, and control of Victoria's water resources is the responsibility of the Ministry for Water Resources. Generally, Melbourne's water supply is managed by the Melbourne and Metropolitan Board of Works, while rural supplies are controlled by the State Rivers and Water Supply Commission. The Mines Department carries out investigations into groundwater resources, while some aspects of water pollution are the responsibility of the Health Department.

The Ministry for Conservation is closely involved in the environmental aspects of water. The Environment Protection Authority is responsible for pollution control and operates through the establishment of policies and the licensing of effluent discharges to water, to meet those standards. The Fisheries and Wildlife Division is responsible for the ecological aspects of rivers and water bodies, while the Land Conservation Council advises on Crown lands forming river frontages. The Soil Conservation Authority has the broad responsibility for catchment management and erosion control. In addition, the environmental effects of significant dams and other river works are assessed by the Ministry before decisions about them are made.

Most Australians live in cities supplied with an abundance of cheap water and, under these artificial conditions of plenty, find it hard to appreciate that they live in the world's driest continent and that water resources must be prized if the environment is to be protected and enhanced. To achieve this, the aquatic environment needs continuing care, which includes such aspects as maintaining the biological and chemical quality of water supplies; protecting catchments; heeding the problems posed by inland cities; finding ways of overcoming the special problems of European carp, water hyacinth, and salinity; protecting river frontages; and ensuring that rivers perform their environmental as well as their hydraulic functions.

The present figures and projections available for Melbourne's water consumption show that demand is expected to increase from the maximum level of 380 litres per person per day in 1975 to a maximum of 500 litres by the year 2000. Factors contributing to this increase include the growing use of automatic washing and dishwashing machines, sink garbage disposal units, non-recycling swimming pools, and greater attention to lawns and gardens. Such a projected increase in water consumption per head of population amounts to almost one third over the 25 year period, even without population growth.

Melbourne is now drawing heavily on other catchments to satisfy this growing demand. It, therefore, becomes important to take special care of our water resources, to restrict wastage, and to curb unnecessary demands. There are several ways which have been suggested for achieving these ends, including the application of pricing policies designed to give incentives to the prudent water user, recycling and re-use of water, restricting garden watering late at night, planting native plants and drought resistant species in parks and gardens, controlling the design and operation of water consuming devices, and restricting distribution losses which can occur within the system.

It is becoming increasingly difficult to provide for the many competing present and future demands for domestic, recreational, agricultural, and industrial water. The means adopted for satisfying these demands could also have far reaching environmental effects. For these reasons the future development of water resources will involve more emphasis on environmental studies, environmental impact statements, and multi-objective planning. All these techniques will help in considering how to align the many competing uses for the limited water resources available.

#### **Fish and wildlife**

Before European settlement, fish and wildlife in the area now known as Victoria inhabited a wide variety of environments to which they were well adapted. Man has since had an impact on all of these environments and on the animals they contained. The problem now is to maintain as many animal populations in as many places as possible, despite the fact that the present environments have experienced great changes.

There are still several important terrestrial environments in which no irreversible changes have occurred. These include high rainfall sub-alpine vegetation, wet sclerophyll forests in mountainous areas, dry sclerophyll foothill forests, savannah woodlands and grasslands, heathlands, arid mallee vegetation, and flood plain forests. Most of these, however, have been changed to some extent by forestry activities, agricultural practices, and other factors.

#### *Terrestrial environments*

Perhaps the major problem in the conservation of land animals in Victoria is the need to acquire quickly portions of particular types of environments which are large enough to maintain viable populations of the animals and plants they contain. Speed is necessary because some environments are rapidly diminishing and all are subject to growing and competitive demands for uses other than wildlife conservation. Moreover, not enough is known about most

of Victoria's animals to allow an estimate to be made of how large each portion should be. Planning is made even more difficult by the certain knowledge that the area required to maintain a particular species must also conserve many other species with which it has an ecological interdependence.

Where appropriate, wildlife and fish populations are directly manipulated by such methods as the capture and relocation of animals, the liberation of fish, and limitations on the harvesting of fish and wildlife. Koalas, for example, are taken from very successful breeding grounds on Phillip and French Islands to suitable habitat on the mainland—more than 7,000 koalas have been released during the last 25 years, to recolonise areas where they were once common.

Wildlife populations are frequently manipulated indirectly by means of habitat management and this type of approach is made on 54 wildlife reserves embracing 50,000 hectares. These include State game reserves, where hunting is permitted during an open season; game refuges where hunting is prohibited; and faunal reserves which accommodate particular species of wildlife in which hunting or disturbance is prohibited. Management practices include fencing and fire break construction, such as have been carried out in the Wathe Faunal Reserve to minimise threats to the Mallee fowl and other wildlife populations. In the Kerang area, water is pumped into swamps to provide suitable habitat during breeding and hunting seasons.

A substantial effort is being made to extend management activities to lands which are privately owned. Success here always depends on the co-operation of land-owners. There is a Wildlife Act which makes provision for co-operative management of land with wildlife potential between the Victorian Government and private landowners and this approach may hold promise in certain areas for some species.

The Serendip Wildlife Research Station at Lara, near Geelong, provides a site for research into wildlife in captivity and free flying waterfowl. Wildlife management techniques on farm lands are also being investigated. Of special note on this site are projects for the re-establishment of rare or endangered species such as the Cape Barren goose, the Magpie goose, and the bustard.

Other important research includes studies of waterbird biology in the key wetland regions of Victoria, and the effect of harvesting wild duck by sport hunting. Coastal wetland surveys are undertaken as part of an Australia-wide programme.

#### *Aquatic environments*

The aquatic environment has changed almost beyond recognition over the last century. The main factors responsible have been the building of dams; the creation of large lakes, which are quite new to Australia; river regulation, which produces changed temperature and flow regimes; extensive bucket dredging of river flats for gold; removal of trees and other vegetation from river banks, resulting in more rapid erosion; widespread watering of stock at rivers; pollution of various types; reclaiming of billabongs and backwaters for agricultural purposes; de-snagging and straightening of river courses; and the drainage of thousands of hectares of marsh lands.

The introduction of exotic fish and plants to Victoria's waterways has also produced some significant changes both in the water systems and in native fish populations. The effects of the recent rapid spread of the European carp over the last decade to more than half of Victoria's waterways have yet to be determined precisely, but there is little doubt that native fish and waterfowl have suffered significantly. The water hyacinth is another noteworthy introduction. Although its range is presently restricted, it could spread to most parts of the aquatic system of south-eastern Australia in the foreseeable future and choke the slower moving waters.

The marine, estuarine, and coastal environments are extremely valuable areas for fish and wildlife and most of them have suffered changes to some

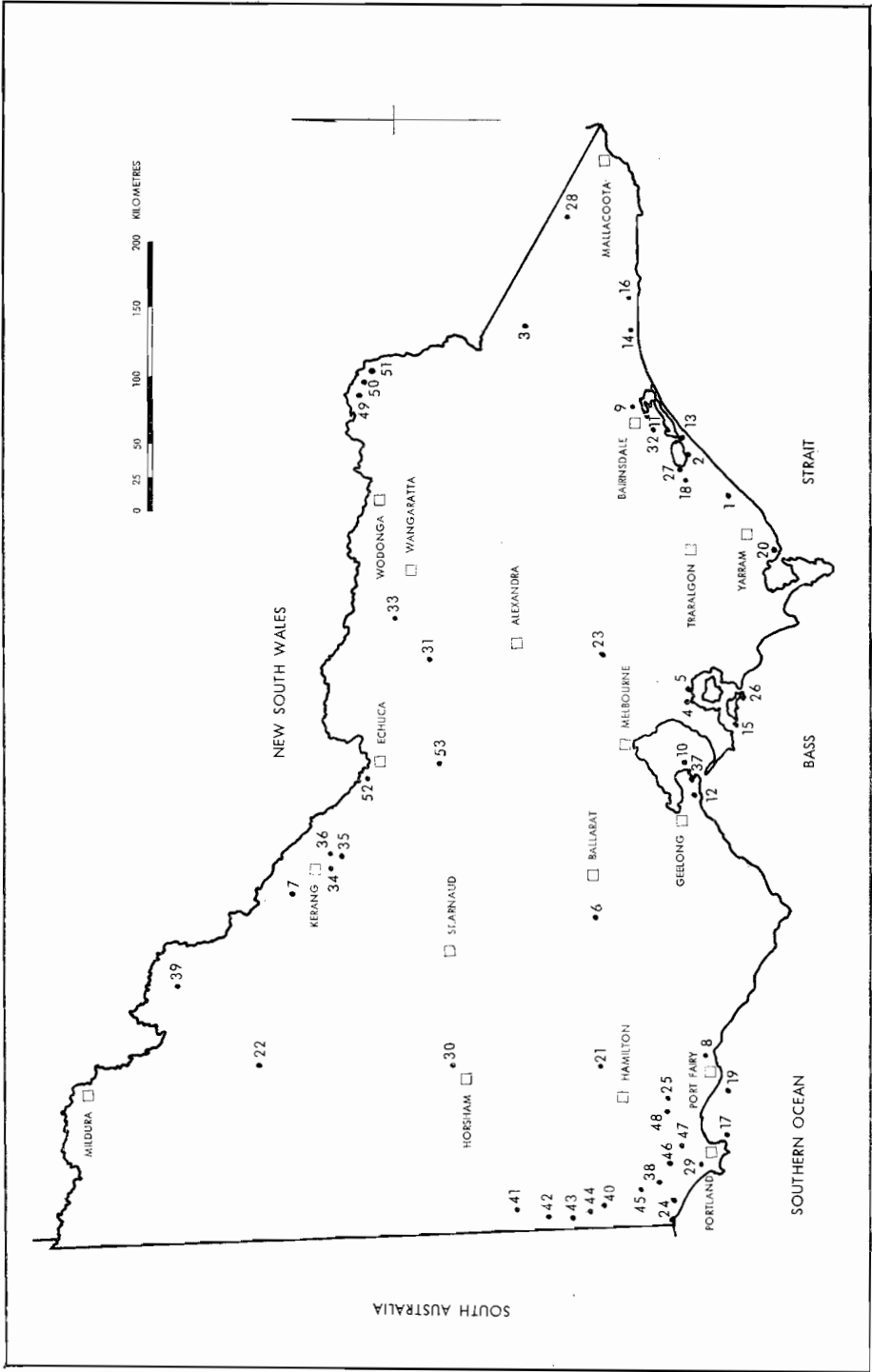


FIGURE 3. Victoria—location of reserves under the control of the Division of Fisheries and Wildlife. (For explanation of numbers in this figure, see foot of page 29.)

extent because of rapidly expanding recreational and industrial uses in recent years.

In attempting to manage and conserve the existing animals in their changing environments, there is a basic task of collecting a wide variety of data describing the biological, chemical, and physical aspects of their environments. There have been extensive environmental studies in Port Phillip Bay and Westernport Bay aimed at preserving the essential environmental qualities in those areas. A major environmental study is planned for the Gippsland Lakes and its catchment and this work will preserve one of the major recreational and wildlife resource areas of Victoria. These studies include detailed examinations of water movement and interchange, inventories of marine and terrestrial organisms, population dynamics of key species, and basic productivity measurements—all of which are essential to the development of effective conservation policies.

In the ocean and estuaries there are commercial fisheries for many species ranging from abalone, a relatively newly fished inshore species, to shark which is often caught many kilometres offshore. The maintenance of these fisheries requires considerable information about the fishermen and fish populations concerned, and while the major concern until quite recently has been to ensure that each of the fisheries produced a maximum crop without jeopardising its future, another important management factor that must now be considered is the overall welfare of the fishing industry. This brings the economics of each fishery under close scrutiny.

The discovery of concentrations of heavy metals such as zinc, mercury, and cadmium in some marine and freshwater animals has produced particular management problems. In localised areas, the source of these contaminants is usually easy to locate, but in the open ocean, both their origins and their levels in the animals are often difficult to explain. Because in some large or long-lived species the level of a heavy metal has exceeded concentrations permitted by public health authorities in food, extraordinary management methods have been adopted to prevent the landing of fish above the critical length.

To satisfy the recreational demands of anglers, thousands of hatchery produced Brown and Rainbow trout are distributed each year into lakes and streams where there is no natural spawning. Little attention has yet been given to the rehabilitation of important native fish in their new environments; however, plans are proceeding for the establishment of a major warm water hatchery and research station which it is hoped will produce large numbers of small native fish in the same way that trout are turned out from existing hatcheries. As a first step in this programme a pilot project has been established at a warm water lake in which several native species spawn naturally each year.

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LEGEND. Names of reserves corresponding to numbers in Figure 3 on page 28:	11 Macleod Morass	27 Dowd's Morass	42 Toooly Lake
1 Jack Smith's Lake	12 Lake Connewarre	28 Kowat	Mundi
2 Lake Coleman	13 Lake Reeve	29 Bat's Ridge	43 Kaladbro Swamp
3 Rocky Range	14 Ewings Morass	30 Darlot's Swamp	44 Kerr Swamp
4 Quail Island	15 Seal Rocks	31 Morphett's Swamp	45 Red Hill Swamp
5 Chinaman Island	16 Lake Curlip	32 Blond Bay	46 Lake Crawford
6 Lake Goldsmith	17 Lawrence Rocks	33 Dowdle Swamp	47 Lake Sinclair
7 Koorangie	18 Sale Common	34 Tragowal Swamp	48 Lake Condah
8 Tower Hill	19 Lady Julia Percy	35 Hird Swamp	49 Clark Lagoon
9 Jones Bay	20 Nooramunga	36 Johnson Swamp	50 Jeremal
10 Mud Island	21 Bryans Swamp	37 Edwards Point	51 Tintaldra
	22 Wathe	38 Burgess Swamp	52 Murphy Swamp
	23 Yellingbo	39 Wandown	53 Gaynor Swamp
	24 Long Swamp	40 Church Swamp	
	25 The Stones	41 Beniagh Swamp	
	26 Cape Woolamai		

### Landscape

Some of the most difficult and controversial aspects of conservation and environment protection lie within the broad range of issues associated with intangible values. Landscape aesthetics is an example of an issue which is difficult to resolve because of the innumerable subjective interpretations and value judgements implicit in its evaluation. In other fields, the basic resource can be measured in "hard" terms of species distribution, numbers of wildlife, rarity, stability, and so on. Areas can be reserved for their scientific and recreational importance and there are techniques available to identify these values and to suggest management programmes designed to maintain or enhance them. Reliable techniques, however, have not been devised in the field of landscape aesthetics, and without this solid grounding it is difficult to evaluate scenery without significant qualifications being placed on the reliability of the results obtained.

Nevertheless, conserving the beauty of Victoria's landscape resource is a matter of considerable concern. It affects the decisions of people in determining places to live, drive, walk, picnic, etc., and also the cost of land is significantly affected by the beauty of the environment within which it exists. In addition, many people are not particularly concerned about the scientific attributes of reserves such as national parks, but they value very highly the perceptual experience of being in a wild and untamed environment, i.e., the landscape or wilderness experience. Accordingly, when change takes place in a locality due to particular management practices or other required development—at times this



must occur even in parts of parks and reserves—it must be related to the landscape if this intangible resource is to be conserved.

The Ministry for Conservation's policy in relation to landscape, for both public and private land, is based on the premise that land should be utilised and managed for purposes consistent with the attributes of the land itself. Thus the first requirement for land is that there be a usage associated with it which in the long-term can be carried out without detriment to the capacity of the land to carry out that purpose. Second, the use should be organised in such a way that the visual integrity of the landscape is preserved. There is a rule of thumb which, although not universally true, applies to many situations: good land-use leads to good landscape and bad land-use to poor landscape.

Whilst the Ministry has obvious responsibilities in relation to public lands and the reserves it manages, it is also interested in the preservation of landscape on private land. It encourages planning authorities to take account of landscape, not only in the so-called scenic areas, but on all land. It is concerned that the regional diversity of landscape throughout Victoria is maintained and is opposed to regional landscaping measures which tend to stamp a uniformity on the landscape of the whole State. Examples of this are the spread of "suburban" brick veneers throughout the country areas, and the widespread planting of non-indigenous (sometimes "native") plants along roadsides.

There are difficulties associated with the conservation of rural landscapes, but these appear to be minor in comparison with the problems inherent in the creation of viable urban areas that are functional and pleasant. In suburban areas the problem relates to the need for civic programmes designed to create identity with diversity. At present, the diversity is created by each individual creating a landscape to his own taste around his dwelling. The suburb becomes indistinguishable from any other suburb in its fragmentation and lack of coherence, and on a metropolitan scale is recognised as part of the suburban sprawl. Identity can be created for suburban precincts so that residents relate to their locality, and diversity between precincts can be designed to emphasise this identity. One simple way of achieving this is by promoting the use of a restricted range of tree species within a new suburban setting.

In the long established inner suburbs, the character of the locality is often pronounced. In this situation, the dynamics of city growth suggest that change is inevitable and efforts would need to be directed towards the management of that change so that the scale, character, and charm are retained rather than in resisting change as such.

The central business district is an environment of special significance. Vitality within it arises from the activity of people and, if the people leave, so does that vitality. Landscaping the central business district seeks to create a set of environments within which people can participate in the diverse functions of the area. This is not confined to a consideration of building façades; rather, it recognises the busy nature of the area and the need for it to be functional but at the same time retaining its identity.

The preservation of landscape covers wide and diverse situations. The landscape experience is difficult to define because it is subjective and the actions that are required to maintain aesthetic values are therefore often difficult to specify. Despite these difficulties, the preservation of the visual values in the environment will continue to be a basic objective of conservation in Victoria.

## **Pollution control**

### *Introduction*

Early pollution control legislation in Victoria arose out of concern about problem areas administered by a number of different departments: the Health Department over the health effects of air and water pollution, the Fisheries and Wildlife Division over the water pollution impact on fisheries conservation,

the Local Government Department over visual pollution and noise nuisance, and so on. Each department introduced its own legislation, with varying degrees of effectiveness, to cover its own particular area of concern.

The Environment Protection Act was introduced in 1970 and set up a new body—the Environment Protection Authority—to provide an overview, and to replace many outdated laws. The Authority, part of the Ministry for Conservation, has over-riding responsibility in Victoria for control of all forms of pollution—of air, of water, of land, and by noise—and must consider all the beneficial uses of the environment enjoyed by the community at large. In this way the Authority must consider not merely the human health hazards or the effects on animals, including fish, of a polluted environment, but also the rights of the farmer to unpolluted water for irrigation or stock watering, the rights of industry to water suitable for industrial purposes, or of people to bathe safely at the seaside or enjoy the visual amenity of an unpolluted countryside.

#### *Environment protection policies*

The Environment Protection Act introduced an approach to pollution control new to Australia. Instead of concentrating on each major source of pollution to see how much it could reasonably be reduced—the old “best practical means” approach—the Act introduced the concept of environmental quality management. This approach to pollution control is based on an initial assessment of the air or water quality or ambient noise levels required to meet the general needs of the community as a whole.

The levels are achieved through the declaration of State Environment Protection Policy for each segment of the environment. The first of these Policies (based on the regional environmental studies), for the waters of Port Phillip Bay, was proclaimed on 10 April 1975. This Policy divides the Bay into a number of segments, based on the differing beneficial uses of the water and related to physical and biological differences between the segments—for example, bathing, fish conservation, industrial water supply, and navigation—and stipulates appropriate water quality criteria to maintain these uses. The boundaries of the segments were defined from the information developed by the First Phase of the Port Phillip Bay Environmental Study. The Policy also sets out an attainment programme and a target date by which time it is anticipated adequate water quality will be achieved. Community input to Policies at the drafting stage ensures that the Policies represent the views of as wide a section of the public as possible.

A number of other Policies are in an advanced stage of preparation. The Act intends that all sections of Victoria will ultimately be covered by Environment Protection Policies, so that in addition to Policies for bays, rivers, and lakes, there will also be Policies for air-sheds setting out desired air quality criteria, and noise Policies laying down maximum noise levels to be allowed in different areas at various periods during the day or night.

#### *Pollution control*

Once the Policy has set out a rationale for pollution control, the Environment Protection Act sets out three methods for controlling pollution, bearing in mind the high cost to the community of a clean environment. First, the Authority can take legal proceedings against anyone who pollutes the environment either wilfully or by negligence; second, it can limit the discharge of wastes by means of a licensing system; and finally, it can exercise regulatory control—for example, by regulations controlling the installation or use of equipment or materials which cause pollution.

Prosecutions under the Environment Protection Act can result in fines of up to \$5,000, and approximately thirty such prosecutions have been undertaken each



## THE VICTORIAN ENVIRONMENT



A flight of wild birds over Lake Connewarre, near Geelong.

*The photographs in this section have been reproduced by courtesy of the Ministry of Conservation.*



Commercial fishing in Victoria has developed greatly over the past ten years. A new management system has been devised to protect the fish, the fishermen, and the consumers.

The world's smallest penguin, the Little (or Fairy) Penguin, nests in burrows in sand dunes at several locations along Victoria's southern coast.





Victoria's coastal areas are an important and much used community resource, but their continued welfare requires careful management. Maintenance of vegetative cover on the primary dunes is the basic aspect of management.

Tree planting to restore natural vegetation along the edge of wetlands is important in providing for the needs of water bird populations.





Saw Banksia (*Banksia serrata*). A native species commonly found on the eastern coastal plains of Victoria. Action is being taken to preserve the species on public land.

Snow covered Snow Gum (*Eucalyptus pauciflora*) in open forest with a dense leguminous understorey. Snow Gum is found in the Eastern Highlands, especially at altitudes of about 1,500 metres.





Myrtle-beech (*Nothofagus cunninghamii*) forest and associated species. This native species is usually associated with Mountain Ash in high rainfall areas (more than 1,500 mm per annum) in South Gippsland, the Eastern Highlands, and the Otway Ranges. Action is being taken to preserve the species.

Scattered Snow Gums (*Eucalyptus pauciflora*) among granite outcrops in the Mt Buffalo National Park.



Soil Conservation Authority officers advise farmers on good land management, including the control and prevention of soil erosion.



Legislation is being progressively introduced as a basis for control of excessive motor vehicle noise. A noise control officer from the Environment Protection Authority tests the noise level of a motor cycle.

Management programmes to provide adequate habitat are helping wildlife species to flourish. This koala will be relocated to colonise a new area.





Victoria's extensive wildlife reserves system provides habitat for wildlife populations. Reserves are also an integral part of Victoria's game management programme and provide hunting opportunities for the public.

Soil is a vital community resource, the productivity of which must be maintained. This once valuable farm land has been degraded by water erosion—the result of inappropriate land-use.





Pollution is an inevitable consequence of human activities. The Environment Protection Authority has overriding responsibility for control of all forms of pollution—including air—for the benefit of the community.

Sub-divided land in Melbourne's outer metropolitan areas is in demand for residential development. The Soil Conservation Authority provides a service to municipal councils to minimise the problems arising from land development.



Monitoring of Melbourne's waterways provides a basis for measuring improvements brought about by pollution control programmes.





year. These have ranged from the factory whose emission of waste gas affected a number of children at a near-by school, or the commercial building from which oil was allowed to escape through a surface water drain into the Yarra River, to the farmer whose piggery manure contaminated a local swimming pool or the farmer who dumped a number of dead cattle in a nearby creek.

Pollution is an inevitable consequence of industrial activity, and the waste discharge licence system recognises that industry must dispose of its wastes somewhere. Every significant discharge to water, to air, or to land must be licensed and the licence will normally carry conditions which ensure that the wastes are adequately treated before disposal and can be assimilated into the environment with the minimum adverse effect. Licence conditions remain in force in perpetuity, unless amended or revoked, but a fee is payable annually in recognition of the cost of issuing and maintaining surveillance of the licence. Breaches of licence conditions again attract heavy penalties.

The regulatory powers under the Act enable controls to be placed on forms of pollution not amenable to the first two methods. For example, the Victorian Government has enacted regulations limiting the level of lead which may be added to petrol sold in Victoria on the advice of the Environment Protection Authority. This should prevent the concentration of lead in the atmosphere from rising significantly above its present level.

#### *Environment Protection Authority*

The authority carries out its responsibilities through its branches which are Administration, Air Quality, Water Quality, Land Waste Management, Noise Control, Investigations, Planning and Research, Legal, Laboratory Services, and Information Services.

Geographically, part of the licensing and enforcement function is delegated to a number of government agencies—the Melbourne and Metropolitan Board of Works, the State Rivers and Water Supply Commission, and the Dandenong Valley Authority in respect of water; the Health Commission in respect of waste disposal to land; and the Latrobe Valley Water and Sewerage Board in respect of disposal to air, land, and water.

Environment protection involves a great deal more than merely controlling pollution, and the Authority carries out comprehensive monitoring programmes of air and water quality in addition to conducting surveys into urban noise levels and the composition and disposal patterns of domestic garbage. It undertakes an advisory role to statutory planning authorities and to industry to minimise future deterioration, together with an education and information role to the community at large. Many special studies and investigations are also undertaken into specific problems such as the eutrophication of certain inland lakes, the effects of motor vehicle exhaust emissions on the Melbourne air-shed, and the impact of freeway noise on urban areas.

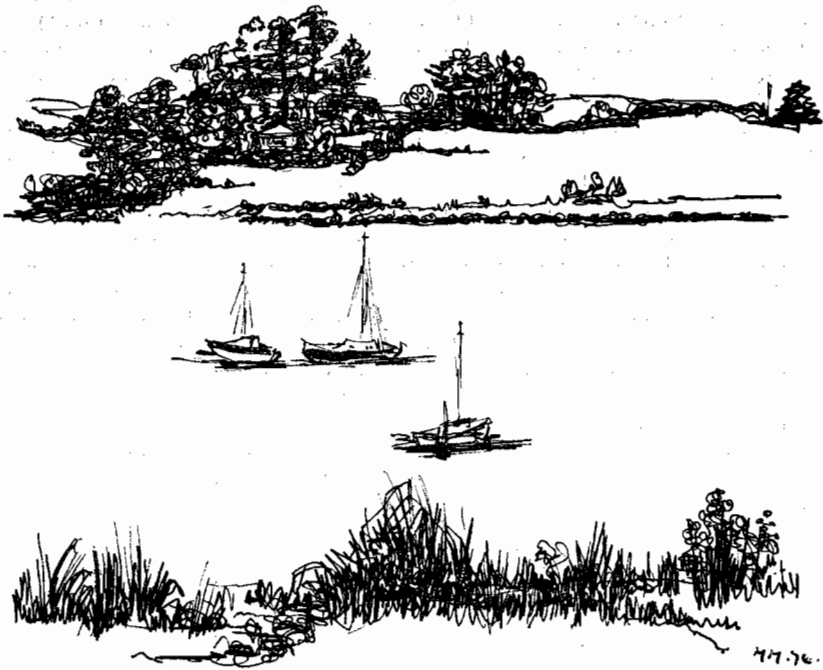
## MAJOR ECOLOGICAL SYSTEMS

### **Coastline**

#### *Erosion mechanisms*

The coastal landform is a zone of varying width comprising complexes of shore, beach, cliffs, and dunes. This zone is commonly referred to as the foreshore. Over the ages, wind, sea, and natural events engage in a constant process of building and destroying these landforms. At the same time, an environmental association of the sea, wind, sand, soils, and vegetation develops delicately balanced ecosystems, unique to coastal areas, which contribute to their stability.

Large sections of the Victorian coast comprise sandy beaches, backed by vegetated coastal dune systems. The dune closest to the sea is the frontal, or



primary, dune, which is the most vulnerable to damage. This is followed landward by secondary dunes, with interdune corridors between them, and the hinterland. Vegetation is the primary factor in maintaining the natural stability of a dune system.

The primary dunes are the key to beach stability, as they protect both the beach which they face and the other dunes and hinterland behind them. They are formed by wind blown beach sand being trapped by vegetation along the back of the beach. This sand builds up until a natural angle of slope prevents the sand from adding height to the primary dune. As new vegetation colonises the crests and upper slopes, development of natural dune systems is achieved. The protection from damage of the vegetation on the primary dunes is important for dune stability.

When seasonal storms are coupled with high tides, large masses of sand are moved from the beach and primary dune to form offshore sand bars, which protect the beach and dunes against the severest wave action. Later, wind and tide action returns the sand to the beach, where the dunes ensure that it is again trapped, thus naturally repairing the storm damage to the primary dune. In this way, a dynamic association, extending from seabed to the dune limits, is completed. Its major element is the total sand content of the dunes, beach, and that part of the seabed which contributes sand to the system.

The vegetation of the secondary dunes consists mostly of shrubs, dwarfed and wind-pruned on the seaward slope and crest of the dune, but increasing in height on the lee side and the corridor floor. Like the primary dunes, the secondary dunes will erode if this protective vegetation is removed or damaged. However, the interdune corridor can be safely used for tracks and camping.

The hinterland is often a woodland of eucalypts, with an understorey of heath and bracken, or it may be heathland. This part of the system is suitable for car parks or camp sites, which should preferably be located in this area.

Victorian beaches are popular recreational amenities but in many areas the dune systems are suffering severely from the resulting pressures. This in turn reacts on the beaches. The beach, being mostly loose sand, plays its own part in the recycling process and tolerates intensive use. Any major permanent loss of sand from the dunes, however, is a loss to the overall system. Eventually the beach level may be reduced by the amount of the loss. The sand loss often takes the form of a breach in the primary dune, caused by destruction of the protective vegetation, followed by wind erosion. This takes the sand out of the system by blowing it inland, usually in the form of drifts.

Work on stabilisation or restoration of damaged areas is best begun at the source of the instability and not on the drifting sand. The latter can be controlled by sealing the breach in the dune and rebuilding the dunes. Rebuilding is usually a two-step operation, involving, first, the control of drifting sand. Permeable fencing is used to seal the breach and to allow wind blown sand to build up over it. Earth moving machinery can also be used to fill the eroded gaps with drift sand. The second step is the replanting of the repaired dunes with stabilising vegetation. The main requirements are the use of correct planting techniques during the winter, followed by fertilising and fencing out of the new plantings.

Plants used on frontal dunes are the indigenous hairy spinifex or the exotic marram grass and sea wheat, both of which have adapted successfully to Victorian beach conditions. Classed as "pioneer" colonising plants, they all tolerate sea spray, high salinity, sand blast, periodical burial, and low soil fertility, but are intolerant of concentrated foot or vehicle traffic.

As pressures increase on the more popular beach areas, such as those along the Otways coastline and the Mornington Peninsula, the prevention of damage to dune systems becomes necessary if the beaches are to be maintained as recreational assets.

### *Management*

The present management for Victorian coastal resources is fragmented. The Port Phillip Authority is responsible for controlling activities on a land belt 200 metres wide around Port Phillip Bay, and 800 metres wide along the Bass Strait coast from the Barwon River in the west to Cape Schanck in the east. Responsibility for control of the rest of the coastline is dispersed between authorities such as abutting shires, the Crown Lands Management Section of the Department of Crown Lands and Survey, or committees of management appointed under the Land Act to administer various foreshore reserves. The Ports and Harbors Division of the Public Works Department has various responsibilities over all coastal waters and for certain public works along foreshores. The Soil Conservation Authority is responsible for providing advisory services and works directly to the relevant authorities on the control and prevention of coastal wind erosion. The Authority may also provide finance to those authorities to assist erosion control programmes undertaken by them, and it may directly participate in works projects.

A desirable management programme for Victoria's coastline has four major requirements:

- (1) An inventory of coastal resources to assess the actual resources;
- (2) integrated planning of coastal resources with planning of the hinterland to provide balanced use for recreation, scenery, nature conservation, preservation of archaeological and historic sites, ports, and access for commerce and industry;
- (3) an administrative system to provide for integrated planning and management, involving the use of data obtained from resource inventories and environmental studies; and

(4) a continuing programme of supervision and restorative maintenance to ensure avoidance of future erosion.

The Ministry for Conservation is investigating and correlating all available data with the objective of recommending the best means of satisfying these requirements.

#### Alpine area

The Alpine area of Victoria represents parts of the southerly termination of the eastern Australian highlands which have been uplifted throughout various geological eras. It consists of approximately 1,200,000 hectares of hilly and mountainous land ranging from the highest "bare" true Alpine areas with their grasses, heaths, and herbfields, to the sub-alpine woodlands, down to the mountain forest, with a variety of tree and other species, including the economically important mountain ash and alpine ash.

The environment is often harsh, with low winter temperatures and high rainfall (sometimes more than 2,550 mm in a year). At elevations above approximately 1,350 metres, snow lies for periods ranging from one to four months each year and the retention of water as snow is most important, as the water later becomes available during the spring thaw. Soaks and moss-beds are also important as natural reservoirs in the mountain catchments. The Kiewa hydro-electric scheme produces electricity from the waters falling and stored at high altitudes on the Bogong High Plains.

Aboriginals lived in the general area and regularly visited the higher areas to feast on Bogong moths, long before Europeans first visited and explored the area in the mid 1800s. Thereafter, at various times, the area was travelled and explored by prospectors in search of gold, selectors in search of grazing lands, and bushrangers, the best known of whom was Bogong Jack. Many of the present roads, such as the tourist road over Mount Hotham which was first constructed as a coach road in the 1880s, follow the same routes as those originally taken.

Much alluvial and reef gold was found in the Alpine area after 1851 but production decreased markedly in the early 1900s and, although production increased again during the Depression of the 1930s, there are only a very few gold mines in operation now. However, exploration for minerals still continues in the Alpine area.

The Alpine area now provides for several uses and resources. The area is an invaluable source of water, and the Victorian Government has directed that the sustained yield, in perpetuity, of maximum quantities of high quality water is the prime function of Victoria's Alpine areas. To implement this directive and to protect the often fragile nature of the environment, the Soil Conservation Authority has statutory control over all land-use in Victoria on lands which are higher than 1,220 metres and any proposed change in land-use must be referred to the Authority.

Much wood is produced from the Alpine area and the ash forests are managed intensively for wood production by the Victorian Forests Commission. Fires, such as the disastrous bushfires of January 1939, can have very serious consequences in the Alpine area and fire protection is another important facet of the Commission's activities.

Grazing of cattle on the High Plains continues, although less extensively than previously, and is carefully managed.

The Mount Buffalo National Park is the only national park in the Alpine area now. However, the Land Conservation Council has investigated its Alpine Study Area and has made recommendations for the future use of land in that study area. Recommendations for other lands in the Alpine area which are not within the boundaries of the Land Conservation Council Alpine Study Area have already been published.

Another important and growing use of the Alpine area is for summer and winter recreation. Bushwalking in the Alpine area is popular in summer—the Alpine walking track, commencing at Mount Erica and joining the Kosciusko National Park at the Victorian border, traverses some of the highest country in the Victorian Alpine area. The popularity of skiing has risen in recent years, and there are five major ski resorts administered by four different government departments—the Victorian Forests Commission, the Department of Crown Lands and Survey, the State Electricity Commission, and the National Parks Service.

Management control of the Alpine area is shared between a number of different government departments—the Victorian Forests Commission (protected and reserved forest), the Department of Crown Lands and Survey (unalienated Crown land, except reserved forest), the State Electricity Commission (the Kiewa Works Area), the National Parks Service (Mount Buffalo National Park, including Tatra Inn), the State Rivers and Water Supply Commission (inland waters), the Soil Conservation Authority (all land higher than 1,220 metres), and the Fisheries and Wildlife Division (fisheries aspects of inland waters, including the maintenance of quality of trout species in the streams). The Land Conservation Council is recommending the future use and management of land in the Alpine area.

## REGIONAL ENVIRONMENT STUDIES

### Introduction

Many of Victoria's most important resources are contained in the Port Phillip, Westernport, and Gippsland regions. Port Phillip Bay is the State's major port and most of the population and most of the industry is located in this region. Westernport Bay, a natural deepwater harbour, is under consideration for development as Victoria's second major port. The land adjoining these deep waters is flat, which makes it economical for industrial development, close to sea transport. The Latrobe valley is rich in brown coal, an important energy source, and oil rigs lie off the Gippsland coast. These three regions represent 15 per cent of the State's land mass, yet 77 per cent of Victoria's population lives there. They are also significant as recreational areas for local, interstate, and overseas visitors.

Increasing concern for the protection of the environment has heightened the need for care in the utilisation of the resources of these regions, so that environmental change is controlled. Natural ecological systems are so complex and interrelated that modification of one system can lead to the unintentional modification of another. Until recently, resource management decisions tended to lack understanding and information on this interaction in ecological systems.

The programme of regional environment studies has evolved out of the need to develop the best possible understanding of the relationships of the ecosystems, and their susceptibility to change. In this context "regional" means a set of co-ordinated investigations designed and carried out to provide information and understanding of the land, water, and other systems present in a region so as to constitute a total view of those systems and their interrelationships. In the case of the Westernport, Port Phillip, and Gippsland regional environment studies, the most appropriate geographical boundaries to define the region are the catchments of the bays and lakes. While this statement is generally accurate, there can be no hard and fast rule in the development of environmental understanding. For example, when investigations into the atmosphere are to be undertaken, the land catchment boundaries are no longer relevant. Similarly, if attention is to be given to social issues, environmental study areas may well extend beyond any one catchment. The studies, therefore, are "regional", examining the environmental consequences of changes within the whole region. In this context, the words "region" and "catchment" are

interchangeable, because the catchments of the three study regions are those areas which have drainage characteristics that result in the transport of wastes generated by change to the receiving bodies of water.

The Port Phillip Regional Environment Study began in 1968 and involved two government agencies, the Melbourne and Metropolitan Board of Works and the then Fisheries and Wildlife Department. The Westernport Bay Environment Study began in 1973; involved in its intensive first phase (1973-1974) were some fifty separate investigations carried out by approximately thirty different research groups. These groups were drawn from government agencies, universities, the Commonwealth Scientific and Industrial Research Organization, and private consultants. The Gippsland Lakes Environment Study will be even broader in nature than the Westernport Study. Thus the concept of regional environmental studies has evolved and gradually included increasing emphasis on the effect of activities in the catchment area on the receiving waters.

The studies are necessarily inter-disciplinary, because no single scientific discipline has sufficient breadth to delineate the component parts of the natural systems and to predict the effects that various forms of resource use will have on these systems. For similar reasons it is now accepted that the studies require a wide range of participation so that researchers and managers from various organisations can combine their skills and experience to reach a common goal. The Westernport, Port Phillip, and Gippsland Lakes regional environment studies are directed by the Ministry for Conservation, although many other organisations are participating in the individual investigations. Within the Ministry, the Environment Studies Section is the multi-disciplinary group responsible for the direction and co-ordination of the studies.

Investigations undertaken in the environmental studies programme are broadly based and include the natural and social sciences and the technologies. Because of the large volume of data gathered, computer techniques are employed to analyse, store, and recall the data.

In a sense, environmental studies may be related to the feasibility studies that have long been applied to development activities. Feasibility studies usually involve tabulating the readily measurable factors (e.g., cost of land, site preparation, utility needs) and weighing their economic costs against market values including potential demand for raw materials and products. It is now no longer acceptable for these factors to be viewed in isolation from the environmental consequences of man's use of land and the resources contained in them. One result is that developers now encounter higher costs for waste treatment facilities, to meet the more stringent environmental quality standards demanded by the community.

In the light of information gathered from the studies and other sources, balanced resource management decisions should now be possible, and developers placed in a position where they can cost the methods needed to meet acceptable environmental quality standards.

The regional environment studies are carried out to provide the background information and understanding needed; this information and understanding is used by government departments in fulfilling their statutory responsibilities for environmental management activities. Some of the management responsibilities are:

*Land-use planning.* Overall responsibility is vested in the Town and Country Planning Board under the Town and Country Planning Act. At a more detailed level, land-use planning activities are undertaken by regional planning authorities, (Melbourne and Metropolitan Board of Works, Geelong Regional Planning Authority, Western Port Regional Planning Authority) and by local municipal councils.

*Waste management.* Comprehensive waste management responsibilities are vested in the Environment Protection Authority under the *Environment Protection Act 1970*. Other government agencies assist in the waste management activities under the delegatory sections of the Environment Protection Act.

*Water supply, sewerage, and drainage.* The Melbourne and Metropolitan Board of Works for the Melbourne metropolitan area, and the State Rivers and Water Supply Commission for the country, are the principal agencies concerned with these services.

To provide detailed advice to these management agencies, and to the other organisations with relevant responsibilities, environmental studies need to investigate land, water, air, and living segments of the environment and their interrelationships.

Communities tend to set different values on their various objectives; if environmental quality, including aesthetic values, is to be maintained, then additional information will have to be collected for many years to come.

#### **Port Phillip Regional Environment Study \***

The motivation for a comprehensive survey of the characteristics of Port Phillip Bay grew out of a scheme proposed in 1967 by the Melbourne and Metropolitan Board of Works. The Board recommended the construction of the South-eastern Purification Plant at Carrum to treat sewage from a major portion of the Melbourne metropolitan area, and proposed to discharge the treated effluent into the Bay. This discharge was expected to commence in 1973 and to continue for an interim period until it became financially practicable to build an outfall pipeline to Bass Strait.

It was believed that the short-term effects of the discharge would be negligible. However, the Board and the then Fisheries and Wildlife Department agreed to conduct a joint study of the Bay and its tributary region, to assess the nature and extent of any consequential environmental changes.

The initial reason behind the study became irrelevant in early 1969 when the Victorian Government directed that the outfall from the purification plant to Bass Strait was to be constructed by the time the plant was commissioned. However, the Victorian Government also saw the long-term value of having a "data bank" relating to Port Phillip Bay and its resources, and directed that the two government agencies continue the study with a modified set of objectives. In summary, these objectives were to:

- (1) Develop quantitative descriptions of the characteristics of Port Phillip Bay;
- (2) establish the effect of discharges on the beneficial uses of the Bay; and
- (3) determine a continuing programme to evaluate quantitatively future changes in the Bay.

The study is being undertaken in two phases. Phase I has been completed and is described in a major report; the more problem oriented Phase II began in 1975.

The report on Phase I provides basic knowledge, not previously available, about the general relationships between the physical, chemical, and biological characteristics of the Bay, the present and future discharges of waste material from land, and their effects upon the Bay. Phase I was a fact-finding mission. Initial work was concentrated on collating known facts: population, land-use in the tributary region, drainage and sewerage systems, and beneficial uses of the Bay, and foreshores. Additional data collection programmes were undertaken in order to describe the tidal and chemical characteristics of the Bay's waters, the forms of life, and their abundance.

From the evidence collected in Phase I it can be concluded that Port Phillip Bay, considered as a whole, "is at present a relatively unpolluted body of water". However, the limited inshore work undertaken indicates that recreational

\* A comprehensive report on Phase I of the Port Phillip Regional Environment Study appears on pages 48-50 of the *Victorian Year Book 1975*.

waters are polluted in some areas, either continuously or for limited periods of time. These contaminated areas are found in the immediate vicinity of the mouths of drains and creeks.

The exploratory work of Phase I shows that Port Phillip Bay can be treated as an integrated set of environmental segments, within each of which the water and/or beneficial uses have similar unifying characteristics. The central segment is a mixing pond for all waste materials, whereas the shoreline segments reflect the character of the land adjacent to them. It is possible to assign responsibility for shoreline conditions in any segment to particular authorities and to the people who live in the catchment tributary to that segment.

The initial report of the study received both praise and criticism. The quality of the work was praised, but the scope of the investigation was criticised. The principal criticisms stemmed from the fact that in Phase I the study made no assessment of the presence and effects of toxic materials such as trace metals, and that conditions at the shoreline were given inadequate attention. It was also felt that activities on land should have been given greater emphasis.

In 1975 the Port Phillip Regional Environment Study became the responsibility of the Ministry for Conservation.

The programme for Phase II acknowledges the criticisms of Phase I, and will concentrate more on management problems of regional significance. The plans for Phase II, drafted in July 1975, include proposals for investigations of :

- (1) Marine conditions offshore from the metropolitan sewage farm at Werribee ;
- (2) heavy metal contamination in Corio Bay ;
- (3) the beaches and foreshores of Port Phillip Bay ;
- (4) the urban waterways of Melbourne ; and
- (5) air quality, the motor car, and industrial discharges.

### **Westernport Regional Environment Study\***

#### *Introduction*

The Westernport Regional Environment Study is established within the Ministry for Conservation and has been jointly financed by government and industry. The Study is essentially a pre-planning exercise designed to obtain a comprehensive understanding of the Westernport region and to apply this knowledge to the formulation of guidelines for the future development and management of Westernport and its many resources.

Western Port Bay is located about 50 kilometres east of Melbourne (see Figure 4 on page 41). Historically, the Westernport region was first developed for agriculture ; later, urban centres were established, and during recent years some heavy industry has commenced operations. Until the 1960s there was little need for Westernport as a port location. The Bay was used in a limited way for commercial and recreational fishing, pleasure boating, and water sports. The value of the wildlife of the Bay and hinterland, in particular Phillip Island, had been recognised for many years and had become a significant tourist attraction.

During the 1960s, however, there was a world-wide increase in the importance of deep-draft shipping, particularly for bulk cargoes. As a consequence, the importance of Western Port Bay as a sheltered deep-water port grew substantially. No other harbour on the Victorian coast and few in Australia are as suitable for deep-draft vessels. At the same time, pressure grew for urban and industrial development at Westernport. This arose partly as a result of the availability of natural gas and crude oil from the nearby Bass Strait fields and the easy access

\* The term "Westernport" is most often used when referring to both the waters of the bay and the land surrounding it, while the term "Western Port" is commonly used when referring specifically to the waters of the bay. The Westernport Regional Environment Study referred to in the text was in fact a study of both the waters of the bay and the land surrounding it.



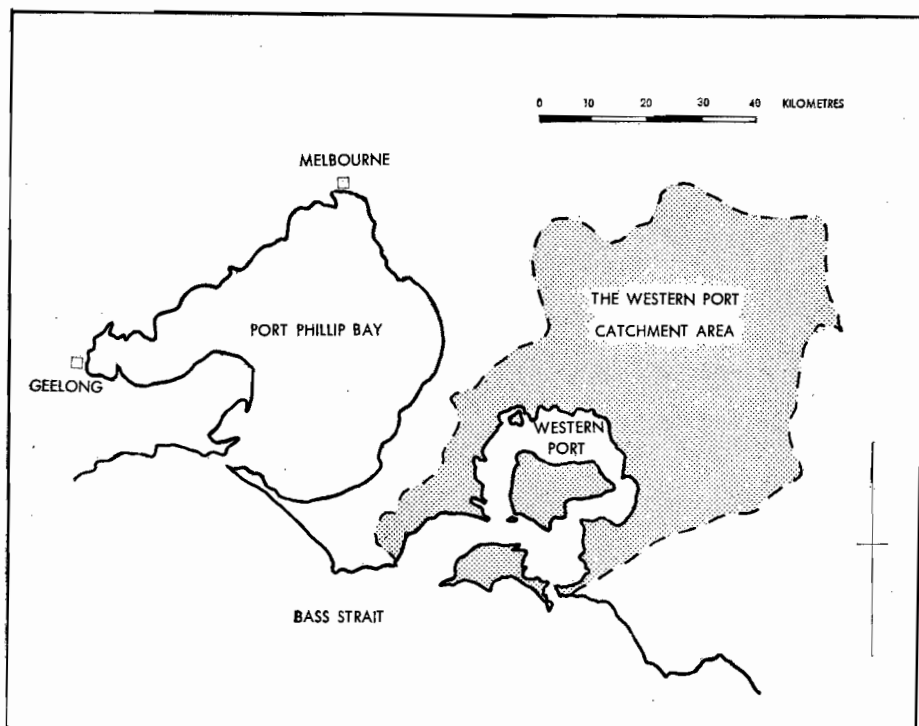


FIGURE 4. Victoria—Western Port and its land catchment.

to the brown coal resources of the Latrobe valley. Also, Westernport is central to the entire market of south-eastern Australia and, in particular, is close to Melbourne's markets and work force. Moreover, the natural deep-water port is flanked by large tracts of flat land suitable for siting industries and cargo-handling facilities.

In due course, a number of proposals were put forward for the development of Westernport as a deep-water port, as a large-scale industrial area, and as an area to accommodate a significant part of the anticipated growth of the Melbourne metropolitan area. There were also associated proposals for major reclamation of the tidal flats of the Bay. Legislation was enacted by the Victorian Parliament to facilitate development, and by 1970 major industries (comprising an oil refinery, a gas fractionation plant, and the first stage of an integrated steel works) had been established on the western shores of the Bay. Port facilities to serve these industries had also been developed.

A number of private individuals and organisations concerned with protecting the environment of the region opposed these developments. There was a growing awareness that the Bay was a multi-purpose resource and that many of its uses could conflict with each other. There was concern particularly that the quality of the Bay's waters should be maintained and hence that development in the region should be carefully planned. It was also realised that this type of planning needed to be based on a sound knowledge of the workings of the natural system consisting of the Bay and the land area draining to it. Thus the concept of a major multi-disciplinary environmental study was put forward by the government agencies concerned. The concept was accepted by the Victorian Government and was also supported by the industries that had already been established in the region.

Phase I of the Study was to extend over two years and was initiated in January 1973. The Victorian Government imposed a two year moratorium on

any further industrial development, pending the completion of the Study's first phase.

#### *Organisation and funding*

While the Study was established within the Ministry for Conservation, overall responsibility for the conduct of Phase I of the Study resided in a four-man executive committee comprising three government officials and a representative of industry. The executive committee was backed by a larger Study Committee, whose major function was to give advice on the technical aspects of the Study and its projects.

At an early stage it was realised that if the Study were to achieve its aims within the constraints of time, money, and other resources available to it, it would require close direction and co-ordination. Thus the "core group" concept was developed and accepted. A full-time Study director was appointed and a core group of full-time staff was established within the Ministry.

This group included biological, physical and social scientists, engineers, and administrators. The Study director and core group were closely involved in the design and running of each of the Study projects, and were directly responsible to the executive committee for the assessment of results and the formulation of guidelines for the future management of the Westernport region. The Study projects were carried out by various government, university, and consultant organisations. Wherever possible, existing manpower and other resources were used, but in a number of cases it was necessary to establish new groups to carry out work of a very specialised nature.

In addition to the Executive and Study Committees, a Committee of Review was appointed by the Victorian Government during Phase I to examine and advise on Study objectives by making an impartial assessment of programmes, and of agency, consultant, and university contractor activity. It was also required to report to the Victorian Government on the organisation, operation, and effectiveness of the Study.

The original budget assigned to Phase I of the Study amounted to \$1m; the Victorian Government contributed \$700,000 and the major industries at Westernport the remaining \$300,000. In October 1973 further funds were allocated so that the Victorian Government contributed \$1,085,000, the major industries \$400,000, and the State Electricity Commission \$50,000.

#### *Aims and scope*

The general aim of the Study is the development of guidelines for the future management of Western Port Bay. These guidelines are to be based on a comprehensive understanding of the Bay, its land catchment area, and the region in which it exists, in terms of its physical, chemical, biological, social, and economic characteristics.

#### *Work done in Phase I of the Study*

At the beginning of Phase I the Study programme covered about twenty separate projects which concentrated largely on investigating the water quality in the Bay and the biology and chemistry of its beaches, salt marshes, mangrove areas, and tidal mudflats. Relatively few projects dealing specifically with the land area itself were included at that stage.

From its inception the Study programme has been periodically reviewed. New directions were incorporated into it and projects dealing with almost all segments of the environment were initiated. These additional investigations dealt with such factors as the air pollution potential of the region, the forecasting of possible industrial development, and the social, economic, and environmental aspects of future development in the region.

By the end of Phase I, more than fifty separate projects had been completed. This work involved about thirty separate groups from government agencies,

universities, and private consultants. The main categories of work in the Study programme follow :

WESTERNPORT REGIONAL ENVIRONMENT STUDY : SUMMARY OF PROJECTS

Project	Components
Land studies	Geology; soils; climate; air quality; inputs to the Bay
Marine studies	Physical characteristics; chemical characteristics; populations and community structure; mangrove, seagrass, and related studies; toxicology
Social and economic studies	Land and bay uses; human settlement patterns; industrial development; agriculture; recreation; history; social survey
Development of mathematical models	Land activities; water quality; ecosystem
Environmental quality control programme	Water quality control; air quality control; solid wastes management

As an aid to using and integrating the results from the land, marine, social, and economic studies, several mathematical models were developed in and for the Study. One of these was developed as a simulation model to indicate patterns of water movement in the Bay and to predict changes in water quality which might result if the amount of wastes discharged to the Bay were increased. Another model, the Land Activities Model, was developed for use in investigating the relationships between alternative patterns of land-use, various waste-water management alternatives, and water quality in the Bay. This model has been used to compare similarities and dissimilarities between different patterns of future development. The real value of this work has been in the determination of the costs and benefits of various management and development possibilities for the region. Further, it has helped other projects in the Study by drawing attention to critical areas where information has been deficient.

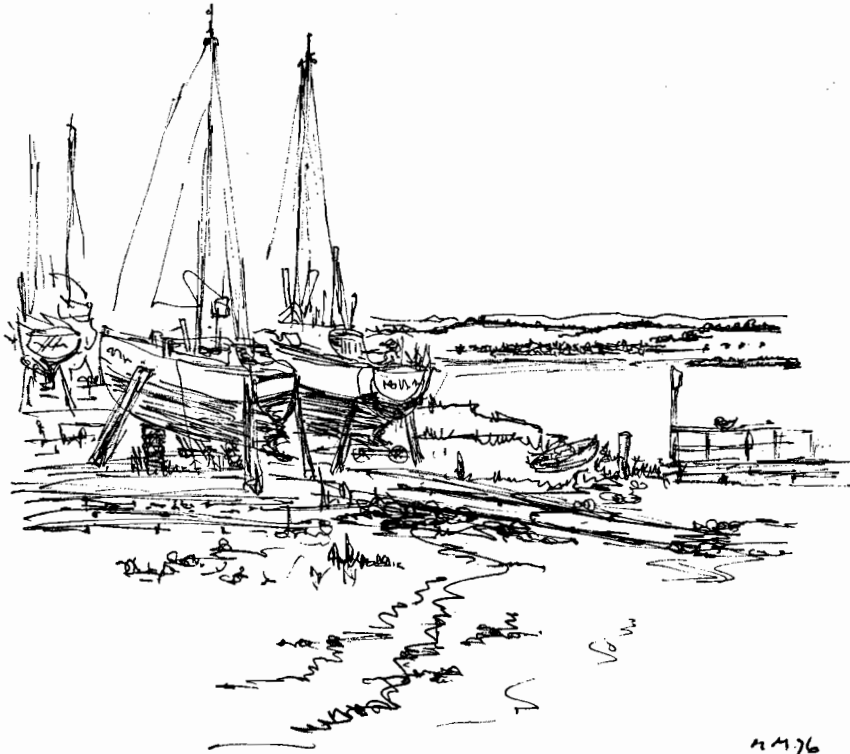
*Results of Phase I of the Study*

A major report on the first two years of the Study was published in 1975. This report summarised the findings of the various projects and, based on these findings, interim advice and guidelines were formulated for the future planning, development, and management of Westernport. The major findings of the report included the following :

- (1) Six coastal areas were identified as containing valuable natural habitats. These areas should be carefully managed to ensure that key elements of the Westernport environment are protected.
- (2) Some industry could be located at Westernport provided adequate waste treatment facilities were established. Housing and recreational facilities could also be extended, with appropriate environmental safeguards.
- (3) The Bay's life systems are especially susceptible to changes in levels of the nutrient phosphorus. Considerable care will be needed with any future development at Westernport to ensure that phosphorus levels do not rise significantly.
- (4) Additional port facilities will be sought as an integral part of any industrial development in the Crib Point-Hastings area. The report warned that port development and associated dredging and spoil disposal could cause significant environmental damage. To minimise this, all specific proposals should be carefully and individually assessed.

*Phase II of the Study*

The advice and guidelines formulated by the Study will need to be reviewed and updated periodically and a programme of continuing work is being carried out for this purpose. This programme includes further studies of the land and



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marine areas, the tributary streams, the atmosphere, and the social and economic systems of the region, with high priority being given to refining guidelines which place severe constraints on future development in the region.

#### *Implementation of Study results*

The Westernport Regional Environment Study was established basically to provide information for "decision makers" with statutory responsibility for the planning, management, and development of the region. These bodies include the Town and Country Planning Board, the Westernport Regional Planning Authority, local councils, the Environment Protection Authority, the State Rivers and Water Supply Commission, and local sewerage and drainage authorities.

An inter-departmental committee was appointed by the Victorian Government in 1975 to report on the administrative and legislative arrangements necessary to give effect to the findings of the Westernport Study. As a result, a Co-ordination Group was set up as a framework for management of the Westernport catchment area.

This is designed to protect the unique ecology and special recreational features of Westernport and to ensure a balanced approach to the resolution of competing demands for the use of the catchment's resources, within appropriate environmental and planning constraints. These arrangements superseded the temporary moratorium on major development in the Westernport catchment, and ensure that no development can take place unless it meets the relevant environmental and planning requirements.

The Co-ordination Group comprises representatives of local farming interests, industry and conservation groups, local councils, the Westernport Regional Planning Authority, and government agencies who are assisted by a small support staff unit. It operates within the structure of the State Co-ordination

Council. The Group works closely and continuously with the Core Group of the Westernport Study, the Westernport Regional Planning Authority, and other planning authorities to ensure that it operates within the planning guidelines and the environmental guidelines set out in the Phase I Report and future studies as they proceed.

One of the major tasks of the continuing Study is to ensure that its results are in a form that will enable them to be readily applied to the needs of the various decision makers. The process of implementing the results is a continuing one—providing information for needs ranging from Statements of Planning Policy and Environment Protection Policies covering major parts of the region, to environmental assessment of particular development proposals.

### **Gippsland Lakes Regional Environment Study**

The Gippsland Lakes and their associated catchment contain an important segment of Victoria's natural resources. Perhaps the most significant are the large deposits of brown coal, fresh water, large natural areas rich in plants and animals, the Lakes system as a recreational area, and extensive forests.

Some uses of these resources are complementary while others are in conflict, so that the development of an overall understanding of the environmental implications of using these and other resources in the area is essential before their use is committed.

The Gippsland Lakes, an interconnected system of shallow coastal lakes covering an area of approximately 400 square kilometres, are located about 230 kilometres east of Melbourne. The catchment extends from the Great Dividing Range to the coast and has an area of approximately 20,550 square kilometres. Three substantial rivers, each having a lesser annual flow than the Yarra River, discharge into the Lakes system. These are the Latrobe, Thomson, and Mitchell Rivers.

Several extensive development projects which are likely to have widespread environmental implications have been proposed for the region. These include the Thomson River Dam, the Loy Yang electricity generating proposal, and a large number of proposals for real estate development around the Lakes coast.

One of the first tasks of the Gippsland Lakes Regional Environment Study, being conducted by the Ministry for Conservation, has been to co-ordinate the existing information about the region, including such matters as existing environmental problems, previous scientific investigations, proposals for development, and present resource usage patterns. This is part of the pre-planning requirements for the development of the Study programme. On the basis of this information, a set of objectives relating to the needs for environmental management has been formulated, including the need:

- (1) To describe the region in terms of its physical, chemical, biological, institutional, social, and economic aspects;
- (2) to evaluate the interaction of these characteristics with present and proposed uses of the region's resources; and
- (3) to use the results of (1) and (2) to propose guidelines for management policies for the region which will ensure optimum use of its resources consistent with a high quality environment.

Australian research workers unfortunately do not have the advantage of lengthy investigation and study relating to particular areas. By contrast, Chesapeake Bay in the United States of America and the River Thames in England have been studied for more than one hundred years, but lack of background scientific information on the Gippsland Lakes region is particularly apparent. In recent years, some valuable work has been carried out by universities, government, and private individuals on the Lakes area, and this will provide a basis for the Study's operations; however, in many respects the Environment Study began in an information vacuum.

The Ministry for Conservation's Environment Studies Section is now carrying out the basic preparation for the Gippsland Lakes Study. Existing maps and navigation charts are inadequate for Study operations, so new and updated material is being prepared within the Ministry, in co-operation with the Lands Department. Preparations are also being made to obtain suitable aerial photographs of the most important parts of the region.

The initial aim of the programme will be the evaluation of the natural resources and features of the region. Mapping, inventories, and basic chemical and physical characteristics will be the main information sought in the early projects. When this preliminary work has been completed, the interaction of environmental factors resulting from resources usage can be assessed to provide a sound basis for rational use of the region's resources.

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MINISTRY FOR CONSERVATION  
 REGIONAL ENVIRONMENTAL STUDY AREAS IN VICTORIA

