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ALTERNATIVE APPROACHES TO
COASTAL HAZARD ZONE MANAGEMENT

Presented in partial fulfilment of
the requirements for the Degree
of
Master of Science
in the
University of Canterbury

by

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and
Lincoln College

1984
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ABSTRACT

An examination of the issues and implications posed by present coastal hazard zone management approaches was made. It was found that the recent shift in emphasis from relying solely on engineering measures to use of planning and legislative controls raised a number of important matters. These included the range of management responses considered by decision-makers, the types of techniques used to define hazard zones, the implementation and administration of hazard zones, and the implications of hazards responses for affected residents.

The common theme that emerged was that the current management approaches do not represent the full range of potential choices that decision-makers could consider. It is suggested that consideration of a wider range of approaches, based on insurance, would not only increase the options available to decision-makers, but would also offer an opportunity to provide management for both existing and future hazard sites. This suggestion also appears to be complementary to other adopted responses.

A number of alternatives are developed and the implications for coastal hazards policy discussed. It is concluded that insurance provides a useful contribution towards developing a comprehensive approach to coastal hazard zone management.
CHAPTER ONE

INTRODUCTION

What region of the earth is not full of our calamities?

Virgil

New Zealand has a long and varied coastline of approximately 10,000 km, with the majority of the population located in urban areas around the coast. To many, the coast represents not only a workplace or a recreational asset but also an opportunity to live, whether permanently or seasonally, in an idyllic environment.

Coastal development accelerated in the late sixties and early to mid seventies as the country's standard of living and mobility increased (Morton et al., 1973). However, prior to this the demand for coastal developments had already been established, particularly following the end of the Second World War. The 'boom' period of the sixties and early seventies reinforced that demand but today it has lessened slightly as a consequence of the prevailing economic conditions, and the implementation and administration of more stringent land use controls.

In New Zealand, as elsewhere in the world, many coastal developments have been built within areas where the shoreline is actively eroding. Other developments have been built in areas where the coast has a stable long term position but exhibits periodic fluctuations around that stable position. In this second case a long term erosion risk does not strictly exist, since there is no net retreat of the coast (Kirk, 1979(b)). For both situations, however, developments located within these active zones may become threatened when the beach is in a retreat stage and damage to assets may occur (Kirk, 1979(b)).

It is this interaction between the natural events system (in this instance, those factors influencing coastal processes) and the human use system (coastal developments and land use)
such that the latter is threatened or damaged which characterizes a natural hazard; there is no hazard where there is no human occupation or use.

1.1 THE NATURE OF COASTAL EROSION

Any beach can be thought of as a three-dimensional body of unconsolidated sediments, resting on some basement, and through which a constant stream of material is moving (Kirk, 1979(b)). This definition concentrates attention on the dynamic nature of beaches and suggests a distinction between the activities promoting supply, transfer and loss of materials; and the form and position of the shoreline, which reflects the state of balance or imbalance among the various material transfers occurring (Kirk, 1979(b)). The consideration of the flows and transfers of materials between and within beach systems lies behind the classic notion of a sediment budget. Thus if a beach gains more material than it loses it will build up and the shoreline will advance seawards. This is termed accretion. On the other hand if the beach loses more material than it gains the sediment budget will be in deficit and erosion will result.

Coastal erosion may therefore have a variety of complex causes, influenced by both natural and man-induced factors, arising either in the factors which supply or remove beach materials, or in some combination of both (Kirk, 1979(b)). Retreat of the shoreline, however, always represents a deficiency of material in the sediment budget.

1.2 STUDY OBJECTIVE

Coastal erosion may pose a hazard to two types of coastal development. First, those subdivisions and developments already existing which are presently or potentially threatened, and second those sites where future settlement or development is anticipated.
Considering those existing developments that are threatened by an erosion hazard, it was estimated in 1977 that there were approximately 90 identified hazard sites on the New Zealand coast (Kirk, 1979(b)). That number has probably increased in the intervening period as more sites with established developments or use have become threatened or damaged by natural or man-induced erosion. This has resulted in an increasing number of assets, both public and private, being placed at risk causing concern to affected residents, local and central government.

The traditional response to a coastal erosion hazard has been that of constructing protective works. Although this response is frequently appropriate to the situation, there are many instances where such an approach has been expensive, ineffective, and caused unanticipated side effects. Recently there has been a shift in emphasis from sole reliance on a 'technological fix' to one of relying on land-use management practices, and particularly planning controls. Again, however, similar problems have arisen with this response.

These types of singular management approaches do not appear to provide positive long-term assistance or assurance to coastal communities located on existing hazard sites should a severe event occur. Considering the number of sites threatened by a coastal erosion hazard, and the value of assets at risk this poses a significant management issue.

Opportunities for future development on potentially hazardous sites have become restricted with the advocacy of anticipatory planning measures such as hazard zone delineation techniques, and the enactment and implementation of relevant legislation. Both of these measures aim to ensure that future developments are sited at a respectable distance back from the beach.

The use of these planning measures poses particular problems, however. Principally these concern the implications associated with the implementation and administration
of each approach, and the implications for developments 'prudently sited' in relation to a defined hazard zone and/or the relevant legislation but which may at some future date become threatened by a coastal erosion hazard.

This is not to imply that such delineation techniques or legislation are not eminently useful. It is suggested, though, that their use raises important management questions that require consideration by coastal resource managers.

Thus, it is clear that the current hazards management responses pose a number of issues and implications for both existing and potential coastal hazard sites. The objective of this study, therefore, is to address those issues by reference to a two-fold approach. First, an examination of the issues, conflicts and implications posed by the present coastal hazards management approaches for existing and future developments is made, and second, alternative management approaches that assist in resolving the issues and conflicts raised by the current management responses are developed.

In this way it is possible to propose management approaches that encompass both existing and potential hazard sites, as well as providing opportunity for multiple adjustments to a hazard. This proposition would seem to offer the potential for a more comprehensive approach to coastal hazard zone management.

1.3 STUDY OUTLINE AND METHODOLOGY

The present study addresses the above objective in the following manner.

CHAPTER TWO introduces the relevant literature on natural hazards research. The key areas of research are identified and discussed to provide a frame of reference within which the study can be defined and to provide a lead-in to issues which are related to, yet separate from, the natural hazards paradigm.
To examine some of the issues, conflicts and implications raised by current hazard zone management approaches, a case-study was made of Wainui Beach, Gisborne. This involved interviewing a wide range of local interest groups including local authority officials, affected residents and government department officers. The study highlighted many of the inadequacies of the present emphasis on planning controls and use of relevant legislation as management strategies. CHAPTER THREE presents the findings of the case-study, and it is suggested that the issues raised there have relevance to many communities on the New Zealand coast faced with a coastal erosion hazard. The development of approaches that address those issues is, therefore, both timely and relevant.

Before it is possible to do this, however, it is useful to consider the legal and institutional aspects associated with coastal hazard zone management. This is outlined in CHAPTER FOUR by reference to the relevant statutes and planning responsibilities, and the policies of the hazards management agencies. CHAPTER FIVE draws together the important issues of the preceding chapters and examines and discusses them in greater depth. Four main issues are identified, with the common theme being that current management approaches do not represent the total range of potential hazards responses. It becomes possible, then, to propose alternatives that increase the range of choices open to decision-makers, encompass both existing and potential hazard sites, and provide a complement to other hazards management approaches. Insurance offers one such option.

CHAPTER SIX serves to introduce the role of insurance as an alternative management response. This is done by outlining the contribution insurance could make to public policy on natural hazards generally, and then discussing its applicability to coastal hazards specifically. The proposition advanced is that insurance for loss of use of land caused by coastal erosion is both desirable and feasible, and merits further consideration as a contribution towards providing a more comprehensive hazards management approach.
CHAPTER SEVEN further develops the suggestion of insurance as an alternative hazards management approach. The principal participants with an interest in and/or duty for coastal hazard zone management are identified, and from these four options are presented and discussed. All the options are based on insurance and involve combinations of the identified participants. No attempt is made to distinguish which of the options should be adopted since ultimately this judgement rests with political decision-makers. Presenting a number of options for discussion does, however, offer opportunity for analysis and debate, and serves to increase the range of hazards management approaches such decision-makers can consider.

To end, the final chapter reviews the findings of the study and presents conclusions.
CHAPTER TWO

NATURAL HAZARDS RESEARCH: A REVIEW

2.1 INTRODUCTION

The coastal zone is one of transition. Dynamic forces associated with on-offshore and alongshore movement, as well as the actions of wind, waves and currents, perpetually modify beaches. It is when such changes to the beach intrude upon and threaten areas of human occupation or use that a natural hazard is created; there is no hazard where there is no human occupation or use.

In this chapter natural hazards research is outlined to provide the theoretical context upon which the study is based. This is useful to give an appreciation of the various concepts that are included within the sphere of the natural hazards paradigm, and to provide a lead-in to following chapters which introduce issues related to, yet separate from, hazards research.

2.2 NATURAL HAZARDS RESEARCH

There is a fundamental distinction between extreme events in nature which are not necessarily hazardous to people, and extreme events in nature which impinge upon an associated human-use system. The interaction of nature and people creates both useful resources and hazards (Figure I) (Burton, Kates and White, 1978).

Kates (1970:1) has defined a natural hazard as:

'...an interaction of man and nature governed by the coexistent state of adjustment in the human use system and the state of nature in the natural events system.'
Figure I: Resources and hazards from nature and man

Source: Burton, Kates and White, 1978:20
and

'...those extreme events of nature that exceed the capabilities of the system to reflect, absorb or buffer them that lead to the harmful effects, oftentimes dramatic, that characterize our image of natural hazards.'


In any study of natural hazards there is necessarily an interaction of all the above in varying degrees and extent. A brief discussion of each is made below.

2.2.1 General and theoretical principles
The lives and affairs of people constantly interact with the natural world. Elaborate technical and social mechanisms allow people to seek in nature that which is useful and to buffer that which is harmful. In order to live with the harmful effects of nature, complex sets of human adjustments are found in all human-use systems. However, such adjustments may prove inadequate to cope with a given set of natural events and serious consequences may ensue (Kates, 1970).
Thus, a natural hazard is characterized as being the interaction of the natural events and human-use systems in such a manner that threatens or damages the latter system. The burden of hazard is two-fold; firstly, a continuing effort to make the human-use system less vulnerable to the effects of nature, and secondly, specific impacts on people and their works arising from natural events that exceed adjustments adopted by the system (Kates, 1970).

The definability of hazard requires more than mere perception, and the recognition that all types of hazard are subject to wide variation in their definition. This reflects the changes in both knowledge about hazards and available technology (Burton and Kates, 1964(b)).

To complicate the matter further, there has been an increase in quasi-natural hazards. These hazards are created by people, but their harmful effects are transmitted via natural processes. An example would be man-made pollutants carried downstream (Burton and Kates, 1964(b)). The inter-relationships of the man-nature systems mean that it is often difficult to categorise hazards into discrete classes, and there may be a linkage between any or all of: natural events, man-made hazards, and man-accelerated hazards. Burton and Kates (1964(b)) pose as an example the problem of when does fog (a natural hazard) become smog?

To close this discussion it is useful to note that research into natural hazards may assist public policy-making by addressing:

(i) the extent of human occupance in hazard zones;
(ii) the full range of possible human adjustments to the hazard;
(iii) how man perceives and estimates the occurrence of hazard;
(iv) the process of adopting damage-reducing adjustments; and
(v) the optimal set of adjustments with regard to anticipated social consequences (Burton, Kates and White, 1968).
Researchers from a variety of disciplines are constantly contributing to our understanding of these questions, as evidenced by the studies cited earlier.

2.2.2 Perception of the hazard

Individuals may perceive a hazard differently according to many influencing factors such as age, socio-economic status, education, personal experience or knowledge of a hazard, degree of personal threat recognised, frequency of hazard occurrence, and awareness of the range and effectiveness of alternative hazard adjustments.

In addition to the perceptions of individuals are those of scientific-technical personnel, and decision-makers such as local politicians, and legislators. The perceptions of this group of 'resource managers' are important since they frequently influence the nature and extent of hazards planning and management programmes, which ultimately affect those individuals located within the hazard zone.

Burton and Kates (1964(b)) note four particularly important points relating to perception. Firstly, it could be expected that there will be a heightened perception in cases where the hazard is directly related to the resource use (for example, foredune erosion that threatens a beachfront home).

Secondly, perception of natural events is related to the frequency of the hazard. Where the events are frequent, there is little difference in perception among the resource users. The same is true where the event is rare since the failure to perceive a significant hazard is widely shared. It is only when the event occurs moderately frequently that considerable variation among users is found. Table I identifies some of the common responses adopted to deal with the uncertainty of natural hazards.

The third point concerns personal experience of a hazard event. It might be expected that personal experience would lead to increased awareness of the hazard. Although it is
Table I: Common responses to the uncertainty of natural hazards

<table>
<thead>
<tr>
<th>Eliminate the Hazard</th>
<th>Eliminate the Uncertainty</th>
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<tr>
<td>Deny or denigrate its existence</td>
<td>Making it determinate and knowable</td>
</tr>
<tr>
<td>'We have no floods here, only high water'</td>
<td>'Lightning never strikes twice in the same place'</td>
</tr>
<tr>
<td>'It can't happen here'</td>
<td>'It's a freak of nature'</td>
</tr>
<tr>
<td>'The government is taking care of it'</td>
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Source: Burton, Kates and White, 1968:18
acknowledged as a significant factor, the effect of experience as a determinant of perception is considerably blurred.

Finally, attitudes to nature influence perception, and hence the manner in which hazard adjustment choices are made. These in turn are likely to affect management policies. Three divergent views of nature can be identified:

(i) People subject to nature - accepts that nature is in command;
(ii) People with nature - a complementary relationship; and
(iii) People over nature - a belief that humans are capable of dominating nature.

Depending on the attitudes prevalent in the society, adjustments to natural hazards will be made with regard to those attitudes and beliefs. For example, if there is a strong belief that people can dominate nature structural solutions such as stopbanks, seawalls or groynes may be favoured to deal with a hazard.

2.2.3 Responses and adjustments to the hazard
Response to hazards is related both to perception and to awareness of opportunities to make adjustments. In examining these adjustments it is useful to make a distinction between those which seek to rearrange or manipulate nature, and those which involve a rearrangement or alteration of human behaviour. The former may be characterized as the technological approach, the latter with the social or behavioural approach (Burton, Kates and White, 1968).

It is possible to identify four major groups of adjustments:

(i) Adjustments that allow adaptation to losses - this may be either through bearing the full consequences of damage individually, or sharing it in some manner with others by, for example, insurance;
(ii) Adjustments that modify loss potential - this is accomplished by minimising the impacts of the natural event and by emergency action after the event. The effects of the event may be reduced by altering man's vulnerability to the hazard by warning systems or evacuation;

(iii) Adjustments that modify the hazard - this is mainly through use of engineering measures, offering the prospect of immediate relief; and

(iv) Adjustments that affect the cause - human use of the environment may precipitate a hazard situation; rarely can man alter the natural events system so he must change the human-use system in the hazardous area and attempt to influence the activity or location of human use within the area to offset the impacts of the hazard (Burton, Kates and White, 1968; Sinnathamby, 1981).

Mitchell (1974:105) presented a summary profile of adjustments to coastal erosion based on the above four groupings, and Sinnathamby (1981:12) has modified Mitchell's summary to make it more applicable to the New Zealand coastal environment (Table II).

According to White and Haas (1975) at least five aims figure in one way or another in public decisions about the choice of adjustments to natural hazards. These are noted as:

(i) national economic efficiency, or those adjustments that yield the largest marginal returns from the investment;

(ii) the enhancement of human health, especially the preservation of human life;

(iii) the avoidance of social surprise or disruption;

(iv) environmental protection or enhancement, although they concede it is often difficult to identify and quantify many environmental impacts; and

(v) the equity in the distribution of costs and benefits in society.
<table>
<thead>
<tr>
<th>CLASS OF ADJUSTMENTS</th>
<th>ENGINEERING</th>
<th>SOCIAL</th>
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<tr>
<td>Adjustments that allow adaptation to the losses</td>
<td>Move endangered structures</td>
<td>Loss bearing</td>
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<td></td>
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<td>Insurance</td>
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<td></td>
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<td>Relief and Rehabilitation</td>
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<tr>
<td>Adjustments that modify loss potential</td>
<td></td>
<td>Storm warning</td>
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<td>Evacuation</td>
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<td>Coastal zoning</td>
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<td>Building restrictions</td>
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<td>Public purchase of endangered areas</td>
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<td>Adjustments that modify the hazard</td>
<td>Seawalls/bulkheads/revetments</td>
<td>Dune stabilisation</td>
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<td>Groynes/breakwaters</td>
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<td>Beach nourishment</td>
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<tr>
<td></td>
<td>Private protective structures</td>
<td></td>
</tr>
<tr>
<td></td>
<td>eg. rubble filled drums/car tyres</td>
<td></td>
</tr>
<tr>
<td>Adjustments that affect the cause</td>
<td>Sand by-passing</td>
<td>Prevent beach excavation and</td>
</tr>
<tr>
<td></td>
<td>Removal of obstacles to the</td>
<td>harbour dredging</td>
</tr>
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<td></td>
<td>passage of river silt</td>
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<td></td>
<td>eg. dams</td>
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Clearly these factors require consideration when suggestions for hazards policies and management strategies are made. The final discussion in this chapter addresses some of the issues policy-making and management raises.

2.2.4 Decision-making, hazards policies and management

Recognition of and response to natural hazards are intimately tied to reducing people's vulnerability to extreme events. However, it is only by translation of these facets into hazards policies and management strategies that they can hope to influence individual and community behaviour. The gap between hazards research and effective policy-making appears large (Olson and Nilson, 1982), particularly in the area of selecting equitable and enforceable policy instruments.

Olson and Nilson (1982) identify four distinct policy types. Firstly, distributive policies which are essentially non-coercive and confer advantages on specific beneficiaries; the burdens or costs are borne by the general revenue system and are thus (usually) only dimly perceived. Good examples of this type of policy are the provision of emergency aid and low-interest rebuilding loans in the post-impact and recovery/reconstruction periods, and structural mitigation aspects of flood control (dams, stopbanks).

A second policy type concerns constituent policies. Again coercion is likely to be remote and unlike distributive policies, public power affects broader entities than individual units. Such changes typically enhance a classified segment of the population without either substantially or directly injuring the whole public or a major portion of it. The beneficiaries of the extended rights and powers are often accepted as the legitimate custodians of new responsibilities. The classic example is that of professional associations.

Regulative policies entail the likelihood of government coercion, with the object of coercion being the non-complying individual entity. There is potential for
substantial political conflict over relatively rigid standards which embody principles opposed by those whose interests and values are threatened by the proposal. This creates a situation in which one group's 'victory' in changing a statute or regulation necessarily leads to defeat for the opposing group. Opportunities for compromise, on the principles at least, are few.

A final policy type is redistributive. These policies are expected to have the greatest impact on the community because the objects of government coercion are whole segments of the population. Redistributive policies demand that benefits be provided to one set of interests at the expense of another (Lowi, 1964, in Olson and Nilson, 1982).

Associated with these different types of policy are different types of politics; distributive policies yield participatory politics in which numerous interests are likely to be encountered, while a constituent policy is expected to yield specialist politics of well-organized, well-informed experts. Regulative policy will be associated with pluralist politics. Such politics involves participation by at least two contending and organized groups, and conflict resolution involves bargaining and compromise. Finally, redistributive policies are associated with elitist decision-making which is private and exclusive. The private resolution of conflicts, followed by general support of the agreed-upon solution, is a political mechanism for minimizing the disruptiveness of controversial policies (Olson and Nilson, 1982).

Hazards policy may be based on any of the above policy-types, singularly or in combination. In formulating policy for coastal hazards, common elements would include:

(i) generation and dissemination of information on coastal hazards;
(ii) thorough examination of the environmental implications of any proposed beach protection works;
(iii) regulation of future developments on undeveloped hazard-prone sites;
(iv) fair treatment of land owners prohibited from developing their property;
(v) examination of the costs and benefits associated with any particular management strategy; and
(vi) provision for presentation, discussion and agreement by affected parties on any proposed plan of action.

More generally, Burton, Kates and White (1978) note that with much overlap, national hazards policies seem to focus on:

(i) disaster relief;
(ii) control of natural events;
(iii) comprehensive reduction of damage potential; and
(iv) combined multi-hazard management.

A disaster relief policy could take the form of a natural-hazard insurance plan. However, the plan would have to be designed to avoid creating higher loss potential by encouraging people to take greater risk in the knowledge that their loss would be covered by insurance. A feasible suggestion is to merge the prospective insurance scheme with land-use planning and regulation, and set premium scales aimed at promoting individual or community acceptance.

Policies based on controlling natural events rely on technologically-oriented adjustments. Often such reliance proves costly, ineffective and may lead to unanticipated side-effects, such as the exposure of more people to rare but catastrophic events. One reason for the ineffectual behaviour is the failure to take individual or community reactions into account; control policies may thus unintentionally increase the damage potential.

Interestingly, there appears to be a move away from the sole reliance on technologically-oriented policies towards study and advocacy of social policies based on land-use management, zoning and insurance (see for example, Baker,
Comprehens

damage reduction policies are not well developed. Perhaps the most advanced is the system of flood insurance in the United States. The Flood Insurance Act of 1969 made local land-use regulation in floodplains a requirement for flood insurance. In 1973 the policy was modified to withhold special benefits from floodplain occupants who had not met the conditions for purchasing insurance and to make purchase a condition of participation in other programmes such as mortgage insurance. A recent comment on the effectiveness of the flood insurance programme points out that the success of this type of regulatory policy has been offset by the fact that regulatory systems are by nature negative and compliance is totally dependent on the attitude, philosophy, and will of the governmental entity (Bragg and Coughlin, 1984). The use of incentives is now being considered as a further means of reducing flood losses - for example, the use of a community rating system, in which a discount could be offered to all policyholders within a community that adopts and, more importantly, administers a loss reduction programme that addresses all of its flooding hazards (Bragg and Coughlin, 1984).

Combined multi-hazard management involves equalization of risks, but the cost of this may be prohibitive and the effort futile. It does not appear that much further work has been carried out for this type of policy.
2.3 SUMMARY

This chapter has introduced the main areas of study conducted within the natural hazards paradigm. These were identified as:

(i) general and theoretical principles;
(ii) perception of the hazard;
(iii) responses and adjustments to the hazard; and
(iv) decision-making, hazards policies and management.

A brief description of each of these was presented to provide the theoretical basis upon which the remainder of the study will extend. Specifically it will address the issues, conflicts and implications posed by present coastal hazard management strategies, discuss approaches that broaden the range of adjustments decision-makers could consider, and examine the implications for hazards policy.

The following chapter will address the above questions by presenting the findings of a case-study conducted on Wainui Beach, Gisborne, North Island, New Zealand.
CHAPTER THREE

A CASE-STUDY OF WAINUI BEACH, GISBORNE, NORTH ISLAND
NEW ZEALAND

3.1 INTRODUCTION

A community and its decision-makers may adopt a variety of strategies in an attempt to reduce perceived impacts of a severe event (see Table II). In this chapter a case-study of a coastal community faced with an erosion hazard is presented. The issues and conflicts raised by the case-study are typical of those experienced by many existing coastal settlements, and the implications associated with the adopted management strategies have wide-ranging significance for coastal hazard zone management in general.

The first section of the chapter outlines the case-study aim and method, leading on to a discussion of the nature and history of the hazard. A third section describes the adopted management responses, and the final section canvasses the important issues and conflicts posed by the current response. Points raised in this last section will form the basis of Chapter Five which discusses the issues posed by current hazards management responses in greater depth.

3.2 CASE-STUDY AIM AND METHOD

Current coastal hazards management strategies, such as use of section 641A of the Local Government Act 1974 and advocacy of coastal hazard zone mapping (Gibb, 1982), focus largely on restricting future inappropriate development. Investigation into developing management options for existing coastal hazard sites appears little emphasized but given the number of sites experiencing an erosion hazard and the value of assets threatened, both public and private, it appears a critical task.
Wainui Beach, Gisborne has been used as a case-study to illustrate some of the questions, problems and conflicts posed by the adoption of current hazards management strategies. It is comparable with many of New Zealand's coastal communities since the types of problems faced and the responses adopted are similar to those of other communities, as are the implications that result. The findings provide an indication of the significance the management strategies have had for the local authority and affected residents. This assists in clarifying the issues that any proposed management options need to address.

A series of informal interviews were conducted. Prior to fieldwork, however, an examination of literature relating to surveys and interviewing was made (Kahn and Cannell, 1957; Stephan and McCarthy, 1958; Oppenheim, 1966; Anon, 1970; Gardner, 1976; Dillman, 1978). Relevant points concerning question design, delivery and recording were noted as well as techniques for probing to gain further information.

Although the respondents could discuss any range of issues, five main themes were introduced during the course of each interview:

(i) respondents' opinions concerning the imposition of a hazard zone in the district planning scheme to regulate building permit applications;

(ii) perceptions about the implications of the hazard zone;

(iii) responsibilities and liabilities if loss of property occurred;

(iv) possible actions if loss of property occurred; and

(v) suggestions for management alternatives to the hazard zone.

Respondents were selected from three main groups. The Cook County Council has statutory planning responsibility for Wainui Beach, and interviews were conducted with the County Clerk, County Planner and County Engineer. A second group were the affected residents living within the hazard zone (as delineated in the district planning scheme). In total
seventeen interviews were carried out. The final group consisted of the East Cape Catchment Board (who have responsibility for maintaining foredune protection works and collecting monies for these), and the district office of the Valuation Department.

Information was also obtained from examining files held by the Cook County Council, East Cape Catchment Board, Valuation Department (Gisborne office), local museum, and newspaper office. In addition the Chairman of the Wainui Beach Front Property Owners and Residents group provided much of the background information concerning the residents' stance and dealings with the Council.

It is acknowledged that the survey used was not a statistically designed method of gathering data. However, it was an appropriate method to use for achieving the objective of this study by providing an overview of the situation from the viewpoints of all relevant parties. This provided an insight into the implications of the adopted management strategy, raising important questions concerning hazards management strategies in general.

3.3 THE NATURE AND HISTORY OF THE HAZARD

Wainui Beach is situated about 4 km east of Gisborne City and is located in the Cook County. The beach is about 4.2 km long and is situated between Tuahine Point to the south and Makarori Point to the north, with the Hamanatua Stream dividing the beach midway along its length. The southern half is an intensively developed beach front subdivision administered by the Cook County Council and the northern half is a public reserve (Gibb, 1981(a)) (Figure II).

Gibb and Jones (1977) believe the Wainui Beach settlement became established around 1912 with a small number of beach holiday cottages along the seaward side of State Highway 35 between the Wainui and Hamanatua streams. Between the two World Wars subdivisions were made at the southern end of
Figure II: Wainui Beach, Gisborne, North Island, New Zealand
the beach, and after World War II subdivision continued northwards to Hamanatua Stream while the existing ones were further consolidated. During this time the character of the settlement changed from a holiday resort to a substantial residential area with many of the original baches being replaced by modern homes. Today the settlement consists predominantly of permanent homes.

Between Tuahine Crescent and the Hamanatua Stream there are 235 sections, and of these 106 front onto the beach (Gibb, 1981(a)). Current valuations of these beach-front properties place the capital value (land value plus value of improvements) at approximately $7.7 million (Valuation Department, Gisborne District Office files, 1984).

The coastal erosion hazard at Wainui Beach has been recognised for almost 30 years. It was dramatically emphasized by the severe storm of July 1955 which left one house undermined and two to three others precariously close to the top of the foredune. Demands for action to protect the whole foreshore were, naturally, expressed by concerned residents.

Further damaging storms occurred in the winters of 1964 and 1974, lowering beach sand levels and threatening some of the homes closer to the edge of the foredune.

Gibb and Jones (1977) state that since beach surveys began in 1973, two localised causes of foredune erosion can be proposed.

The first cause is the presence of rip current channels. Ward (1977) has summarised their characteristics thus: when waves and wind drive a body of water towards the shore, the nearshore water level may be higher than that further seaward. A water pressure gradient away from the shore is created, so that the water attempts to flow from the higher water level to the lower water level (that is, from nearshore to offshore). The presence of nearshore sandbars, and troughs in the surf-zone may temporarily obstruct this
flow but when the returning water pressure is sufficient it will find or create openings. Water passes through these openings to flow seawards at relatively high speeds. These seaward streams are termed rip currents. Because they are often swift flowing they can carry sediments (mainly beach sand) as well as scouring a channel; in this way sand is transported offshore into deeper water. A reduction in beach sediment available to help consolidate the foredune is a consequence, so that during storms the foredune has less material stored to act as a 'shock absorber' to buffer incoming waves.

For most of the year and over most of the length of Wainui Beach the presence of shoals, troughs and offshore bars encourages the formation of rip currents. Movement of sand offshore results, so that the beach is narrowed and storm waves can more easily attack the foredune. Positions of rip current channels vary along the beach with different wave directions, so that any part of the foredune is potentially under threat depending on wave conditions (Gibb and Jones, 1977).

However, it should be noted that rip currents occur on all sand beaches which are in a reflective state. This means that the beach face has first to be built up to the reflective stage before erosion caused by rip currents can occur. Thus, there is a sequential behaviour of beach build-up followed by beach-loss contributing to the longer term trends of erosion or accretion. No evidence suggests this pattern does not occur at Wainui Beach also. To assert that rip currents are a cause of erosion is debatable since they do not 'explain' anything of themselves, and it still remains for the true causes of erosion to be identified.

A second possible cause of erosion postulated by Gibb and Jones (1977) was the presence of the sheet pile spur groynes. Groynes are structures that extend seawards from the beach into the surf zone; their primary function is to intercept beach material moving alongshore to create a build-up on one side of the groyne, thus elevating beach
levels on the updrift side but causing lowering of beach levels on the downdrift side (since material movement alongshore has been obstructed). Additionally, groynes only trap material moving alongshore but do not assist in trapping material moving on- or off-shore.

At Wainui Beach the groynes aided foredune erosion by intercepting the wave residual (swash) moving up the beach, and directing the water to the head of the groyne. This scoured the face of the foredune causing serious erosion damage adjacent to each groyne (Gibb and Jones, 1977). It should be noted that an agreement has recently been reached between the Cook County Council and the Soil Conservation and Rivers Control Council (acting through the East Cape Catchment Board) for removal of most of the spur groynes, as beach conditions allow.

Although one of the suggested causes of the foredune erosion has been removed, it is obvious that movement of sand alongshore and offshore will continue to occur. It is also clear that adverse weather conditions will from time to time cause dramatic loss of foredune, on top of any long-term erosion trend that may exist. The nature of the hazard, therefore, is both a long- and short-term proposition.

3.4 MANAGEMENT RESPONSES ADOPTED

In Chapter Two it was suggested that hazard responses could be categorised under two major headings:

(i) technological (which usually involves constructing some type of structure); and

(ii) social (usually involving planning measures for both physical and human resources).

Wainui Beach represents an example of both types of hazard responses; it has gone beyond the 'technological' response phase (spur and longitudinal groynes) and is now entering a second phase: hazard zone management based on a 'social' response (use of sections 641, 641A Local Government Act 1974 in association with coastal hazard zone mapping).
It is not proposed to discuss at length the first phase since it has been well documented by Ward (1977), and also because most of the spur groynes have been progressively removed. Since the issue of the groynes is relevant to the current conflicts, however, a brief discussion of them is made below. Much of the discussion is drawn from the work of Ward (1977).

3.4.1 Spur groynes

The severe storm of July 1955 led to both the Cook County Council and local residents making representations to the Government for assistance. It was not until October 1959 that Cabinet approved a scheme designed to protect the length of the developed foredune south of Hamanatua Stream. This consisted of 28 sheet pile spur groynes perpendicular to the beach, as well as longitudinal rail and netting protection placed parallel to the foredune at the southernmost end of the Beach. The work was carried out during 1961-1962, with further work needed in 1966 caused partly by the abrading effect of the hard calcareous sandstone boulders eroded from the Tuahine Point headland.

All the work was carried out by the Cook County Council with finance from loans, government subsidies, and Council's own funds. No formal provision for maintenance of the works was established so that many of the groynes deteriorated to the extent that they were a danger to beach-users, as well as degrading beach aesthetics. Their contribution to foredune protection was questionable (because of the scouring problem), and in 1977 it was recommended they be removed (Gibb and Jones, 1977). A 50% Government subsidy for their removal was offered and in late 1982 Cook County Council resolved to contribute the remainder. Most of the required work has now been completed.

3.4.2 Longitudinal protection works

Investigations carried out by the Poverty Bay (now East Cape) Catchment Board in the mid-seventies indicated the need for continuous longitudinal protection along the entire beach front. This was proposed as a series of basket
gabions (a gabion is a wire or plastic mesh basket which can be filled with stones larger than the mesh, and is usually anchored to a foundation) which were to be buried below the beach. In addition a space 15 m behind the gabions was identified as a buffer zone to provide sand to the beach system, by allowing the foredune slope to re-adjust during heavy seas. A planting programme on the foredune was encouraged to help stabilise it.

The works were constructed in three stages during the period 1975 to 1978. Costs were shared by beach-front property owners, who were levied according to property frontage, and a subsidy from Government. Provision for maintenance of the works was also established. Both of these procedures were formalised by the establishment of a Section 11 Area, for each stage, under the Soil Conservation and Rivers Control Amendment Act 1948.

A 1981 report by the Catchment Board (East Cape Catchment Board, 1981(c)) noted that allowance had to be made for upgrading and extending longitudinal protection works when beach losses necessitated. Two other reports (East Cape Catchment Board 1981(b), 1981(d)) recommended that a unified rating district based on the capital value of the property be set up, and that a brief be given to a classifier for the scheme. Land was to be classified according to the degree of direct and indirect benefit received from the construction and maintenance of works - for these purposes properties were to be grouped into not less than two and no more than six classes. The classification was completed in early 1982 with the adoption of three classes, which has rationalised scheme administration. Provision for an unsubsidized emergency fund from collected rates was also confirmed.

It is emphasized that the longitudinal works are the responsibility of the East Cape Catchment Board to maintain, and to collect rates for this purpose. Also the works are for the protection of the foredune and not protection of the beach as such (East Cape Catchment Board 1981(a)).
The second phase of hazards management adopted for Wainui Beach has been planning procedures.

3.4.3 Planning controls

Between August 1974 and March 1976 Cook County Council adopted four resolutions to be used as guidelines for the issuance of building permits on beach frontages:

'22 August 1974 : Cook County adopted the recommendation that further building on sections subject to coastal erosion be controlled. The siting of such buildings to be subject to council's approval and that future subdivision of this nature be controlled under council's Planning Scheme.

September 1974 : The council clarified that policy by applying this policy to all work on beach frontage properties in the county requiring a building permit.

March 1976 : The council resolved that permits be issued only for houses of a single storey nature. The construction to be of such a design (for the building) to be capable of being removed from the site. Such removal and dismantling expenses to be at the owner's expense.

March 1976 : That before any building permit is issued for alterations, replacement on an existing dwelling or a new dwelling in the area on the seaward side of the road from the Okitu Stream [Hamanatua Stream] to and including Tuahine Point the applicants be required to enter into a Deed indemnifying the council against all losses and also agreeing to council registering a Caveat against the title and successors in title' (Gibb and Jones, 1977:14).

In addition to adopting the above guidelines, the County Council informally used a hazard line to assist it when considering building permit applications. The line was delineated by the East Cape Catchment Board, and was used until section 641 of the Local Government Act 1974 became effective on 1 April 1980. This section made the refusal of building permits mandatory if there was actual or potential
risk that a site was unsuitable for building on, and if no provision had been or was to be made for protection of the land.

To assist in implementing section 641, a commitment to define a coastal hazard zone at Wainui was made in 1980. The aim was to define an area in which building restrictions would have to be imposed, and the task was delegated to the Council's consultants, the Ministry of Works and Development. Cook County Council imposed a moratorium on the issuance of building permits until it received the consultant's report, which was completed in June 1981. A "100 year hazard zone", ranging from 25 to 55 m wide, was recommended for the southern portion of the Beach (where most of the houses are situated), as well as the adoption of appropriate ordinances in the district planning scheme to encourage land uses compatible with the identified coastal hazards. It was also recommended that the extent of the hazard zone be reassessed at each scheme review (every five years) having regard to data collected during that time (Gibb, 1981(a)). The County Council have endorsed and adopted the consultant's report, and a policy statement and maps for the hazard zone appear in the proposed review district planning scheme (which is shortly to become operative).

At the same time as the consultant's report was being prepared, pressure by Wainui residents and the Council led to the introduction and subsequent enactment of section 641A of the Local Government Act 1974. This gave councils discretionary power to issue building permits for relocatable buildings on present or potentially unstable land, subject to any conditions council considers necessary. If a permit is granted, details are entered on the certificate of title to the land by the District Land Registrar. There is also provision for a council to have an apparent protection against liability for any future loss.

Currently Cook County Council are considering building permit applications by reference to their location within
the identified hazard zone, and sections 641, 641A of the Local Government Act 1974. It is their interpretation and administration of those two management responses that have given rise to the issues, conflicts and problems revealed by the interviews.

3.5 HAZARDS MANAGEMENT AT WAINUI BEACH - ISSUES, CONFLICTS AND IMPLICATIONS

The history of management responses adopted at Wainui Beach has been outlined as it is integral to the current conflicts faced by the local authority and affected residents. To examine these it is proposed to consider each of the three main groups separately.

3.5.1 Cook County Council
Under the Town and Country Planning Act 1977 and the Local Government Act 1974, the Council has statutory planning responsibility for Wainui Beach.

Sections 641, 641A of the latter Act, and the endorsement of a 100 year hazard zone have been the main issues Council has had to deal with.

For the purposes of establishing a policy for the issue of building permits the Council has divided the foreshore into two categories:

(i) land subject to an immediate hazard and which also forms an integral part of the beach defence scheme. It comprises the space immediately behind the longitudinal gabions plus a further landward strip of 15 m width; and

(ii) land predicted by the consultant's report (Gibb, 1981(a)) to be subject to erosion within the next 100 years.

Although the Council is aware of the implications caused by the adoption and administration of the hazard zone, it believes its stance is a middle line approach. On the one
hand are the interests and individual rights of property owners, and on the other the statutory requirements of the Town and Country Planning Act, and the Local Government Act. For example, prior to enactment of section 641A of the Local Government Act, the Council acknowledged that residents' interests were suffering more from progressive tightening of legislative constraints than from an immediate threat of erosion. Because section 641 was so restrictive it was felt that properties at the Beach would start to deteriorate because of legal obstacles even if the consultant's predictions were proved absolutely accurate. These concerns were a major reason for the Council and Wainui residents strongly supporting introduction of section 641A, with its discretionary provision for approving building permit applications.

The Council's desire to formally define a hazard zone at Wainui, to assist it in fulfilling its responsibilities under section 641 (and later, section 641A), was unfavourably received by the residents. However, the Council felt that such a zone was necessary if it were to consider building permit applications, and if it were to avert a 'decay' of existing homes through restricting maintenance. The zone provided a bench-mark against which permit applications could be referenced and in adopting it as such, a strict enforcement was made. Fearing that a successful application for building inside the hazard zone (that is, seaward of the delineated line) would set a precedent, and perhaps lead to a claim for negligence if subsequent damage or loss occurred, the Council adopted an absolute 'no-go' restriction. This apparently protected Council from the possibility of a liability claim but made it very unpopular with affected residents who claimed their rights were being restricted and that they were being discriminated against.

This raises some significant points regarding the Council's interpretation of its planning responsibilities.

Having received the consultant's report regarding the situation at Beach, the Council had a number of
options available. Firstly, it could have rejected the report and recommendations; secondly, it could have accepted the report but implemented only some of the recommendations; and thirdly, it could have endorsed both the report and recommendations in full. The third option was the one the Council adopted.

A first point to be made is that although the Council received expert advice from a specialist in coastal erosion, his expertise does not encompass either engineering or planning in any recognised professional sense - for example, before the Planning Tribunal. The converse is true for the engineer and planner. Thus although the Council has a statutory responsibility to act, it does not necessarily have to accept and action in full any findings and recommendations made by its consultants without also considering the views of its engineering and planning officers. However, factors such as lack of understanding about coastal processes or unqualified acceptance of particular hazard area delineation techniques may result in little, if any, questioning of the report's findings or investigation of alternative management strategies. Full endorsement and actioning of the expert advice received may, therefore, be a 'convenient' management approach to adopt - in some respects a shelter for not investigating alternative hazards management approaches.

This leads to a second important point concerning the Council's protection from claims for liability and negligence. Total rejection of expert advice could place the Council in a vulnerable position if a claim were made since it had been forewarned. On the other hand, total acceptance of the advice does not appear to absolve the Council from such claims either. The two situations that make this tenable are:

(i) having endorsed the advice and established a hazard zone, a severe event erodes more land than delineated by that zone; and

(ii) having endorsed the advice and established a hazard zone, erosion does not occur to the extent
predicted yet people have been denied use of their land through restrictive planning controls being enforced.

Both of these situations are feasible and potentially grounds for claims against the Council. Again it is suggested that it may be merely a convenience to simply accept in full the expert advice received, and make little effort to investigate other management approaches.

Investigation of alternative management approaches is a third significant point. Referring back to Chapter Two it was noted that responses to hazards were related both to perception and to awareness of opportunities to make adjustments (see page 13). In the case of Wainui Beach it appears that the Council has chosen to consider only one of many possible responses - in essence the hazard has been perceived but there has been little investigation of adjustment opportunities. This restrictive 'tunnel vision' approach may have resulted in viable management options (for example, a strategy incorporating the existing engineering works and planning controls) being uninvestigated. In addition the approach adopted by the Council has resulted in many unforeseen problems concerning individual property rights, the equity of the management response, and the role of experts in decision-making. Table II classified two major hazard adjustment techniques:

(i) engineering; and
(ii) social.

It has been suggested that the first technique is often costly, ineffective and may lead to unanticipated side-effects. Similar criticisms may be made about the second technique, except that the problems are more likely to affect the human resource rather than the physical resource. Thus, limiting management strategies to exclusive responses poses considerable implications and restricts development of complementary approaches.

Statutory planning responsibility for hazardous areas mean councils everywhere are concerned about ways of protecting themselves from liability and negligence claims. It is
clear that all local authorities are mindful of decisions such as *Dutton v Bognor Regis Urban District Council*,¹ *Anns v London Borough of Merton*,² *Junior Books Ltd v Veitch Co. Ltd*,³ *Pirelli General Cable Works Ltd v Oscar Faber and Partners*,⁴ and *Fellowes v Rother District Council*.⁵

The Dutton case was the first instance where a Council was held liable for negligent approval of plans and negligence in inspection (in this instance for a house on top of a filled-in rubbish tip). Of particular significance was that it showed that not only could local authorities be legally liable for physical loss or damage as a direct result of local authority activities, but also for the indirect results of local authority activities due to negligent acts, accidental errors or omissions being committed by local authority employees in or about their duties.

Since then other cases have consolidated the Dutton ruling, and extended various matters relating to negligence.²,³,⁴,⁵

New Zealand legal precedents which supported the English judgement in *Dutton v Bognor Regis* became established by:

(i) *Hope v Manukau City Council*,⁶
(ii) *Johnson v Mount Albert Borough Council*,⁷ and
(iii) *Mount Albert Borough Council v Johnson*,⁸

which introduced firmly the English decisions into New Zealand.

Having decided to fully endorse the findings of the consultant's report and accept the recommended hazard zone, a draft policy statement for the Wainui Erosion Hazard Area was advertised for submissions and objections in 1982.

1. [1971] 2 All ER 1003; [1972] 1 All ER 462.
2. [1977] 2 All ER 492.
3. [1982] 3 All ER 201.
5. [1983] 1 All ER 513.

Cases cited are referenced according to legal convention, as explained in Appendix I.
Following a hearing in late 1983 the Council rejected all objections and resolved to adopt the draft policy into the proposed review scheme. It would probably have been inconsistent for the Council not to have done so, given its commitment to the hazard zone, and the apparent implications of negligence and liability claims.

The strict enforcement of this zone has been relaxed recently so that some minor building additions and alterations to existing residences have been allowed, subject to the provisions of section 641A of the Local Government Act 1974. No new non-relocatable buildings are likely to be permitted. This flexibility has placated affected residents to some extent but the Council is treating each case on its merits, having regard to statutory responsibilities and potential liability claims.

If loss of property did occur at Wainui, those Council officers interviewed stated that compensation from local sources would be unlikely if only one or two houses were affected. In contrast, if a significant proportion of the houses and/or property were endangered, there would be more likelihood of a disaster fund being set up (similar to that established after the 1984 Southland flood). It was felt unlikely that the Council would consider purchasing or relocating endangered buildings because of the cost and the end result of being left with a parcel of 'useless' land.

Finally, insurance was not accepted as providing any 'backstop' for residents since the Earthquake and War Damage Commission would be unlikely to accept claims for loss of land or buildings by erosion, subsidence or inundation. This was also felt to be true for private insurance companies.

Thus, the discussion in this section has pointed out several implications for the Council arising from its adoption of a hazard line and supporting policy:

(i) the Council acknowledges that it must balance the interests and rights of affected residents, and its statutory planning responsibilities;
(ii) it would appear that the Council adopted a rather restricted consideration of management approaches and may have chosen to endorse and action in full the report and recommendations of its consultant without investigation of other options;

(iii) an earlier stance of strict enforcement, and latterly a more flexible approach, in assessing building permit applications has left many Wainui residents disillusioned and angry about the Council's interest for Beach residents; and

(iv) the Council appears to be adopting a 'wait and see' attitude regarding the future of the beach houses. Although it is using the defined hazard zone as a bench-mark in assessing building permit applications, affected residents are in effect facing a do-nothing option since the hazard zone does not assist them in dealing with or preparing for short- and long-term erosion problems. The Council does not seem to be investigating possible solutions to this, and it appears only severe damage to property (as happened in the 1955 storm) will motivate positive action. For Wainui residents this may be too little, too late.

3.5.2 Wainui Beach residents

It was not until section 641 of the Local Government Act came into effect in 1980 that residents became concerned about their Council's planning actions. They were already aware of the erosion hazard since annual levies were made for the maintenance of the longitudinal protection works (gabions), and also because the County Council annually asked for installments on the loan raised to design and install the spur groynes. The implications of the hazard for property owners were less appreciated, however. Building permit applications were considered by reference to an informal hazard line but seemed relatively easy to obtain.

After section 641 became law the situation for residents became very restrictive since a Council had to administer legislation apparently prohibiting maintenance or relocation
of a house further back from the foredune. Intense lobbying by residents and the Cook County Council saw enactment of section 641A in 1981. However, the residents' satisfaction with this concession was abruptly halted by the announcement of the Council's intention to engage a consultant to formally identify a hazard zone to assist in meeting statutory planning requirements. The conflicts were about to emerge as residents perceived their individual and democratic rights, and financial interests being threatened. Paramount was the issue of the extent of rights local and central Government have to intervene and restrict the freedoms of individuals to do what they like on their property.

Cook County Council's endorsement, interpretation and administration of the hazard zone have been the principal concerns of residents, particularly in regard to:

(i) the width of the hazard zone;
(ii) the adequacy of the data used to derive the hazard zone, and the possible influences of local events;
(iii) the effects of sea level rise, land uplift, abnormally high tides, plate tectonics;
(iv) disregarding any influence foredune protection works may have in reducing the impacts of severe events;
(v) the use and relevance of a 100 year reference to define the extent of the hazard zone;
(vi) the delineation of the zone through parts of houses, buildings or sections;
(vii) property valuations and rate demands; and
(viii) the provisions of section 641A which, it is felt, absolve the Council from any subsequent risks, damages and civil claims if a building permit is approved.

A discussion of these points is made below.

As noted previously the hazard zone ranges from 25 m to 55 m along the southern part of Wainui Beach (see Gibb, 1981(a): 34-37). For many residents this width for the zone was difficult to accept, not only because of its technical
derivation but also because it contrasted so greatly with their personal observations and knowledge of local erosion rates. The need for a hazard zone was accepted by most of the people; the extent of the adopted zone was, however, seen as an overstatement of the situation. Further, it was contended that the degree and imminence of risk vary across the width of a hazard zone with front row houses being more at risk than those located further back. However, in delineating the zone all houses in that part of the zone are treated the same irrespective of location on the section. In fairness to the concept of identifying hazard areas, however, it would be difficult to adopt any other view.

The width of the zone was also questioned because of the emphasis placed on a series of air photos, taken over a relatively short time span from 1942 to 1981 as a major input for establishing the zone. Specifically the aerial surveys were made in 1942, 1953, 1966, 1972 and 1981. Clearly the intervals between each survey were unequal and this raises a general point about the use of air photo surveys to estimate the net trend of shoreline changes: ideally the time intervals should be equal, together with a lengthy record of surveys to allow useful inter-comparisons between them. In the case of Wainui Beach there are five photos covering a 39 year period, so that the questions to be asked are:

(i) How well does this describe the last 39 years?; and
(ii) Since the Council has chosen to base its planning controls on a 100 year predicted line, how well does it represent the situation for the next 100 years?

Leading on from the questions posed above the conflict was compounded by the use of the coastal hazard zone mapping technique, which uses a time period of 100 years to derive the 'line beyond which the shoreline (seaward limit of land vegetation) is not expected to lie' (Gibb, 1981(a):34), since few people could see the relevance of adopting such a long time interval on which to base current planning controls.
Questions were also raised about the dangers of 'predicting' the erosion as an average and constant rate of change. It was suggested that it may either be a series of discrete events, or be mitigated to some extent by the foredune protection works. In either case the effect would be to cast doubt on the accuracy of any proposed hazard zone width.

A further issue concerned the air photo data used to derive the hazard zone, particularly the degree of reliance and validity to be placed on having only 39 years of information. Also the influence of local events such as sand mining in the 1920's and 1930's, and earthquake damage in 1947 were suggested as contributing factors to erosion which were not accounted for. This raised the question of how well the available air photo record might assist in indicating the situation 100 years hence? Kirk (1982), for example, has pointed to some of the problems posed by the paucity of historical information on much of the New Zealand coast: problems in making various data sources such as old maps, deposited survey plans and air photos strictly comparable and the errors which arise in the measurements; and the clustering of the available historical data from the 1930's onwards.

Thus, it is frequently difficult to distinguish short-term fluctuations around a stable beach position from longer-term sequences of erosion or accretion of the beach as a whole. Extrapolation of available information for planning purposes requires discretion, therefore, for two important reasons. First, the difficulty of distinguishing short-term changes from any longer-term trends of erosion or accretion, and second, the problem of how representative the historical record is in indicating the net trend of shoreline change over time.

Additionally, there is a question concerning the cumulative influence of local events on the beach state, and on any hazard zone delineations made. The local events cited for Wainui Beach demonstrated the implications of this question
because they illustrate how such delineations may be under- or over-estimates if significant past events were not considered.

Long-term 'macro' level influences, such as sea level rise and land uplift, were seen as having an effect on the erosion rate particularly when considered with erosion of the Tuahine and Makarori headlands. It was felt that these factors would affect the shape of the beach (since the rate of each 'macro' event affects the amount of land potentially erodable), and thus the extent of the hazard zone. Again this posed the question of the relevance of a 100-year prediction - except this time it was not extrapolation, but interpolation of time scales that was at issue.

In calculating the hazard zone, the consultants chose to ignore the existing longitudinal protection works (gabions). Because they were designed and constructed to withstand only moderately severe storms it was believed that it would be unwise to place any reliance on them. Residents, on the other hand, felt the works should have been considered. This reaction was not unexpected since they are paying for the works, but the residents argued that the gabions have reduced the effects of erosion since they were installed. Their action in the winter storms of 1978 was cited as a good example, as well as a Catchment Board report stating that since the works were constructed there has been no significant erosion of the sand dune in the protected area (see East Cape Catchment Board 1981(b):2). In proposing a revision of the hazard zone the Beach Front Property Owners and Residents group have maintained that the works are having a positive effect in mitigating erosion and must be taken account of. To date the Council and the consultants reject this idea on the grounds that the gabions were designed and constructed for a specific period and set of conditions, and that it has not been possible to assess the extent to which the works may be reducing erosion.

A particularly contentious implication of the hazard zone has been the use of a 100-year period to define its extent.
There was total agreement amongst residents that this was irrelevant because 100-years was too far into the future on which to establish a hazard zone, and it was seen as inequitable because it effectively restricted residents' aspirations to make improvements or additions to property within their lifetimes. In effect, the adoption of the 100-year line was viewed as a 'ball and chain' on individual property rights. Despite the consultant's assertions that the 100 year period reflects the useful life of a modern dwelling, and that in the case of Wainui there is one property that has stood for 75 years (and should stand for another 75), residents did not accept a need to establish such an inappropriate time span. They preferred that any hazard zone should be established for a more reasonable period ranging from 20 to 50 years, to be reviewable at 5-yearly intervals. The reviews would take into account the effects the gabions were having, the beach profile and sand volume data of the Catchment Board, and other relevant information. Appropriate changes to the position of the zone would then be made. Effectively the Residents' group were seeking a 'rolling review' of the situation so that updates could be made as new information came to hand and trends became evident. Although the Council and the consultants have refused to reposition the hazard zone, the Council has conceded that a 'rolling review' merits consideration and useful meetings between them and the Residents' group are proceeding.

The question of the appropriateness of a 100-year time period, or indeed any time period, for basing planning and management controls remains unresolved. The Council appears to have sidestepped the issue for the time-being by agreeing to a 'rolling review' but it is almost certain to arise again when the proposed review scheme itself becomes due for review. It is quite possible too that the question of basing zoning restrictions on a 100-year predicted line will become significant at other coastal sites where the hazard zone mapping technique is used, particularly if a severe event were to remove a greater portion of land than actually delineated by the hazard zone. The implications of this for
the local authority and the Ministry of Works and Development, especially concerning civil liability claims, appears daunting.

Residents also objected to the hazard zone delineation dividing parts of houses, buildings or sections. It was seen as unfair since residents believed the above should either be wholly inside or outside the zone, not divided between the two. As the situation stands residents find they can carry out additions or alterations, subject to usual planning controls, for perhaps one-third of their house and not be allowed to do so for the other two-thirds. However, it was suggested, that if the Council administered the line more flexibly by assessing each permit application on its merits the residents could accept the delineated zone. Presumably this was based on a view that the Council, after considering the effects of the proposal, might grant permits for minor works or works nearest the landward boundary of the zone. One landowner was recently granted a permit for a work falling under this latter category and it remains to be seen how the Council, having regard to this precedent, will deal with other permit applications.

A further area of concern to residents has been the apparent non-effect of the hazard zoning on reducing property valuation and rate figures.

In 1983 the Valuation Department completed a revaluation of properties at the Beach. For most properties the land value had increased substantially, in some cases almost doubling. Although some increase was anticipated, the extent of the actual revaluations took most residents by surprise since it was felt the imposition of the hazard zone would act to lower property values. This belief was based on the view that since the Council was enforcing strictly the planning controls when considering building permit applications, property values should not increase very much, if at all, because no improvements had been possible. In addition it was believed that the delineation of the zone in the proposed review district scheme would deter prospective
buyers, or at least cause them to offer much less than the property was worth. A total of 28 objections were lodged with the Valuation Department stating that the land valuations were too high; none have been amended, however (Laing, Valuation Department (Gisborne), pers.com., 1984).

Associated with the new valuations have been higher rate demands since Cook County Council bases its rating schedule on these figures. Accounts for rates were sent out in April but it was not possible to obtain the figures. It is suggested, however, that since the Council uses the valuations to set its rates the residents were faced with a substantially higher account. Reactions were probably similar to those when the new valuations were released - dismay that even though they have to accept restrictive planning controls, the valuations and rates for their property have continued to escalate rapidly. In regard to the rates issue, however, it was possibly all the more difficult for residents to accept because on the one hand Council had severely limited improvement opportunities and yet on the other hand was asking for higher rates.

In essence, by adopting the hazard zone and using valuations as the basis for setting rates, the Council may be getting the best of two situations - reducing potential liability for civil claims, and increasing its rating revenue. The equity of this for Wainui residents is a debatable question.

A final issue raised by residents was the provisions of section 641A of the Local Government Act 1974. This section gives councils discretionary power to issue building permits for relocatable buildings, and apparent indemnity if subsequent damage occurs (the latter point is still unresolved by legal opinion in regard to third party liability).

Wainui residents were a major influence in getting this section enacted. Once established they felt this section provided the Council with the protection it needed when
approving permit applications, particularly as the certificate of title to the land would indicate that a permit had been approved under section 641A. This entry would, it was felt, completely absolve a Council from any claims for liability and negligence. The Council, however, was doubtful of this and is actively seeking legal opinions on the matter.

This raises a general question about the use of sections 641 and 641A in approving building permit applications - if a council carries out all the actions set out in those two sections, does this not only absolve the council from liability claims but also de facto absolve it from any further need or effort to investigate means of controlling the erosion? It appears that use of these two sections provide for the short-term use of land but do not place any responsibility on councils to investigate the causes of the erosion or to consider options for controlling erosion, by perhaps a combination of approaches, in the longer term. In effect, then, approvals for permits under these sections amount to little more than treating the symptoms and not the causes of the hazard. Such an approach may result in a rather narrow set of management approaches being proposed and implemented by decision-makers. It is appropriate to emphasize again the point made in Chapter Two regarding hazard responses - perception and the awareness of opportunities to make adjustments are the two critical factors.

For beach-front residents, then, section 641A has not been the answer to their hopes. Many residents would make additions or alterations to their homes under this section if they could, and be willing to sign an indemnity against the Council; indeed they feel this provision already exists. Further it was believed that once they had signed an indemnity, this implicitly recognized that there was no come-back on the Council. The desire to do as they wished with their property, within common sense, was emphasized frequently. This included rebuilding if loss of property or fire destroyed their house.
Frustration with the manner in which the Council was interpreting and implementing sections 641, 641A and the hazard zone peaked when the Residents' group lodged an objection to the Wainui Erosion Hazard Area shown in the proposed review district scheme (see Appendix II). Their objection was based on the assertion that use of section 641 and the hazard zone to derive the Hazard Area discriminated against beach front properties. The proposed alternative was a new hazard zone substantially closer to the sea, related to the likely position of the foreshore in 20 years time, after taking account of protection works and updated data on factors used to define the present hazard zone.

After a hearing in March, 1983 the Council notified the Residents' group in September that their objection had been disallowed. At this point the group lodged an appeal to the Planning Tribunal. However, at the same time the group resumed discussions with the Council on the feasibility of considering a 'rolling review' of the hazard zone based on 5-yearly reviews of the situation. As yet the Council have not formally committed themselves to this proposal, although discussions are proceeding. Clearly, then, both parties believe there is room for negotiation and compromise and that a satisfactory solution can be implemented.

3.5.3 Ad hoc agencies and Government departments
Included in this section are the East Cape Catchment Board and the Valuation Department.

The East Cape Catchment Board endorsed the hazard zone as fairly representing the likely natural location of the foredune in 100 years time, as well as stressing that the protection works were designed and constructed to buffer moderate storms only. They did not offer any opinion about the validity of ignoring any effect the works may have in reducing erosion, or whether the hazard zoning should have taken some account of them. It appears, therefore, that the Board preferred to avoid getting involved in the issue and was content to merely reiterate its responsibilities for maintenance of the protection works, and present information on sand levels and beach profiles.
Involvement of the Valuation Department's district office has been confined to the latest revaluations, and objections arising from this. It appeared that beach front residents were not aware that their valuations were based on house sales adjacent to the hazard zone, with a 7% reduction to reflect the zone designation. Because homes at Wainui, both inside and outside the hazard zone, sell quickly and for high prices it was not surprising that all valuations should increase. This emphasizes how popular the beach is to home-buyers who, it seems, are prepared to accept the possibility of erosion as a fact of purchasing sea front property. It also emphasizes that the hazard zone here really has had no major negative effect on property values, despite residents' fear to the contrary; it would be interesting to investigate this for other beaches with an identified hazard zone.

Although 28 objections were received by the Department, 17 were subsequently withdrawn with no change in values and 11 are outstanding (Laing, Valuation Department (Gisborne), pers.comm., 1984).

However unfair it may seem to base valuations on the sales of surrounding property, it should be recognised that this procedure follows the provisions of the Valuation of Land Act 1953 and its 1977 amendment. This is not to say that revised procedures more appropriate to the circumstances are not needed because, although more coastal subdivisions are having hazard zones delineated, a beach front home is still regarded as prime real estate.

3.6 SUMMARY

Wainui Beach was used as a case-study of a seaside community faced with a coastal erosion hazard. An examination was made of the management approaches that have been adopted, before discussing the issues, conflicts and implications of the current planning response. It was seen that there were three main parties involved:
(i) the Cook County Council, who had statutory planning responsibility for the area and who have adopted a hazard zone to assist them in carrying out this function;
(ii) local residents affected by the delineation of the hazard zone; and
(iii) the East Cape Catchment Board, and the district office of the Valuation Department.

The implications of the Council's adoption of the hazard zone were outlined for each party. These can be summarised as:

(i) Cook County Council wanted to adopt a middle line approach - on the one hand carrying out statutory planning duties under the Town and Country Planning Act 1977 and the Local Government Act 1974, and on the other hand recognising and taking account of individual property rights of Wainui residents. Use of the hazard zone to assess building permit applications was seen as a feasible means of performing both.

(ii) Residents living within the area shown by the hazard zone were concerned that the Council was treating them unfairly. The basis for this viewpoint was that Council's endorsement, interpretation and administration of the zone was placing severe restrictions on their rights to do as they wished with their property, particularly as it was felt that granting building permits under section 641A of the Local Government Act 1974 absolved the Council from any civil liability claims. The need for a hazard zone was accepted; the usefulness and relevance of adopting a 100 year period in deriving the zone, however, was strongly challenged as was the ignorance of any influence the longitudinal protection works may have in reducing erosion. Questions about the validity of the method and data used to define the zone were also raised.
Arising from their frustrations with the Council's administration of the zone, the Residents' group lodged an appeal to the Planning Tribunal. This action followed an earlier objection to the Council concerning an Erosion Hazard Area designated in the proposed review district scheme which was disallowed. A regular 'rolling review' of the zone has been proposed as an acceptable compromise to the residents.

(iii) The East Cape Catchment Board appear to have adopted a neutral stance. At meetings and in correspondence they repeatedly reiterated their responsibility for collecting monies for maintaining the longitudinal protection works, and accepted that the works should not be considered in any calculation of the hazard zone. They stressed that this was because their design limit was only to buffer moderate storms.

A recent revaluation of properties at Wainui meant the district office of the Valuation Department became involved in the hazard zone issue. Because valuations are based on house sales in an area, the popularity and high prices for homes at Wainui have substantially raised valuations of homes inside the hazard zone. Further, because the Cook County Council bases its rates on the valuation figures, residents were faced with an increased rate demand.

The case-study also raised some general points concerning the relation between the adopted management responses and hazards theory.

It was suggested that the Cook County Council may have considered a narrow set of management alternatives, which restricted the options available to local decision-makers to choose from. This was a significant point since response to hazards is related both to perception and to an awareness of opportunities to make adjustments. Thus, the adoption of a 'tunnel vision' approach to management may unnecessarily preclude the consideration of alternative hazards responses that could be more appropriate to the situation.
Wainui Beach represents an example of a coastal community that has gone beyond a 'technological response' phase of relying solely on protective works, with the adoption of planning controls for a defined hazard zone. Both of these responses have been made independently of each other, however. It would appear that the opportunity to utilise both types of responses, in combination, as a management alternative was dismissed as being unrealistic. In an effort to make the human-use system less vulnerable to the effects of severe natural events, however, the promotion of multiple adjustments to a hazard would not seem unreasonable. In the case of Wainui the protective works and the planning controls encompass two types of adjustments: those that modify the hazard, and those that modify loss potential (see Table II). A detailed study of the combination of the two as a management option would have been useful to broaden the range of alternatives considered, in addition to study of other types of possible adjustments. In this manner the awareness of opportunities to make adjustments would have been increased.

It was seen, therefore, that sole reliance on firstly, a technical response and latterly, a planning response has not resulted in an approach that satisfies either the Cook County Council or affected Wainui residents. In fact, the present management response has exacerbated the issues and conflicts associated with the adopted approach. In part this may be due not only to a limited review of alternative management options, but also as a consequence of the relevant legislation the Council must implement and administer.

The legal and institutional aspects of coastal hazards management describes those matters a local authority must have regard to and/or administer. Thus, the statutory requirements play an important role in defining the nature and extent of a council's responsibility for management. These requirements are examined in the following chapter since many of the issues raised in the case-study are founded on the hazards legislation and policies that have been enacted.
CHAPTER FOUR

LEGAL AND INSTITUTIONAL ASPECTS OF COASTAL HAZARDS MANAGEMENT

4.1 INTRODUCTION

The case-study on Wainui Beach, Gisborne highlighted a number of issues, conflicts and implications arising from the present management approaches. It is important to recognise, however, that those approaches are to a large extent based on the relevant legislation and policies that administering agencies must implement. An examination of the legal and institutional aspects of coastal hazards management is therefore relevant since it defines the nature and limits of the administering agencies responsibilities.

This chapter considers these aspects by reference to two factors:

(i) relevant statutes and planning responsibilities; and
(ii) policies of hazards management agencies.

Finally, by way of a comment on the chapter's main points, some observations of the above two factors are presented.

4.2 RELEVANT STATUTES AND PLANNING RESPONSIBILITIES

There are five principal statutes relevant to coastal hazards management. They are the Soil Conservation and Rivers Control Act 1941; the Harbours Act 1950; the Water and Soil Conservation Act 1967; the Local Government Act 1974; and the Town and Country Planning Act 1977.

4.2.1 The Soil Conservation and Rivers Control Act 1941

This Act and its various amendments was enacted to, inter alia, make better provision for the protection of property from damage by floods.
A Soil Conservation and Rivers Control Council was established (section 3) and charged with specific objects (section 10), functions (section 11), and powers in connection with watercourses and defences against water (section 22); of particular relevance are the following responsibilities:

(a) The prevention of damage by floods (section 10(c));
(b) The investigation and design of measures for preventing or reducing flood damage or reinstating property so damaged or controlling the water table in relation to any land (section 11(d));
(c) The assistance of persons whose land has been affected by soil erosion or floods or whose land may be used to fuller capacity by the control of water thereeto (section 11(h));
(d) The general supervision and control of Catchment Board activities (section 11(k));
(e) The power to deepen, widen, straighten, divert, or otherwise improve any watercourse or outfall for water, or remove any obstructions to the above including obstructions to the free flow of flood waters in existing flood channels. In addition Council has the power to raise, widen, or otherwise improve any defence against water (section 22(b));
(f) The authority to make any new watercourse or outfall for water to allow it to connect with the sea or any arm of it, or with any other watercourse or a lake. Council may also erect any new defence against water, or carry out any other work considered necessary or desirable for controlling or preventing damage by flood waters (section 22(c)); and
(g) Authority to make grants or loans towards the cost of coastal erosion control works, either directly to any person or body, or through a catchment authority or regional water board (section 30). This provision, however, is qualified by a National Water and Soil Conservation Authority (NWASCA) policy that claims for the protection of urban development initiated after 18 November 1971, and for the resettlement of persons affected by marine erosion or flooding are ineligible for grants and loans.
The Act also established catchment districts (section 34) and catchment boards (section 40) with certain powers and duties (Part VII).

Generally catchment boards have the same functions and responsibilities as the Soil Conservation and Rivers Control Council, except on a local rather than national level (see in particular sections 126 ('General powers of Catchment Boards'); 130 ('Governor-General may vest control of watercourses in Boards'), and 133 ('Maintenance and improvement of watercourses and defences against water, etc.').

Under Part VIII of the Act catchment boards may make bylaws for the protection of watercourses and defences against water (section 149), as well as bylaws relating to land utilisation (section 150). Both sections aim at reducing or preventing the damaging effects of floods by controlling actions on or adjacent to watercourses.

In 1959 and 1980 the Act was amended to introduce sections relating to safeguards against erosion and flooding (see the Soil Conservation and Rivers Control Amendment Act 1959, and 1980). Particularly important are sections 34 ('Safeguards publicly notified') and 35 ('Individual notices of safeguards'). Basically section 34 states that the occupier of any land in any catchment district or territory shall carry out every operation affecting the land in conformity with prudent land use practice and prevent or mitigate, inter alia, deposition in watercourses, lakes, or the sea, and the control of floods. No person shall carry out any activity publicly notified within the immediately preceding two years if it is likely to facilitate soil erosion or floods, or cause deposits in watercourses, lakes or the sea unless prior consent from the Catchment Board, Commission or Soil Conservation and Rivers Control Council has been obtained. In order to check erosion, whether by landslip, water, wind or otherwise, or to check deposits in watercourses, lakes or the sea, or to promote flood control section 35 allows the Council to require any change, prohibition, restriction or regulation in land use. Notice
in writing to such effect shall be given to the present occupier of the land and various actions may be specified which are to be carried out within a certain time period.

Finally, it should be noted that a 1983 amendment to the principal 1941 Act has placed the Soil Conservation and Rivers Control Council within the responsibilities of an enlarged National Water and Soil Conservation Authority, although its role and functions remain unchanged (see Soil and Water 20(2), 1984:27-29, 30-34, 35-36).

4.2.2 The Harbours Act 1950
Under section 176 of this Act it is an offence to construct any works or structures in, on, over, through, or across tidal lands, tidal waters, or the bed or the waters of the sea, or of any harbour, navigable lake or navigable river unless authorisation has been received from the Minister of Transport. This means that any coastal protection scheme containing works that impinge into any of the above areas will need to be scrutinised and approved by the Harbours and Foreshores Section of the Ministry of Transport, in addition to satisfying any other conditions imposed by other agencies (for example, meeting the National Water and Soil Conservation Authority's financing and maintenance provisions for such works).

4.2.3 The Water and Soil Conservation Act 1967
The Long Title to this Act notes that the prevention of damage by flood and erosion is one of the many responsibilities vested in administering bodies.

Section 14 details the functions, powers etc. of the National Water and Soil Conservation Authority (NWASCA), and notes that it shall have all the functions, rights, powers and duties of the Soil Conservation and Rivers Control Council (SCRCC) (section 14(1)).

Provision is made for investigating problems concerning the control of erosion on the banks of rivers, lake shores and the sea shore as well as controlling the flow and flooding
in and from rivers and lakes (section 14(3)(a)). In addition section 14(3)(e) gives NWASCA the function and power to:

'...exercise, in relation to erosion, accretion, and pollution in estuaries and on the sea front and in all other places within the outer limits of the territorial sea of New Zealand, all of the functions and powers conferred in the Soil Conservation and Rivers Control Council...as if those functions and powers extended to the said estuaries, sea fronts, and places.'

It is a statutory function of the 20 catchment authorities and regional water boards throughout New Zealand to administer the functions and duties of NWASCA and the SCRCC as delegated to them by these bodies.

4.2.4 The Local Government Act 1974

There are four sections of this Act relevant to the present study; they are

(i) section 274 ('Subdivision not to be permitted in certain circumstances');
(ii) section 641 ('Refusal of building permit');
(iii) section 641A ('Power to issue building permit where land subject to erosion, subsidence, slippage or inundation'); and
(iv) section 684 ('Subject matter of bylaws').

Section 274 notes that a council shall refuse to approve any scheme plan if it is satisfied that the land on the plan is not suitable for subdivision, or that the proposed subdivision is contrary to any proposed or operative district planning scheme. In addition approval shall be withheld if the land or any portion of it in the subdivision is subject to erosion, subsidence, slippage, or inundation by the sea, a river, stream, lake or any other source. This requirement extends also to include situations where a council is satisfied that subdivision is likely to accelerate, worsen, or result in any of the above events to land not part of the subdivision. However, approval for
subdivision may be granted if council is satisfied that provision has been, or will be, made for the protection of the land (whether part of the subdivision or not) from erosion, subsidence, slippage or inundation (writer's emphasis).

Under section 641(2) a council shall refuse to grant a permit for the erection or alteration of any building where:

(i) the land or the part of the land where the building is to be erected or altered is unsuitable, unless council believes adequate provision has been, or will be, made to make the land suitable for the proposal; (writer's emphasis)

(ii) the proposed building or alteration is presently or potentially at risk from damage arising directly or indirectly from erosion, subsidence, or slippage of the land on which it is sited. A permit shall also be refused if inundation from such events is likely, or if the proposal may accelerate, worsen, or result in erosion, subsidence, slippage or inundation of the site or any other land. If a council is satisfied that adequate provision has been, or is to be, made for the prevention or protection of land from such events, however, it may grant a permit.

It should be noted that this section makes the refusal of building permits mandatory if a council believes any of the above threats apply to a particular site and if no provision has been made to make the site suitable. Further, the emphasis is primarily on protection of the land rather than protection of buildings - a point stressed by the Planning Tribunal in Southland County Council v Southland County Council9:

'...to some extent the legislative intent behind s641(2) is the protection of buildings. But it is also the protection of land from the consequences of building activity. Obviously if land is protected..., then the building erected on that land will also be protected.'

A discretionary power for councils to issue permits for relocatable buildings is provided by section 641A. Subject to any conditions set, a permit for a relocatable building may be given for the erection of a building on any land or part of any land that is or will be subject to:

(i) erosion;
(ii) subsidence;
(iii) slippage; or
(iv) inundation arising from the erosion, subsidence, or slippage of that land.

Under this section a building permit may be issued for:

(i) the alteration of a building;
(ii) the erection of another building on the same site consistent with the use and occupation of the existing building;
(iii) the restoration of any damage suffered by that building; or
(iv) the relocating of a building on its existing site.

If a permit is approved the council is required to notify the District Land Registrar who shall make an entry on the certificate of title to the land that a building permit has been issued under this section. Provided that this notification (which is mandatory) has not been rescinded, and that the other requirements have been met, subsection 3 exonerates local authorities from 'civil liability to any person having an interest in that building' on the grounds that a council was negligent in issuing the permit. It is uncertain, however, whether the council would be released from liability should someone who did not have an interest in the building which was erected or altered suffer loss or damage, that is, third party liability. To date, this question remains unresolved.

Section 684 concerning the subject-matter of bylaws is the final section of relevance here. Of particular significance are powers to make bylaws for the protection from damage, injury or misappropriation of any property belonging to, or controlled by, the council (subsection 6); the inspection of
any land, building, or premises for any purpose of this Act (subsection 21); and prescribing any conditions for the control, prevention or protection of land from slippage (subsection 25).

4.2.5 The Town and Country Planning Act 1977
This Act is principally concerned with the preparation, implementation, and administration of regional, district, and maritime planning schemes. With regard to this study sections 3, 36, 90, 91, the First Schedule (clause 4(c)), and the Second and Third Schedules, (clause 8(a)) are significant.

Matters of national importance are set out in section 3, which notes that 'The wise use and management of New Zealand's resources...The preservation of the natural character of the coastal environment and the margins of lakes and rivers and the protection of them from unnecessary subdivision and development' shall be recognised and provided for in planning schemes.

The contents of district planning schemes are outlined in section 36. In addition to making provision for matters laid out in the Second Schedule there are specific requirements regarding what shall be included in schemes; for example, a statement of the scheme's objectives and purposes and the policies to achieve them.

When district schemes become due for review it is not unusual for councils to review their zoning of particular areas. However, existing uses within those zones are protected by sections 90 and 91 which allow the established use to continue provided certain conditions are met. If an area is rezoned, the existing uses now become non-conforming to the new zone designation; section 91, however, provides for the right to reconstruct, alter, or add to an existing building according to specific conditions.

An operative district scheme may be changed by the council seeking to introduce a variation to a particular zoning.
Again, so long as the uses in the zone were lawfully established, sections 90 and 91 protect the rights of existing uses.

The First, Second and Third Schedules, which set out matters to be dealt with in regional, district, and maritime planning schemes respectively, also deal with natural hazards.

Specifically, clause 4(c) of the First Schedule allows for the 'General identification of areas to be excluded from future urban development, including...land subject to hazard such as flooding and earth movement...'

Appropriate provisions for natural hazards are also allowed for in district planning schemes (Second Schedule, clause 8(a)) and maritime planning schemes (Third Schedule, clause 8(a)). Both clauses state that these schemes must provide, where appropriate, for:

'The avoidance or reduction of danger, damage or nuisance caused by -
(a) Earthquake...flooding, erosion, landslip, subsidence, silting...'

It should be noted that the other matters to be dealt with in maritime schemes, as listed in the Third Schedule, are not relevant to this study. Clearly, however, all appropriate matters listed in that Schedule will be provided for when a maritime planning authority prepares its scheme.

Having presented the main statutes relating to coastal hazards, and outlined the planning responsibilities of the administering agencies, the next section summarises the policies of Government and private-sector groups with a duty for and/or interest in coastal hazard zone management.
4.3 POLICIES OF HAZARDS MANAGEMENT AGENCIES

It is possible to identify two distinct groups of agencies directly or indirectly involved in coastal hazards management; the first are Government organisations such as the Soil Conservation and Rivers Control Council, the National Water and Soil Conservation Authority, and the Earthquake and War Damage Commission. Secondly, there are the private-sector organisations, principally the insurance industry.

4.3.1 Government organisations

Both the Soil Conservation and Rivers Control Council (SCRCC) and the National Water and Soil Conservation Authority (NWASCA) have a responsibility for the identification and management of coastal hazard sites. It should be noted that the SCRCC is now part of an enlarged National Water and Soil Conservation Authority, serviced by the Ministry of Works and Development.

Policies for managing coastal erosion problems were announced in November 1971 and reviewed in April 1977 by the SCRCC, and by NWASCA in July 1981. The current NWASCA policy on coastal hazards closely follows the 1981 statement.

The SCRCC policy of 1971, upon which current policy is based, was in response to the statutory responsibility placed on NWASCA by the Water and Soil Conservation Act 1967, section 14(3)(e), and was influenced by a number of principles:

'(a) the existence of many urban coastal communities established before Town and Country Planning provided any control or guidance on development, and before erosion trends and coastal movements had received any study or general understanding;
(b) the high material value of many urban coastal developments;
(c) the value to the community as a whole of coastal recreation areas;
(d) the relatively low value of rural coastal farmland in comparison with the high cost of protection works;
(e) the enormous technical difficulties often confronting coastal protection work and the high risk of failure;...' (Soil Conservation and Rivers Control Council, 1977: 1-2).

Of particular importance, the policy provided for:

(i) grant assistance to urban coastal developments only where these existed prior to 18 November 1971 (the date on which the policy was first issued). It was felt that all local territorial authorities should by that date have prepared a district planning scheme under the Town and Country Planning Act 1953, or should have had such a scheme under consideration. In addition section 53 of the Town and Country Planning Amendment Act 1966 required that district schemes consider 'Control of development in areas containing...land likely to be affected by...flooding, erosion, landslip and subsidence...' so that developments approved after 18 November 1971 were regarded as proceeding in the light of planning controls which acknowledged erosion risks;

(ii) protection of public recreational assets where there is 'an amenity of recognised public value';

(iii) exclusion of resettlement costs for persons affected by coastal erosion.

The policy statement stresses that previously subsidized works are not automatically eligible for further assistance. Council is free to re-assess a subsequent application on its merits as a new case;

(iv) assessment of economic (eg. value of the asset at risk, cost of proposed works) and non-economic (eg. recreational value to the community of the asset at risk, the record, where applicable, of the local authority in initiating action through planning legislation to control development in potentially hazardous areas) factors; and

(v) giving catchment authorities and other agencies a set of guidelines aimed at reducing future problems (eg. investigation of coastal processes, consideration of environmental factors).
A review of the policy was conducted in 1977 and it was concluded that the policy had been, and continued to be, relevant and effective in managing coastal erosion hazards. It was emphasized, however, that each case for grant assistance would be assessed on its merits and that grants above two-thirds of the total cost for protective works were unlikely to be granted.

Following on from this review, NWASCA released a policy on natural hazards and limitations to land use in July 1981. It endorsed the technique of coastal hazard zone mapping, as described in Gibb (1981(b)), and adopted as policy:

'(i) the general identification of lands subject to hazards such as erosion, flooding and landslip and the promotion of the inclusion of such information in the relevant Regional Planning Schemes;
(ii) the promotion of the inclusion in District Planning Schemes of maps and information describing the location, type and extent of each hazard; and
(iii) the promotion of the inclusion in Regional and District planning schemes of provisions for land uses compatible with the type and extent of the hazards identified.' (National Water and Soil Conservation Organisation, 1982:1).

Catchment authorities were requested to promote the above policy in carrying out their responsibilities and during any discussions with regional and local authorities concerning the preparation of planning schemes or reviews.

The current NWASCA policy for coastal erosion and hazard planning endorses and consolidates the earlier statements outlined above. Emphasis is placed on the prevention of damage by coastal erosion through use of appropriate planning procedures, taking into account any technical advice provided by either NWASCA or local catchment authorities. It also stresses that the maintenance of any proposed coastal work must be assured before grant assistance will be approved, and that proposals for protection works must indicate what steps have been taken to control future development in the threatened area.
In addition to the SCRCC and NWASCA, the Earthquake and War Damage Commission has an interest in hazards management, although not specifically including loss of land by coastal erosion.

Established by the Earthquake and War Damage Act 1944, the Commission forms the basis of a national natural hazard insurance scheme (O'Riordan, 1971).

Under section 14 of the Act, any property insured against fire is deemed also to be insured for the same amount against earthquake and war damage. Insurance companies pay an earthquake and war damage premium to the Commission for this cover.

In 1956 the Earthquake and War Damage Regulations established an Extraordinary Disaster Fund to be run separately from the Earthquake and War Damage Fund. Ten per cent of all premiums paid into the latter Fund by insurance companies were transferred to the Disaster Fund. Coverage extended to damage caused by storm, flood, or volcanic eruption (excluding damage caused by landslip, subsidence of earth or rock, or erosion by the sea) (writer's emphasis) if it was of an abnormal and unforeseen nature, and of extraordinary effect. It should be noted, however, that new Regulations enacted in 1984 delete cover for storm and flood damage, so that perils now covered are earthquake, volcanic eruption and hydrothermal activity, and landslip. In addition the Extraordinary Disaster Fund has been renamed the Disaster and Landslip Fund.

Automatic landslip insurance was introduced from 17 July, 1970; landslip being defined as:

'subsidence of a substantial land mass other than by settlement, soil shrinkage, or compaction; and includes the movement from any hill, mound, bank, slope, cliff, or face of earth or rock, or of a substantial mass of earth or rock, which before movement formed an integral part of the hill, mound, bank, slope, cliff, or face' (Earthquake and War Damage Regulations 1984:2).
As a result of the Abbotsford landslip in August 1979, a Commission of Inquiry was set up, and one of its recommendations was that a review, consolidation and amendment of the Act and Regulations was now appropriate. The new 1984 Regulations have gone some way towards meeting the Commission of Inquiry's recommendations with the introduction of limited land insurance which covers damage which is imminent as the direct result of landslip if the likely outcome will be total loss of the property concerned.

Loss of use of land by coastal erosion is, however, still not covered by the Act or Regulations despite a recommendation by the Abbotsford Landslip Commission of Inquiry to the contrary (see Report of the Commission of Inquiry into the Abbotsford Landslip Disaster, 1980:160-163).

4.3.2 Private-sector organisations

Principally these are insurance companies, although it appears none of the major companies offer, or anticipate offering, any policies to cover loss of land by coastal erosion. This also appears to be the stance adopted by the Insurance Council of New Zealand which is the national body for the insurance industry (Chung, 1983).

The recent changes to the Earthquake and War Damage Regulations mean that storm and flood cover are now underwritten by the insurance industry so that it seems most of the natural hazards experienced in New Zealand are covered by either the Earthquake and War Damage Commission or the private insurance industry - loss of use of land by coastal erosion, however, is a major exception.

There is no statutory duty for the insurance industry to offer any policies covering natural hazards, or to become involved in hazards management. However, it is suggested here that the industry could play a vital role in coastal hazard zone management by investigating and implementing policies for loss of use of land by erosion; particularly relevant would be study of introducing insurance policies as a complementary hazard response to engineering protection.
works and land use planning practices. To some extent this has occurred in the United States in regard to flood hazards with the enactment and subsequent refinement of the National Flood Insurance Program (see for example, Anderson, 1974; Miller, 1977; Kusler, 1982; Bragg and Coughlin, 1984). It is possible that the lessons learned from that experience could be relevant and adapted to the management of coastal zone hazards in New Zealand.

4.4 SOME OBSERVATIONS OF THE LEGAL AND INSTITUTIONAL FRAMEWORK

The five principal statutes relevant to coastal hazards management were previously outlined. It is possible to note that through time the intent of the legislation appears to have moved from one of emphasizing technological responses (the Soil Conservation and Rivers Control Act 1941) to one of stressing the complementarity of technological and planning responses (the Local Government Act 1974, Town and Country Planning Act 1977).

This shift in emphasis is perhaps a function of better knowledge about the interactions and influences of coastal processes and coastal land use, as well as a recognition that singular responses do not provide satisfactory management results. It may also reflect changing societal attitudes towards the coastal environment - no longer are people prepared to see the very asset that attracted them to the coast subverted by ugly, and often ineffective, protective works.

However, a new set of problems have been posed by this change in legislative emphasis; with the increasing promotion and advocacy of land-use planning controls as a means of managing coastal hazard sites (for example, use of sections 641, 641A Local Government Act 1974) issues such as the equity of the planning responses, the restrictions placed on individual property rights by planning controls, and the apparent non-recognition of the problems faced by
residents who have to live with the imposed controls are becoming both clearer and more numerous.

It seems, then, that the current statutes offer adequate controls for limiting future development on hazardous sites but are rather weak in considering what can be done for managing existing hazard sites. Possibly this may be because it is difficult to influence or change what is already physically present, but it does not mean that extension of the relevant legislation could not be investigated. Possibly this would mean extending the powers, duties and functions of administering agencies to explicitly provide for the management of existing hazard sites. Without legislative direction and guidance there is no statutory obligation (or indeed the finance or staff) for administering bodies to develop policies or implement management approaches. Management responses to natural hazards then merely become disjointed 'fire fighting' efforts rather than as part of any overall long-term strategy; for many communities on the New Zealand coast that are currently experiencing erosion problems, this suggestion appears to hold true.

This introduces the second aspect dealt with in this chapter - the administrators of legislation, and relevant interest groups.

Government agencies exist primarily to carry out their functions and duties as outlined by legislation. Clearly then, the problems and omissions inherent in legislation are likely to be translated into the policies of administering agencies. Any particular interpretation of their statutory responsibilities will possibly be reflected in an agency's policies depending on factors such as perception of the problem, awareness of alternative management responses, and the degree of emphasis placed on developing long-term strategies as opposed to short-term containing actions. Efforts in formulating appropriate controls for future development are eminently useful but until the same effort goes into studying the issues and options for existing developments only part of the problem is being addressed.
The exclusion of cover by the Earthquake and War Damage Commission and the insurance industry for loss of use of land by coastal erosion raises the question: What makes the coastal hazard so different to other natural hazards?

Possibly the degree of foreseeability may be one consideration. Coastal erosion, whether it is at the almost imperceptible rate of millimetres per year or the dramatic metres per hour during storms, may be considered quite predictable. In contrast, it is almost impossible to predict when and where an earthquake will strike. This degree of foreseeability, then, has implications for any insuring agency since it is likely to have to pay for claims sooner or later. It is possible that in the case of loss of use of land caused by coastal erosion the insurers believe that payouts will be sooner rather than later.

In addition, they may believe that the 'target population' is too small to warrant introducing policies. Since any claims are likely to be high if severe damages occurred, the money received from premiums may not cover all the losses. For the insurance industry this consideration is significant. The implementation and administration of any insurance scheme have also been suggested as barriers to introducing any policy, particularly the rate of the premiums needed to be charged, and in the case of any scheme administered by the War Damage Commission the equity of such a proposal. However these do not seem insurmountable problems as witnessed by the American experience with a government-subsidized flood insurance programme. The role of insurance as an input to coastal hazards management will be further discussed in later chapters.

From reviewing the relevant hazards legislation and policies, it is suggested that there already appears to exist opportunity for implementing multiple adjustments to a coastal erosion hazard. For instance, the provisions of the Soil Conservation and Rivers Control Act 1941, the Local Government Act 1974, and the Town and Country Planning Act 1977 when looked at in combination seem to provide statutory
scope for enacting both technical and planning responses to a particular hazard. The policies of the administering agencies therefore are given a wide discretion in interpreting and implementing this capacity, although it appears that they are not utilising this opportunity to the full. Instead the administering agencies are focussing their policies on providing singular hazards responses. In turn this mutually exclusive management approach has raised a number of significant issues and implications, as evidenced by the findings of the case-study of Wainui Beach, Gisborne.

In addition, it is suggested that the legal and institutional framework for coastal hazards management in New Zealand encompasses most of the theoretical range of adjustments to erosion, as outlined in Chapter Two. The opportunity to utilise both technical and planning responses, through statutory and policy measures, means that hazards adjustments could include a combination of modifying the hazard (by for example, protective works), and modifying the loss potential (through say, zoning controls in planning schemes). These types of adjustments may also alter the human-use system in the hazardous area so that vulnerability to a hazard is reduced.

Thus, the only type of adjustment not covered by the present legal and institutional set-up for coastal hazards is that of adapting to the loss. Such an adjustment involves consideration of the role of insurance, and relief and rehabilitation schemes. This type of adjustment places more emphasis on post-hazard impacts and the provision of adequate measures to help cope with the burden of loss.

The opportunity exists, then, to examine this type of adjustment as a possible management alternative to complement other hazards responses adopted. Before this is done, however, it is relevant to draw together the main issues that have emerged from the preceding chapters to provide an outline of the problems and implications raised by the current emphasis on singular types of management
approaches. From this it then becomes possible to consider alternative approaches that will assist in overcoming the identified problems.
CHAPTER FIVE

COASTAL HAZARD ZONE MANAGEMENT: IDENTIFYING THE ISSUES

5.1 INTRODUCTION

Present management responses towards coastal hazards raise a number of important issues encompassing the physical, social and economic dimensions. The case-study of Wainui Beach, Gisborne highlighted a number of conflicts and implications posed by the adopted management approaches. Similarly, the review of the legal and institutional aspects of coastal hazards management pointed to some important considerations that require examination.

This chapter draws together the significant issues raised by the preceding chapters. In particular there are four main issues identified within which are a number of related questions, problems, and propositions that can be raised. The four major issues discussed are:

(i) the range of management responses considered by decision-makers;
(ii) the types of techniques used to define hazard zones;
(iii) the implementation and administration of hazard zones; and
(iv) the implications of hazards responses for affected residents.

The common theme through all of these is that the current management responses do not represent the total range of potential hazards adjustments. This raises the question: Is it possible to develop alternative management responses that address these issues and provide a wider range of adjustments for decision-makers to consider?

It would not be realistic to formulate a complete range of potential adjustments. However, it is realistic to propose various options that provide contributions towards
developing more comprehensive hazards management approaches and particularly approaches that recognise the issues facing existing coastal hazard sites. Providing adjustments that allow adaptation to losses, through insurance, is one such option. The last two chapters of this study develop this proposition as an alternative management approach that promotes multiple adjustments to coastal hazards.

5.2 IDENTIFYING THE ISSUES

5.2.1 The range of management responses considered by decision-makers

Response to natural hazards is related to two main factors: perception of the hazard, and an awareness of opportunities to make adjustments. For most coastal hazards, perception is not a major problem: the effects of the hazards, whether delayed or dramatic, are apparent. The second factor governing response is not so clear-cut, however.

In New Zealand, as elsewhere, the traditional response to coastal hazards has been to rely solely on engineering works. This is evidenced in the number of structures such as seawalls, groynes and revetments constructed along many beaches. In some circumstances the technical response has been appropriate and has helped alleviate the situation. In other circumstances, however, this type of response has been expensive financially and environmentally (often irreversibly so).

Recently there has been a shift away from emphasising purely technical responses towards social responses based on land-use management, and specifically planning controls. However similar problems can be identified with the singular reliance on planning measures, except that the impacts are directed more towards the human resource (people), rather than on the physical resource (the coastal environment).

These observations give rise to the question: Is it more useful to propose management approaches that integrate both
technical and social adjustments? There are cases where either type of adjustment is suitable, but there are possibly more instances where a mixture of both is appropriate. Such an approach widens the range of adjustments that can be developed and presented to decision-makers. This is significant since a narrow range of alternatives, whether technical or social, limits the types of management responses that can be investigated and implemented; effectively this promotes management within a 'tunnel vision' setting. Decision-makers in this situation may in fact exacerbate the problem if an adopted management strategy consequently raises unanticipated social, physical and economic implications.

For example, a decision to build a groyne out from a beach may lower beach aesthetics, will probably induce further groyne construction along the beach in an attempt to build up beach levels (since groynes trap sand moving alongshore) which in turn reduces beach aesthetics further, and will definitely require maintenance costs.

An integrated approach utilising both technical and social adjustments also acknowledges that it is just as important to consider what goes on top of the land as it is to consider what factors influence the land's foundations. Thus, it is important to recognise that there is a relation between above- and below-ground factors and that there are other land-uses apart from buildings that may contribute to the hazard. The site may become unstable if one of these factors is placed under undue stress by, for example 'landscaping' through foredune levelling, or restricted drainage by compaction of soil.

The use of both types of adjustments in combination therefore provides for a broader approach towards managing a hazard through its emphasis on treating the natural and human-use systems as a total entity rather than as two disjointed elements. From this it follows that if the land is protected then any buildings on it are also protected, and not vice-versa.
5.2.2 The types of techniques used to define hazard zones

There are a variety of techniques available for identifying the nature and extent of hazard-prone areas, such as buffer zoning (Kirk, 1979(a)), set-back limits (Healy, 1980, 1981), and coastal hazard zone mapping (Gibb, 1981(a), 1981(b)). For all of the techniques a number of questions can be posed concerning their use as inputs towards hazard zone management.

First, how long is the historical record that is available for the site? For most parts of the New Zealand coast the historical record is relatively short and frequently there are considerable gaps between recordings. Kirk (1982) has pointed to some of the difficulties posed by this short information base: problems in making various data sources such as old maps, deposited survey plans and air photos strictly comparable and the errors which arise in the measurements; and the clustering of the available historical data from the 1930's onwards. As he notes, not only is the record short but it is also concentrated in the "near" end of our history. This situation forces coastal resource managers into making the most of the available information, prompting discretion and conservatism in any hazard zone delineation and associated planning controls.

Secondly, from an acknowledgement of the short historical record, a further question concerns the representativeness of that record for describing present and future situations, in other words, how good a descriptor is the record? This recognises the fact that there are often long time periods when recordings for sites (whether personal observation, air photo analysis, or wind and wave data) are unavailable. For example, at Wainui Beach, Gisborne five air photos taken over a 39 year period from 1942 to 1981 were used as a major input towards defining the hazard zone. A number of points can be made from this:

(i) five air photos only allows four inter-comparisons to be made, which is barely adequate or accurate as a descriptor of past and future shoreline states;
(ii) the historical record is very short; and
(iii) the time intervals between each photo run were unequal so it is difficult to estimate a net trend of shoreline change over the length of the historical record.

This last point has been recognised by Kirk (1982) who cites McLean (1978) as noting that in order to distinguish a realistic net trend (direction) of shoreline change it would be preferable to have a minimum of ten equi-spaced time periods for comparison (at decade intervals) over the total length of the historical record. Generally, however, this situation will not occur as illustrated by the Wainui Beach example.

This leads on to the third question concerning the accuracy of extrapolating past trends into the future to predict rates of shoreline change. Kirk (1982:14-17) has illustrated the difficulty in identifying shoreline trends, particularly the problem of distinguishing short-term fluctuations from longer-term sequences of erosion or accretion.

This has implications for management since an incorrect diagnosis of shoreline trends may result in inappropriate strategies being proposed or worse, implemented. It also raises for consideration the appropriateness of some of the existing management responses. The technique of coastal hazard zone mapping (Gibb, 1981(a), 1981(b)) has been accepted by the Soil Conservation and Rivers Control Council (now part of NWASCA) as being applicable nationwide. Gibb (1981(b):29) notes that the criteria for assessing the width of a hazard zone will differ from site to site, but factors to be considered include, inter alia,:

(i) long-term (about 100 years) erosion or accretion rate;
(ii) short-term (a few tens of years) fluctuations in the position of the shoreline; and
(iii) the likelihood of a reversal from net shoreline advance to net retreat in the future.
All of these factors would be difficult to unambiguously determine considering the problems of distinguishing the 'noise' of short-term changes from longer-term trends of erosion or accretion, and the third factor is probably speculative (Kirk, 1982).

Bearing in mind the limitations of the available historical data (the short record, and the representativeness of that record) the delineation of hazard zones using this technique raises two further points:

(i) how well does the information describe past trends?; and
(ii) how well does it represent the likely situation in the future?

Both of these points are significant since a hazard zone defined by this technique is shown as a "100 year predicted line" on district planning schemes, with associated planning controls being imposed. As Gibb (1981b:29) notes:

'...the landward extent of the hazard zone represents the line beyond which the shore line (seaward limit of land vegetation) is not expected to lie...Any development placed within the hazard zone during the next 100 years may be destroyed by coastal erosion.'

Having regard to the earlier discussion of the short-comings of the data-base available for most of the New Zealand coast, it is difficult to confidently place bounds on the width of a hazard zone from extrapolation of past trends and certainly not for a period 100 years hence.

The final question concerns the degree of confidence that can be placed on the available information sources for planning purposes. The usefulness of specifying time periods in delineating hazard zones is particularly contentious. It has been noted earlier that there is a meagre historical record to use as a guide when looking to the future, and this severely limits the confidence that can be placed on extrapolating too far forwards. Additionally, there may be legal implications in proposing a time period, particularly a period such as 100 years, since planning
periods are commonly 15 years and district schemes are meant to be reviewed every 5 years (Kirk, 1982). Also, regional planning schemes are required to be reviewed after 10 years.

Coasts are subject to a variety of hazards, not just erosion. Any techniques that seek to identify hazard zones need to account for this, and incorporate a wide range of factors when calculating the width of the zone. Information on the risk of seawater inundation, the height, bulk, and conformation of dunes, the effect of sea level change, an assessment of the overall sediment budget, and the effects of tectonic uplift will be appropriate considerations for particular sites - rarely is the measurement of erosion degree adequate for defining hazard zone widths.

Buffer zoning, set-back limits, coastal hazard zone mapping and other hazards identification techniques incorporate the above considerations to a greater or lesser extent in their calculations. It is conceivable that for a given situation, a different hazard zone may be delineated depending on the type of technique used, and the interpretation made of the information base (see for example, Kirk, 1982). For planning purposes this may pose an interesting problem for a local authority or planning tribunal, because, depending on the technique used and the interpretation made of the information sources, completely different hazard zone widths may be proposed. Assuming that due care and discretion have been exercised in defining the zone width, a planning or judicial body may find itself having to decide which technique, or perhaps combination of techniques, best defines the extent of the hazard zone. To date planning tribunals have not had to deal with this dilemma but it is realistic to expect them to have to face such a situation in future as more coastal communities have hazard zones delineated by one 'expert', and subsequently challenged by affected residents engaging another 'expert' who may define the hazard zone differently. It should also be noted that none of the techniques available have any legal force by themselves; the planning tribunals appear to have accepted the proposed hazard zones on the basis that they were
defined using adequate discretion and according to logical interpretations of the relevant information. Again, although there has not yet been a court case where a hazard zone defined by one method has been challenged by a different interpretation using another method it is bound to happen in future.

Finally, it is significant that none of the techniques presently used as management responses provide much positive assistance to existing coastal communities facing a hazard. Like much of the legislation relating to natural hazards, each of the techniques emphasizes limiting future development on inappropriate sites. To be fair none of the techniques claim to address this issue. However, it appears that such an omission is serious given the number of coastal communities presently and potentially threatened, the value of assets at risk, and the current 'management' approach of merely drawing lines on maps and designating the area within as a hazard zone, leaving the local authority and affected residents to cope as best they can.

5.2.3 The implementation and administration of hazard zones
Local authorities who must manage coastal hazard sites are increasingly accepting and endorsing, in part or in total, hazard zones defined by the various techniques. Appropriate planning controls are specified in district schemes to reflect the nature and extent of the threat and to reduce the number and value of human and physical assets at risk. However, these local authorities are treading a tight-ropes: on the one hand they have a statutory planning duty to avoid or minimise the effects of erosion, subsidence, and inundation but on the other hand they have to recognise and provide for the property rights of land owners. Planning controls for hazard sites may infringe upon those rights to a greater or lesser extent depending on the width of the hazard zone adopted and the manner in which the council administers the zone.

This balancing act is compounded by the fact that local authorities are mindful of possible claims for negligence if
they issue building permits and subsequent damage occurs. Although section 641A of the Local Government Act 1974 appears to exonerate councils from this possibility, it seems most are not tempting fate and are choosing to administer the hazard zones quite strictly when building permit applications are submitted.

The role of expert advice to councils is another important point. Ultimately planning decisions have to be made by the full council, but they are dependent on the advice given to them by their staff at officer level (such as planners, engineers, building inspectors) and any consultants they may engage. It is possible that a limited range of 'feasible' management approaches will be presented to the council so that decisions are made with a degree of 'tunnel vision'. This represents management on a very convenient basis since the council may select its preferred approach from those presented and feel that it has fulfilled its statutory planning duties, and at the same time believe that they do not need to initiate further investigation of alternative management approaches. Thus, the awareness of alternative adjustments may be confined to a narrow range; a range that could overlook adjustments more appropriate to managing the hazard.

Expert advice, whether from local authority staff or consultants, raises other considerations. Total rejection of expert advice could place a council in a vulnerable position if a claim for negligence is made at a later date since the council had been supplied with relevant information and had been made aware of the situation. Conversely, total acceptance of expert advice does not absolve a council from such claims either. Two situations make this view tenable:

(i) having endorsed the expert advice and established a hazard zone, a severe event removes more land than delineated by the zone; and

(ii) having endorsed the expert advice and established a hazard zone, erosion does not occur to the extent predicted. However, during this time
people have been denied used of their land through the strict planning controls imposed.

Having regard to these points, it is clear that councils should act with extreme caution when deciding on the type of hazards management response to be implemented.

In administering hazard zones sections 641 and 641A of the Local Government Act 1974 seem to offer some positive guides to councils in resolving the dilemma of meeting statutory duties as well as providing for individual property rights. This proposition poses some questions, however.

First, does use of section 641A allow councils to 'get their cake and eat it too'? This section provides councils with a discretionary power to issue building permits for relocatable buildings and appears to protect them from any subsequent liability claims. This implies that a council can gain rates from any new buildings constructed or additions, alterations that have been made, whilst meeting its statutory planning obligations, and providing for the individual rights of property owners all at the same time. The problems of who will move the relocatable buildings and to where during a storm or flood, and how this will be done are matters few councils appear to have considered.

Second, does approval of applications made under sections 641 and 641A release a council from any further need to investigate alternative means of managing the hazard? It appears that these two sections provide for the short- to medium-term use of land but do not place any onus on councils to study other types of responses or develop long-term management approaches. Adjustments to the hazard may be confined to a narrow set of alternatives that treat the symptoms of the problem without offering any suggestions for its resolution. This may be a convenient approach towards management but it means that responses are no more than containing actions rather than part of any overall plan.
This raises the question of the adequacy of the existing hazards legislation and administrative framework. No effort is being made to co-ordinate the various management approaches, whether it is use of the hazard zone identification techniques, planning controls, the legislation, or protective works into a coherent overall strategy that considers both the control of future inappropriate development and the management of existing hazard sites. Management efforts are therefore isolated, disjointed and look to the short- to medium-term: effectively 'fire-fighting' responses. There is a need to promote strategies that provide long-term guidance, address the issue of existing hazard problems, and encourage a wider awareness of alternative management approaches that decision-makers can consider.

A final point to consider is how useful are the current hazards responses for residents living inside designated hazard zones? The proposition is that the management approaches currently used are no more than a sophisticated 'do nothing' option for these people. None of the techniques used for defining hazard zones, legislation, or planning controls appear to address the particular needs of affected residents and none offer any positive assistance in preparing for the impact of severe events. It is unfortunate that the present emphasis on drawing lines on maps around hazard sites and calling these hazard zones is the extent of the management effort. Not only is this effort of little practical assistance for affected residents within the hazard zone, but it also clearly illustrates the narrow range of adjustments considered by decision-makers, planners and resource managers.

There are several reasons why it is urgent that this range be broadened. The first is that the number of existing sites threatened by coastal hazards has probably increased from the 90 identified by the Ministry of Works and Development in 1977; associated with this is the value of the assets threatened, both public and private. A third reason why the range needs to be widened concerns the moral
question: Does society walk away from these people and their needs believing that they should cope as best they can without any recourse to the taxpayer, Government or other groups for disaster aid?

5.2.4 The implications of current hazards strategies for affected residents

Principally the issues are:

(i) the costs and benefits of the strategy;
(ii) the usefulness of defining hazard zones; and
(iii) the restricted range of management approaches considered.

The benefits and costs of occupying a hazardous area are numerous. Baker (1976) notes that among the benefits are aesthetic or emotional attractiveness of the site, particularly to residential users, while the costs include loss of life, physical damage to property and buildings, psychological trauma, and environmental degradation when severe events occur. However, he emphasizes that these are only the primary costs; secondary costs result from the diversion of resources (financial, disaster aid by volunteers) from their primary goal because of the onset of a disaster. To date these secondary costs have been difficult to quantify.

In estimating the effects a land use management policy may have, several points require consideration:

(i) loss aversion;
(ii) environmental effects;
(iii) other secondary effects;
(iv) administrative costs;
(v) foregone benefits of hazard zone use; and
(vi) public acceptance (Baker, 1976).

Probably the most significant consideration in evaluating hazard zone management alternatives is the effect the strategy will have on losses from severe events (Baker, 1976; McDonald, 1980). The primary benefits from a land use management approach are reductions in losses, but such an
approach has little effect on protecting people and assets currently at risk. Rather they control the amount of future risk-exposed development (Baker, 1976).

In addition to averting losses, land use management can reduce environmental degradation by controlling the nature and types of activities and uses within the area. Environmental effects are just one aspect of what may be called the secondary effects of the adjustment. These are effects which are generated by the adjustment but were secondary to the motivation of hazard loss management; examples include diversion of economic growth and population redistribution (Baker, 1976).

Restrictive land use strategies also involve costs of implementing and administering the strategy. Principally this falls on the local authority who must not only define the area to be managed but also enact and enforce the relevant policy and ordinances of their district scheme.

For most land use alternatives the largest cost is the opportunity cost of not using the land for its most productive use, or expressed another way the use which maximises economic rent (Barlowe, 1972 in Baker, 1976). Some land uses are more profitable, giving a greater economic return, than others and if the 'higher' uses are precluded then the benefits foregone can be considered opportunity costs of restricted development (Baker, 1976).

The argument is that if an activity sought to locate in the hazard zone initially, it was because the site offered something more than it could get outside the area. Thus, if the activity is forced to locate at the next best location (outside the hazard zone) because of land use regulations, then the difference in profits to the activity from its location outside the area and what they would have been within the area must be considered a cost of the regulation (Baker, 1976). Against this, however, must be weighed the benefits of the aversion, and reduction of environmental degradation. Some researchers have attempted to estimate
opportunity costs associated with land use management (Lind, 1976; James, 1972) but accurate measurement of such costs are difficult to obtain.

Public acceptance of any management approach is important. Depending on the type of approach adopted and the manner in which it is implemented and administered, public acceptance or disapproval may be counted as either a benefit or cost. It would be difficult to quantify such reactions since it is most likely to be reflected by people's attitudes and behaviour towards the local authority, so that a subjective assessment will be required.

It has been noted that land use management has little effect on protecting people and assets currently at risk. This poses the question: Are zoning controls a zero-cost (do nothing) option?

Zoning in itself only restricts land uses, controls subdivision development, and buildings. Thus, most of the hazards management approaches that emphasize planning controls are not offering any suggestions about understanding the cause of the hazard, developing alternative management approaches, or what types of adjustments are relevant for existing hazard sites. Effectively, land use management places these sites in a 'freeze' situation since the planning controls restrict (often severely) what activities and uses are permitted, whilst little attempt is made to investigate adjustments that offer practical relief should a severe event occur. Considering that people within existing coastal hazard sites are not eligible for insurance cover for loss of use of land from either the insurance industry or the Earthquake and War Damage Commission, and are unlikely to receive compensation or be relocated by the local authority, the current management approach of defining hazard zones on maps and imposing planning controls appears to support the zero-cost option.
This promotes the suggestion that it would be timely to initiate study of a wider range of hazard adjustments apart from engineering works and land use management. Response to hazards is governed by two factors, one of which is an awareness of opportunities to make adjustments.

Alternative adjustments that deserve investigation are those that allow adaptation to losses (for example, by the availability of insurance), and adjustments that modify loss potential (such as funds for purchase of endangered property) (see Table II). Development of a wider range of strategies is advocated for a number of reasons. First, the problems raised by reliance on purely engineering 'solutions' such as cost effectiveness, environmental degradation, unanticipated side effects appear also to be occurring with the current emphasis on land use management (see for example, Withy and Henderson, 1982). Second, the above two approaches are unnecessarily restricting the choice of management approaches that decision-makers can select from so that the adopted response may not be the most appropriate; and third, given the number of present and potential coastal hazard sites and the value of assets at risk it is critical that a long-term, integrated hazard management approach be promoted; one that not only seeks to limit future development on inappropriate sites but also provides positive assistance for residents and communities already threatened by coastal hazards.

Thus, it is suggested that it is realistic, and perhaps urgent, to develop strategies that are applicable through time and which also increase the range of adjustments that decision-makers can consider.

5.3 SUMMARY

This chapter has drawn together all the issues raised in the preceding chapters and examined them under four categories. These were identified as:
(i) the range of management responses considered by decision-makers;
(ii) the types of techniques used to define hazard zones;
(iii) the implementation and administration of hazard zones; and
(iv) the implications of hazards responses for affected residents.

Each category prompted a number of related questions, problems and propositions which were discussed, but the dominant theme to emerge was that current management responses do not represent the full range of potential hazards adjustments. Although it is unrealistic to formulate an exhaustive range, it is possible to provide contributions that broaden the types of approaches decision-makers can consider, and therefore increase the opportunities for providing management responses appropriate and relevant to the hazard. This is a significant point because response to hazards is governed by two main factors; first, perception of the hazard, and second, an awareness of opportunities to make adjustments. Increasing that awareness, therefore, increases the possibility of developing an appropriate management approach.

Both the case-study of Wainui Beach and the review of the legal and institutional framework for coastal hazards management highlighted the problems posed by the present emphasis on mutually exclusive types of hazards responses. It was suggested that there would be merit in considering, and indeed there already appears statutory provision for, a wider range of management approaches that could provide positive assistance and assurance to existing and future coastal communities threatened by an erosion hazard. In addition, such alternatives should be complementary to other types of hazards responses. Thus, it would then be possible to propose a more comprehensive approach to hazard zone management that is relevant through time and across a number of theoretical adjustments.
Insurance offers one such alternative. The following chapter examines the role insurance could play as part of a management approach that promotes multiple adjustments to a hazard. Such a proposition offers the opportunity to resolve many of the issues and conflicts discussed in this chapter.
CHAPTER SIX

TOWARDS COMPREHENSIVE HAZARDS MANAGEMENT: THE ROLE OF INSURANCE

6.1 INTRODUCTION

The identification of the issues raised by current hazard zone management approaches is only one aspect of a multifaceted inquiry. Another aspect concerns the question of framing approaches that contribute towards resolving those issues whilst at the same time increasing the range of hazard adjustments for decision-makers to consider.

In response to this proposition, this chapter outlines the role insurance may play as an alternative hazards management approach. It is emphasized, however, that insurance is not seen as the definitive management approach. Rather, insurance is viewed as one of many possible hazards adjustments, and as a complement to both the engineering and planning responses.

6.2 INSURANCE AND PUBLIC POLICY

Insurance schemes are a formal method of spreading risk and basically have two fundamental characteristics:

(i) transferring or shifting risk from one individual to a group; and

(ii) sharing losses, by some means, among all members of the group (Vaughan and Elliot, 1978).

Hellberg (1984) contends that insurance can only cater for risks when the following features are present:

(i) there must be a sufficient number of risks of a similar class being insured so as to produce an average of loss experience;

(ii) it must be possible to calculate the chance of loss;
(iii) the occurrence of loss must be fortuitous;
(iv) there must be an insurable interest to protect; and
(v) the possible loss must not be catastrophic.

He notes further that it is possible by the law of large numbers or the law of averages to calculate what are the chances of an event or events happening and the amount that will be required to provide the common fund or pool to which the many contribute, and out of which those who suffer losses are compensated. However, he believes that there are some instances where insurance can not be provided, such as for landslip or erosion since the occurrence of loss may not be fortuitous.

This raises a matter of social policy, since it must be decided whether consideration must be given to the provision of compensation or indemnity for the victims of uninsurable events (Report of the Commission of Inquiry into the Abbotsford Landslip Disaster, 1980).

In considering whether it is desirable in principle that a comprehensive disaster insurance scheme should be established or extended, consideration must be given to several questions of policy and principle. First, it is necessary to decide whether what is envisaged is an insurance scheme, basically sharing the risk, or whether what is proposed is a form of social insurance, partly or fully charged upon the whole community, to cover some forms of material damage to real and personal property. Many implications will follow from this basic decision. If what is contemplated is a form of true insurance, then it is possible to extend the insurance scheme on to existing contracts provided that the scheme is based on economically viable premium rates and provided that there is a realistic connection between premium and risk, taking into account that if such insurance is voluntary, then the nature and extent of the premium pool necessary to meet claims must determine the premium amount (Report of the Commission of Inquiry into the Abbotsford Landslip Disaster, 1980).
However, if what is really envisaged is the assumption by the State of what would normally be an individual risk, and financial compensation for that risk (that is, a system of social insurance to compensate for material damage to property), then, subject to ordinary considerations of equity, it is appropriate that cover be extended on the basis of some universally applicable payment, most probably in the form of a tax. It may be possible though to propose a scheme which is a compromise between both extremes (Report of the Commission of Inquiry into the Abbotsford Landslip Disaster, 1980).

Any form of disaster insurance, or compensation scheme which is of an insurance nature rather than simply a government funded compensation scheme, should consider a number of conditions if equitable cover is to be provided. These conditions include:

(i) there must be a demand for the coverage, so that sufficient premium income on a large number of risks can bear the cost of individual claims;

(ii) there must be a spread of risks, by nature and location, so that no single event can cause a loss of such magnitude that it would eliminate the premium pool and its reserves;

(iii) the events covered must not be influenced or be capable of being influenced by deliberate actions on the part of the insured;

(iv) the frequency and magnitude of losses must be assessable;

(v) the circumstances of the occurrence must be capable of definition;

(vi) the amount of premium must be acceptable to the insured from the point of view of his capacity to pay; and

(vii) statistical data covering a sufficiently long period and over a sufficiently wide base should be available, if at all possible (Lester, 1980).

It would appear that insurance for some natural hazards, including loss of use of land caused by coastal erosion, has
to date been discounted as a possible management approach because of the possibility of catastrophic loss (Butler and Doessel, 1983). Kunreuther et al., (1978(a):244-245) also cite factors such as:

(i) adverse selection, since the demand for coverage is concentrated in relatively few areas;

(ii) moral hazard, that is the difficulty insurance companies have in distinguishing between avoidable and unavoidable risks when drawing up their insurance contracts;

(iii) the transaction costs incurred in developing customised premiums reflecting the situation faced by the individual property owner; and

(iv) the problem of externalities, or the effect that the location of structures in one area has on damage to other areas.

These are seen as major difficulties to the insurance industry in marketing hazards insurance.

These factors, according to Kunreuther et al., (1978(a)), explain why the economic system has not developed a more satisfactory set of markets for risk-bearing and insurance (see also, Marshall, 1974). This view was shared by Arrow (1963:947 in Kunreuther et al., 1978(a):246) who noted:

'when the market fails to achieve an optimal state, society will, to some extent at least, recognise the gap, and nonmarket social institutions will arise attempting to bridge it.'

The National Flood Insurance Programme enacted in the United States in 1968 is an excellent example of how social institutions have developed to overcome the sources of market failure (Kunreuther et al., 1978(a)). These authors noted that since the federal government [central government] subsidized rates, people were able to buy coverage at reasonable prices. In addition the subsidized rates eliminated the high transaction costs that would otherwise be required in setting customised rates for existing structures on floodplains. Rates on new property reflect the degree of flood risk; the property owner bears the cost
of determining the appropriate elevation of the house and this then forms the basis of his premium. A government reinsurance programme protected any participating insurance companies against catastrophic losses caused by the problem of adverse selection, and the enforcement of land-use regulations and building codes reduced the externalities associated with upstream development.

It was found, however, that although subsidized flood insurance was readily available, few individuals purchased coverage on a voluntary basis. In response, the Flood Disaster Protection Act was passed in 1973. This increased the incentives for flood-prone communities to participate in the programme and for residents of those areas to purchase flood insurance. An identified flood-prone community has the choice of participating in the programme or forfeiting federally subsidized flood insurance and all but emergency forms of assistance in the areas subject to severe flooding. In essence, the programme is now designed as a compulsory insurance scheme for flood plain management (Kunreuther et al., 1978(a)).

This last point is significant as it has been found that voluntary participation in a hazards insurance scheme is minimal, even if it is heavily subsidized (see Kunreuther, 1973; Bernstein, 1973 in Kunreuther et al., 1978(a)). The latter has stated that

'...most property owners do not buy insurance voluntarily, regardless of the amount of equity they have at stake... People do not buy insurance voluntarily unless there is pressure on them from one source or another' (Bernstein, 1973 in Kunreuther et al., 1978(a): 248).

From the preceding discussion, then, there is support for the view contained in the Report of the Commission of Inquiry into the Abbotsford Landslip Disaster (1980) that a national disaster insurance fund can only work if it is:

(i) compulsory and based on a properly calculated premium; or
(ii) heavily subsidized by the government; and
(iii) fully underwritten by the government as a virtual reinsurer of last resort.

It would appear that an insurance scheme for natural hazards is viable, and indeed already exists for some hazards as evidenced by the cover offered by the Earthquake and War Damage Commission.

There is also a useful model provided by the American Flood Insurance Programme which could be examined for its usefulness and applicability to New Zealand, particularly for the hazard of loss of use of land caused by coastal erosion since this is presently not covered by either the insurance industry or the Earthquake and War Damage Commission.

6.3 INSURANCE AND COASTAL HAZARD ZONE MANAGEMENT

A fundamental question that requires attention is: Why should there be any insurance provided for communities located on hazardous coastal sites?

There are a variety of disciplines within which it would be possible to seek arguments for and against insurance for a natural hazard. Clearly morals and ethics play a part since a philosophical base is implied in the question; economics, too, is another important element since it is possible to involve cost-benefit analysis, welfare economics, and economic philosophies spanning the spectrum from the free market at one extreme to the welfare state at the other with combinations of both between these extremes. Psychological considerations concerning uncertainty and reactions to stress are also significant aspects.

It is not proposed to examine these various disciplines in further detail, although this is not to denigrate the contribution they can make towards any hazards study. Rather, the diversity of specialised fields that could
provide relevant considerations indicates the complexity of the question posed. It also suggests that ultimately the answer to the question must be founded on the philosophical stance adopted by the individual or decision-maker, which should be made clear and explicit.

The proposition advanced in this study is that insurance for communities located on hazardous coastal sites is both desirable and feasible as a management approach. A number of points can be made in support of this view.

First, there is a need to recognize that in the past many coastal subdivisions were approved on sites which to the best available knowledge at the time appeared suitable. It has only been over time that these decisions have been proved wrong and subsequent problems have arisen whether because of unsuitable initial siting of developments, destruction of foreshore features such as dunes or vegetation, or because of poor regulation of activities such as sand and gravel mining from beaches. Whatever the cause of the hazard there are a significant (and increasing) number of existing developments faced with coastal hazards, which poses a critical management question.

A variety of options exist to approach the issue. As noted earlier in the study the traditional response has been to rely on the 'technological fix' syndrome, namely construction of protective works. Recently there has been a shift in emphasis towards use of land-use management, through planning controls in district schemes, for hazard zones defined by a variety of techniques. Another option, surprisingly frequently overlooked by decision-makers, is that of doing nothing. Le Marquand (1982) makes an interesting case for this option where the cost of 'protection' outweighs the value of the assets at risk. Yet another option is that of insurance, or adapting to the loss (see Table II). The previous section of this chapter has outlined the essential features of insurance, and shown how such a scheme has provided a formal means of relief for flood plain residents in the United States. It is relevant
to note that the United States programme integrates both present and future floodplain developments, and also integrates the programme with other hazards responses such as land-use management, building codes, and engineering works. Thus, the programme covers developments through time as well as complementing other management approaches.

A second point is that although in New Zealand there currently exists legislation limiting future development on hazardous sites (sections 641, 641A Local Government Act 1974), and a number of hazard zone delineation methods (Kirk, 1979(a); Gibb, 1981(a), 1981(b)), this does not mean that such sites, if developed, may not require protection or disaster relief at some later date. Insurance may, therefore, provide a useful management tool in association with other approaches.

An argument can be made that the availability of insurance would encourage people to locate in hazard-prone areas, knowing that if they suffer losses they are essentially benefitting at the taxpayer's (or insurance pool's) expense. However, Kunreuther et al. (1978(a)) suggested that individuals were likely to voluntarily purchase insurance only when they felt the hazard was a problem. Thus, promotion of hazard awareness amongst prospective property buyers was viewed as a significant input into the location decision. Additionally, promotion of the value of insurance and the consequences of the hazard were seen as likely to make people more cautious and responsible. In the New Zealand context, potential developers and subsequent purchasers of property within a hazard zone would become aware of the hazard potential when they viewed the relevant zoning in the district scheme, or certificate of title to the land.

Providing insurance for new developments also contributes towards a comprehensive approach to hazards management since it would integrate both existing and future developments, and is complementary to other adjustments, as shown on Table II, whether they involve engineering works or planning responses.
The final point forms the basis of the proposition advanced here. It is suggested that present management approaches do not adequately consider the needs of those communities presently faced with a coastal erosion hazard, and given the number of such sites and the value of assets at risk this poses a significant management issue.

Drawing lines on maps and designating these as hazard zones provides no positive assistance to these people if disaster strikes. In effect it seems that this type of management is nothing more than a sophisticated do nothing option. The question then becomes: Does society close its eyes to the problems faced by these communities and seek to ensure they do not re-occur in future developments? At present, the answer appears to be in the affirmative.

It is possible, however, to present a moral view that society should not walk away from these affected communities merely because improved knowledge and experience has shown such sites to be inappropriately located.

There is also a question as to whether the coastal hazard should be differentiated from other natural hazards, such as earthquakes, floods or landslip, for which insurance is available. As noted by the Report of the Commission of Inquiry into the Abbotsford Landslip Disaster (1980:159):

'Whether claims are paid or nor should not depend upon the fine distinction between different events of an essentially same character and with essentially similar physical and practical consequences. We do not think that it is equitable to distinguish between disaster situations which arise as a result of so called "Acts of God" and those that are attributable to "Acts of Man".'

This is significant because it is likely that a coastal community at some date will experience a 'coastal Abbotsford' (possibly this has already occurred to some extent at, for example Omokoroa promontory near Tauranga (see Gibb, 1979:20-21), parts of the Hawkes Bay coastline, and Raumati on Wellington's Kapiti coast). The causes of
such an event could conceivably be attributable to a combination of both an "Act of God" and an "Act of Man". However, the differentiation implied by the two terms suggests that the causes of a disaster are mutually exclusive. This would seem unlikely to be the case given the interdependence of most natural hazards which by definition involve an interaction between the natural events system and the human use system in such a manner that threatens or damages the latter system (see Kates, 1970:1).

From this two questions can be posed:

(i) if the present distinction remains, how will they be distinguished in a particular hazard situation?
and
(ii) what actions will be taken concerning relief and rehabilitation if either event results in loss of use of land?

On the basis of these points it seems reasonable to conclude that there is little rational basis upon which to draw a distinction between the coastal erosion hazard and other natural hazards.

There is an acceptance, then, that although it is important to benefit from past mistakes it is equally important to attempt to rectify existing problem areas if possible. Insurance offers one such method.

6.4 SUMMARY

This chapter has introduced the potential role that insurance could play as a hazards management approach. It was emphasized that it was neither the definitive solution nor was it a mutually exclusive approach. Rather it offers a contribution towards comprehensive coastal hazard zone management by integrating cover for both existing and future developments on hazardous sites, as well as providing a complement to other hazard responses.
A basic decision is necessary first, however. It is essential to decide whether what is envisaged is an insurance scheme, basically sharing the risk, or whether what is proposed is a form of social insurance, partly or fully charged upon the whole community. Many implications would follow from this choice.

It was noted that an insurance scheme for natural hazards would be viable if it was:

(i) compulsory and based on a properly calculated premium; or
(ii) heavily subsidized by the government; and
(iii) fully underwritten by the government as a virtual reinsurer of last resort.

The proposition was advanced that insurance for loss of use of land by coastal erosion is both desirable and feasible as a management approach. Three major reasons were raised in support of this view.

First, there appear to be an increasing number of existing communities faced with coastal hazards which threaten both private and public assets. These developments were approved at a time when the available knowledge of coastal processes and land-use management practices were minimal, and it has only been over time that such decisions were shown to be inappropriate.

Second, although there is legislation available to limit future development on hazardous sites, and a number of methods available to delineate hazard zones, this does not mean that such sites if developed may not require protection or disaster relief at some later date. The availability of insurance for future developments would provide communities with positive assistance and assurance should disaster strike, without encouraging development on hazard-prone sites.

Finally, it was suggested that a moral view could be presented that accepted that society should not walk away
from the problems faced by existing coastal hazard sites, and rely on the legislation to ensure future developments were more appropriately sited.

This raised a significant question concerning the present differentiation between the coastal erosion hazard, for which insurance cover is not available, and other natural hazards for which cover is available. It was noted that it did not appear equitable to distinguish between situations arising as a result of so called "Acts of God" and those attributable to "Acts of Man", particularly since there will probably be some mix of the two in any hazard event.

Arising from this proposition, two questions were posed:

(i) if the present distinction remains, how will they be distinguished in a particular hazard situation?

and

(ii) what actions will be taken concerning relief and rehabilitation if either event results in loss of use of land?

The likelihood of a coastal community experiencing a 'coastal Abbotsford' at some date would seem to make the above points an important consideration, and on this basis it was concluded that there was little rational base upon which to draw a distinction between the coastal erosion hazard and other natural hazards.

Insurance for loss of use of land caused by coastal erosion was therefore proposed as being both desirable and feasible as a management approach. The following chapter outlines a number of approaches that could be considered by decision-makers if insurance were available. This recognises that ultimately a decision on the type(s) of hazards adjustments adopted is a political decision, and that insurance is merely one of a number of possible responses that could be reviewed. It also recognises that decision-makers need to be aware of the various alternatives available for formulating management approaches if hazards responses are to be relevant and appropriate to the situation.
CHAPTER SEVEN

DEVELOPING ALTERNATIVE MANAGEMENT APPROACHES

7.1 INTRODUCTION

It has been suggested that there are a number of issues posed by current hazards management approaches (Chapter Five). Additionally, it has been noted that the recent shift in emphasis from an engineering response to a planning response for hazard zone management has not alleviated the situation faced by residents living in existing hazard sites. Insurance was suggested as one possible approach which might contribute towards comprehensive hazards management by integrating measures for both existing and future development on hazardous sites, as well as by providing a complement to other responses such as engineering works or land-use management.

This chapter further develops the idea of insurance as an alternative management approach. Specifically, for coastal hazard zones it is possible to identify five major parties with an interest in and/or duty for management. These parties are outlined, before discussing a variety of alternatives that could be adopted as hazard adjustments. Each alternative is presented and examined but no attempt is made to distinguish which should be adopted. This stance acknowledges that final decisions regarding the mix of hazard adjustments rest with political decision-makers, who should consider insurance as only one of a number of possible management approaches. Finally, an examination of the implications raised by insurance for hazards policy is made.
7.2 THE MAJOR PARTICIPANTS INVOLVED IN COASTAL HAZARD ZONE MANAGEMENT

Four major 'actors' can be identified as having an interest in and/or statutory duty for coastal hazards management. They are:

(i) the insurance industry;
(ii) Government agencies with a statutory duty and/or interest;
(iii) local authorities; and
(iv) affected residents.

7.2.1 The insurance industry

Kunreuther et al. (1978(a)) noted that the insurance industry found it difficult to offer hazards insurance for reasons such as adverse selection because of demand for cover being concentrated in relatively few areas, the possibility of moral hazard involving dishonest practices of the insured, and high transactions costs incurred in developing customised premiums.

These authors also believe that from a company's viewpoint the price charged for protection must be determined by the risk. If risks are interdependent, which is most likely in the case of a natural hazard, then an additional premium will be charged to reflect the potentially high loss from a major disaster. This extra cost will cover the cost of reinsurance (whereby a company spreads its portfolio of policies to ensure it spreads the risks) or the possible risk of bankruptcy. A further source of additional costs cited by these authors concerns the degree of uncertainty on the probability distribution and losses associated with the risk.

It appears that the reasons listed by Kunreuther et al. (1978(a):245), and noted in the preceding chapter, regarding the reluctance of the industry to provide hazards insurance applies in New Zealand in relation to cover for loss of use of land by coastal erosion. For example, Chung (1983) found that the insurance industry does not currently offer any
policies for such loss and did not anticipate doing so in the immediate future. However, the industry does provide cover for flooding and it may be possible to extend their policies to include loss of use of land caused by coastal erosion.

7.2.2 Government agencies

Principally these are the National Water and Soil Conservation Authority (NWASCA), the Soil Conservation and Rivers Control Council (SCRCC), and the Earthquake and War Damage Commission.

Following a recent amendment to the Soil Conservation and Rivers Control Act 1941, the functions and duties of the SCRCC have now been placed within the responsibilities of an enlarged NWASCA (see Soil and Water 20(2), 1984:27-36). It is therefore possible to deal with both of these organisations as a single entity.

The current NWASCA policy on natural hazards and limitations to land use was released in 1981, and its main points were outlined in Chapter Four. It would be possible to include the promotion of any insurance cover for loss of use of land caused by coastal hazards as part of this policy, particularly since the policy is largely orientated to limiting future development on hazardous sites without a similar emphasis on actions that could be taken for managing existing hazard sites.

Extending the NWASCA policy to include promotion of insurance cover would also support the view that not only should hazards management encompass present and future hazard sites, but also that insurance provides a complement to both the engineering and planning responses. This is significant because the current SCRCC policy for managing coastal erosion problems emphasises protective works as a favoured response whilst the present NWASCA policy on natural hazards places stress on land-use management through planning. Now that both policies come within the overall responsibility of NWASCA, it would appear that promoting
insurance as an additional policy is timely and provides opportunity for a more comprehensive management approach.

Further, there could be consideration given to integrating building code regulations into the hazards policies administered by NWASCA as it is important to acknowledge that what gets placed on top of land is equally as important as what makes up the land and the uses it is put to. Recently a review of planning and building controls was completed and it was suggested that a Building Industry Commission should be established to oversee the implementation and administration of a national building code (Office of the Review of Planning and Building Controls, The Treasury, 1984). Such a Commission could provide useful assistance in the drafting of additional sections to the relevant policy statements.

Cover afforded by the Earthquake and War Damage Commission has undergone revision recently and the perils now covered are earthquake, volcanic eruption and hydrothermal activity, and landslip (Earthquake and War Damage Regulations, 1984). As a national, government-guaranteed agency the Commission would appear a natural choice as the organisation that could provide cover for loss of use of land caused by coastal erosion. This view was proposed by the Commission of Inquiry into the Abbotsford Landslip Disaster (1980:160-161, 171), who recommended that such cover should be available on a compulsory basis to all landowners with premiums being collected through the local authority rating mechanism based on unimproved value of land. The main factor against the Commission providing such cover concerns the lack of sufficient funds to pay out on claims (Hellberg, 1984; Parr, 1984(b); Terry, 1984). If this problem were overcome the Commission could play a significant role, similar to that of the government-backed National Flood Insurance Programme in the United States, with much of the necessary expertise and administrative machinery already available.
7.2.3 Local authorities
The manner in which local authorities implement and administer controls for hazard zones is critical. It would be useful to initiate an educational campaign for affected residents to create an awareness of the hazard threat and its potential impact, as well as outlining the type(s) of management approaches adopted and the reasons for these. If insurance was one of the approaches endorsed, attention should be drawn to its availability and the relevant organisation to contact. Possibly all this information could be part of a 'hazard awareness kit' enclosed with the annual rate demand notice.

Additionally use of films and visual displays could be considered, particularly for use at public meetings held at, say, six month intervals. Presenting information in this way may increase memorability and imaginability enough to raise the subjective probability of the event above a person's critical threshold (Kunreuther et al., 1978(a)).

This last point is important since Kunreuther's study concluded that

'...people refuse to attend to or worry about events whose probability is below some threshold, the level of which may vary from individual to individual and from situation to situation' (Kunreuther et al., 1978(a):236).

The above conclusion becomes significant if insurance were part of any management approach adopted since it has been suggested that the two most important factors in predicting whether a person would purchase insurance were whether the hazard was considered to be a serious problem, and whether the person knew someone who had purchased cover (Kunreuther et al., 1978(a)).

As Saarinen (1982) notes the first of these factors seems to be related to hazard experience, and the second highlights the importance of the personal influence of friends or neighbours in the adoption process.
For an effective educational programme, however, Saarinen (1982) believes random distribution of information on hazards to the public is not enough. He contends that the educational effort should be part of a broader set of strategies whose elements should evolve over time and that could include land-use management approaches or incentives which reinforce environmentally sound behaviour. He also notes that because of the importance of personal influence from friends and neighbours and the need for feedback and encouragement, community action programmes involving face-to-face contact in meetings and small groups may be necessary for optimal results.

Sood (1982) takes up this view and suggests that communication for improved hazard awareness involves:

(i) using mass media to disseminate awareness messages and to provide news coverage of hazards;
(ii) conducting well-designed, on-going public information campaigns; and
(iii) involving members of vulnerable communities in the awareness effort.

A final point to be made is that the effectiveness of any public education campaign depends on the manner in which it is conducted (Saarinen, 1982). Thoughtful selection of the target audience is a basic first step, according to Saarinen (1982), since the strategies could differ for hazard zone occupants, the general public, and media representatives. Rather than broad generalities about the hazard, the focus should be on specific actions the audience can take, clearly presented in terms of local examples (Saarinen, 1982), and highlighting actions taken by the local authority and government organisations to provide management.

7.2.4 Affected coastal residents

It is particularly important that information concerning the nature and possible impacts of the hazard are available to coastal residents. Also it is essential than an educational programme, as outlined above, be conducted to create an awareness of the hazard and the management approach(es)
adopted so that residents become familiar with the reasons why particular actions have been taken, especially in relation to planning controls and protective works. Information concerning the availability of insurance could be disseminated by a number of organisations depending on the management approach taken. For example, the insurance industry could send out pamphlets advising that cover is available when they send out their premium notices. Alternatively, local authorities could inform residents by enclosing suitable pamphlets with the yearly or quarterly rate demand notice.

The influence of friends and neighbours has been cited as important regarding the dissemination of information, particularly for insurance availability and terms of a policy (Kunreuther et al., 1978(a):243). Thus, they are likely to play a vital role in influencing the decision process because they are viewed as accessible and reliable sources of information (Kunreuther et al., 1978(a)). It would be useful, then, to combine this informal type of information network with that of a formal type whether conducted by a local authority, government, or the insurance industry or even a combination of these.

7.3 ALTERNATIVE HAZARDS MANAGEMENT APPROACHES

From reviewing the major 'actors' involved in coastal hazard zone management it is possible to suggest a number of alternative management approaches based on insurance. As in the preceding chapter it is stressed that insurance is not viewed as the absolute solution nor is it a mutually exclusive approach. It offers opportunities, however, to provide management for existing and future hazardous sites as well as being complementary to other hazards responses whether they are structural or planning types. In this way insurance would provide a contribution towards a more comprehensive management approach.
There are four combinations that are examined as possible management alternatives. They are:

(i) cover offered by a government-private individual approach;
(ii) cover offered by a government-insurance industry approach;
(iii) cover offered by a government-local authority approach; and
(iv) cover offered by an insurance industry-private individual approach.

7.3.1 Government-private individual
This would involve extending the cover of the Earthquake and War Damage Commission to include loss of use of land caused by coastal erosion. In this approach the premiums for fire insurance, collected by the insurance industry, would probably need to increase. As presently occurs, a proportion of this money would be paid by the insurance companies to the Disaster and Landslip Fund administered by the Commission.

There are several advantages associated with this approach. First, it is government guaranteed so that any shortfalls in funds for claims could be met out of the Consolidated Fund (although it is likely the government would charge interest on its 'loan' to the Commission).

Second, the insurance industry merely acts as a go-between between individuals and the Commission without bearing responsibility for claims, or having to administer the programme. Additionally the industry does not bear the costs of finding other insurance companies willing to accept a share of the risk; that is, the industry does not have to reinsure the risk.

Thirdly, the insurance industry does not have to concern itself with the problem of adverse selection because even if demand for the cover is concentrated in relatively few areas it is the Earthquake and War Damage Commission, not the industry, who will seek to reinsure the risk. Thus, the
industry is protected against the problem of insufficient funds to meet a catastrophic loss.

A number of disadvantages can also be raised however.

Principally these centre around the ability to find and afford other insurers willing to act as reinsurers, and the need to draw on the Consolidated Fund should claims exceed the funds held by the Commission. This is a real possibility, as noted by Terry (1984). He stated that the Commission cannot afford any reinsurance cover after an extensive survey of the world market, and without this cover claims resulting from a major disaster [or series of disasters] which exceeded the Commission's $900 million fund must be met from the Consolidated Fund (see also, Anon, 1984(b):25).

The Earthquake and War Damage Act 1944 obliges the government to loan the Commission any additional money required to meet claims not covered by its fund (Terry, 1984). However, as Terry (1984) states, this means that ultimately the burden of funding reconstruction rests largely with the taxpayer.

A further disadvantage was also raised by Terry's article: alternatives to reinsurance such as a greatly increased Commission levy are unpopular and would not get government approval. (At present the Commission takes 5 cents per $100 of all money connected for fire insurance premiums.)

Parr (1984(b)) pointed out another problem with this approach. The compulsory nature of the programme and the uniform premium rate poses an equity issue. All parts of society are treated as of equal risk. He notes that critics argue that low risk areas are subsidizing areas of high risk because of this but acknowledges that field assessments of risk is a challenging task.

A final disadvantage, which holds for all approaches involving the Commission, concerns the liability of the
Commission. According to Parr (1984(b)) its liability is the lesser of:

(i) the sum insured; or

(ii) the indemnity value at the time of loss.

He notes that most liability payments are on the basis of the assessed indemnity value at the time of loss but the Earthquake and War Damage Act does not define indemnity value and a legal definition of the concept is difficult to find. Thus, he believes, coverage on the basis of indemnity value will not even come close to meeting the actual costs of restoration. Hellberg (1984) supports this view when he suggests that an accurate study of a maximum possible loss to the Commission must include influences such as inflation following the loss. He believes it is questionable whether claims will be settled in cash, based on an estimate of the cost of repairs, or whether claimants will prefer to wait until the actual cost of damage is known before agreeing to settlement. A further influence is the extent of any under-insurance (this was a major problem associated with the 1984 Invercargill floods; see Lind, 1984:20; Anon, 1984(a):25).

7.3.2 Government-insurance industry

In this approach the insurance industry would market cover for loss of use of land caused by coastal erosion but there would also be a measure of government involvement.

The government would subsidize premiums to make cover affordable and also to eliminate the high transactions costs that would be required if customised premiums had to be established for existing properties. Premiums on new developments would be set to reflect the degree of risk, which could be reduced by having the developments sited at a respectable distance back from the foredune. Use of the provisions contained in sections 641 or 641A, and 684 of the Local Government Act 1974 could assist in ensuring that both new and reconstructed assets were not located in immediate-risk areas.

A government reinsurance programme would protect any participating insurance firms against catastrophic losses
caused by the problem of adverse selection (Kunreuther et al., 1978(a)).

Land-use management, protective works, and building codes also have a role to play, especially since they assist in reducing the externalities associated with beach developments and in this way offset some of the potential losses. Thus, it could be a co-requisite of any insurance cover that, as appropriate, the community has a hazard zone designated with appropriate land-use management controls enforced, or engineering works constructed to protect assets; a combination of these two may also be appropriate in certain circumstances.

It would be important to encourage participation in this approach on a community basis rather than on an individual basis because without community oversight of developments, the efforts of some to reduce losses could be undermined by the careless building of others. However, before this the community must make a basic decision: Would the adoption of insurance and associated management measures benefit residents without imposing overly severe constraints on property rights? This question recognizes that community participation in this approach is a voluntary decision made by those most affected. Those communities that choose not to participate could forfeit the government-subsidized insurance and be reliant on emergency assistance and taxpayer generosity if disaster struck. For those communities choosing to participate, buying insurance would be compulsory as would adherence to any other management responses.

Much of the above has been adapted from the American flood insurance programme experience (see Kunreuther et al., 1978(a):246-247; Anon, 1984(c):4) and it is acknowledged that there is further work needed to assess its applicability not only to flood, but also to coastal hazards in the New Zealand context. It does provide, however, a useful starting point from which adaptations can be proposed.
There are considerable benefits associated with this approach. First, because the cover is offered by the insurance industry they will be able to use their marketing expertise to ensure the public is aware of its availability and perhaps emphasize the relatively low cost achieved by resort to government subsidization.

Second, government reinsurance would provide a back-up to the industry and eliminate the urgency to find other firms willing to take a share of the risk. Although it might be argued that this would mean the taxpayer ultimately pays out for any shortfall in a firm's fund, this is probably unlikely since firms will collect the premiums, retain some commission, and use the rest to invest or to add to the overall funds received from other policies. In this way the firm could build up adequate reserves to meet most claims.

A third advantage is that other hazards responses such as planning controls or engineering works are viewed as complements to insurance cover. By making the adoption of either or both of these other responses co-requisites to obtaining insurance it becomes possible to initiate multiple adjustments to a hazard and also provide management relevant to present and future developments.

Finally, community participation is strongly promoted. This allows for a unified approach towards management, giving it both purpose and direction. Additionally it recognizes that coastal hazards rarely affect isolated individuals - they are a beach-wide threat requiring beach-wide co-operation in management.

Perhaps the greatest barrier to this approach, however, is the assumption that a government will consent to subsidizing premiums and also act as a reinsurer. Financial and political realities may preclude this. Before any decision is made, though, the government would have to consider the benefits of providing both these services, particularly since under the present situation there is considerable local and national pressure to provide relief and emergency
assistance after disasters have struck. It might be more cost-effective for the government to provide subsidized premiums and reinsurance than to totally meet by itself the financial and material demands currently made after a disaster.

Another potential problem concerns the voluntary nature of the approach. If the community has decided not to participate there is little that can be done to try and reverse that decision even if it is patently clear to local authorities or government organisations that a particular community is threatened by a major hazard. Democracy stresses that people have the right to freely choose. The problem becomes, then, whether that choice should be biased so that people will select a particular option. Possibly there is a need to fairly emphasize the benefits of participating as well as the costs of non-participation, through a media campaign, and then leave people to decide as they will.

There appear to be few other disadvantages with this approach and it merits further study and consideration by decision-makers.

7.3.3 Government-local authority
Essentially this approach follows that set out in the Report of the Commission of Inquiry into the Abbotsford Landslip Disaster (1980:160-163) where they discussed insurance for loss of use of land.

The cover afforded by the Earthquake and War Damage Act Commission would be extended to include loss of use of land caused by coastal erosion, claims arising when a landowner has been effectively and permanently deprived of the use of his land. Use, according to the Commission's Report, means use for a purpose.

The Report also noted that:

(i) the maximum level of payment should be the unimproved value of the land of which use is lost,
calculated at its value on the day before the date of loss; and

(ii) payment should be made only in respect of loss, which means effective and permanent deprivation of use. Damage, therefore, is not compensable (Report of the Commission of Inquiry into the Abbotsford Landslip Disaster, 1980:161).

Premiums would be collected by local authorities as part of the annual rate demand, and passed on to the Earthquake and War Damage Commission. This would be based on the unimproved value of the owners' land, and the Report suggested that an annual premium of 2 cents for each $100 of unimproved value should be charged. It was also suggested that the premium should be reviewed after three years in the light of claims made to the Commission.

Although cover for loss of use of land could arguably be a voluntary scheme, a compulsory scheme is seen as being more useful (Report of the Commission of Inquiry into the Abbotsford Landslip Disaster, 1980:179). This acknowledges that loss of use caused by coastal erosion is only one of a number of perils to be covered, so that whilst inland residents might not experience coastal erosion, coastal residents might not be threatened by say, hydrothermal activity.

The main advantage of this approach is that the necessary expertise and administrative machinery is already available, so that establishment costs would be substantially reduced. Further, the premium to be charged is relatively low and is likely to be acceptable to both the public and government, whilst providing much needed funds to the Commission to cover its added responsibility.

Another benefit is that it would bring coastal hazards into line with other natural hazards covered by insurance, whether by the Earthquake and War Damage Commission or the insurance industry. To date there has been a differentiation between hazards such as storms and floods, volcanic
eruptions, landslip (all covered by insurance) and coastal erosion (not covered); this is a significant omission, particularly for existing communities threatened by a coastal erosion hazard since they are unable to obtain insurance cover and must rely on the goodwill of the taxpayer in the form of relief and disaster funds. Thus, the formal incorporation of coastal hazards into an insurance scheme would provide positive assurance and assistance for these communities if disaster strikes.

The compulsory nature of the cover could be cited as a disadvantage. As noted earlier Parr (1984(b)) has pointed out that critics believe a compulsory scheme forces people in low risk areas to subsidize those living in high risk areas. This can be countered by pointing out that natural hazards do not discriminate according to any boundaries, social, political or geographical. Low risk, infrequent events may be of a catastrophic nature when they do occur and may wreak more damage, physically and psychologically, because people's awareness of the hazard has been dulled over time. In contrast, people living in high risk areas are likely to be more aware of the hazard and its implications and be receptive to mitigative measures.

There is also evidence that despite the availability of subsidized insurance, few individuals have been interested in purchasing cover on a voluntary basis (Kunreuther et al., 1978(a):246-247). In the United States this was a major reason for the introduction of the Flood Disaster Protection Act of 1973 which increased the incentives for flood-prone communities to participate in the flood insurance programme and for residents of those areas to purchase cover (Kunreuther et al., 1978(a):247).

As with the previous approach, then, it is suggested that further development of this option, and examination of its implications is merited.
7.3.4 Insurance industry—private individual

This would follow the procedure currently used by the industry to market cover for storm and flood damage. Companies would send out notices with annual premium demands for ordinary household and contents cover to inform people that insurance was available for loss of use of land, including loss caused by coastal erosion. It would then be up to individuals to decide whether they should follow this up and purchase cover. It would be expected that an active promotional and marketing campaign would be part of this approach.

From the companies' viewpoint the premium must be determined by the risk. As Kunreuther et al. (1978(a)) note the actual rate will normally be higher than the pure loss premium for several reasons. First, there are costs associated with establishing the rate to be charged, and servicing the policies (transaction costs). Second, if risks are interdependent as is probable in the case of a natural hazard, an additional premium will be charged to reflect the potentially high loss from a major disaster. This extra charge will cover the cost of reinsurance or the possible risk of bankruptcy. A further source of additional costs noted by these authors concerns the degree of certainty that loss will occur and the costs of settling claims subsequently made (a form of adverse selection).

All of these costs may result in the premiums being too high for people to afford, and uptake of cover being minimal. In this event companies may find it more profitable to withdraw such cover and either offer insurance for other matters or choose to invest their funds.

Other potential problems identified by Kunreuther's study (1978(a)) concern moral hazard and externalities. Moral hazard refers to the difficulty companies could have in distinguishing between avoidable and unavoidable risks in drawing up their insurance contracts. For example, a person with cover may deliberately move old appliances to areas where they will be damaged and then claim for this. To
minimize this problem insurance companies would need to specify a certain excess (whereby the insured pays the first amount of any claim) for policies.

Externalities refers to the actions of others that affect people who had no part in initiating that action. Thus, groynes on one part of a beach could impose externalities on others along the beach by restricting longshore movement of material and causing erosion problems. Determining the effect of externalities for the purpose of setting premiums would be difficult to quantify and pose administrative problems because the effect of the externality could vary from one location to the next along the beach, and possibly over time.

Further, it is likely that companies would not offer cover for loss of use of land unless it were part of an industry-wide approach. This is asserted because no one company or number of companies could afford to bear all the costs of administering such a policy or afford to settle claims if disaster struck. Reinsurance, for example, would be difficult to obtain since other companies would be reluctant to accept part of the risk. It is clear, then, that if such insurance were available it would have to be on an industry-wide basis.

The recent transfer of storm and flood cover from the Earthquake and War Damage Commission to the insurance industry presents an excellent opportunity to observe the viability of natural hazards cover by the private sector. It will be both interesting and relevant to study whether the public will actively support such a move through their purchase of policies, and the manner in which the industry administers the programme as well as the amounts it pays out for claims. Such observations would assist in framing up approaches for insurance for loss of use of land.
7.4 THE IMPLICATIONS OF INSURANCE FOR COASTAL HAZARDS POLICY

Although a number of alternative management approaches based on insurance have been outlined, it is possible to generalize the implications of such alternatives for coastal hazards policy.

As has been stressed previously insurance is not seen as the absolute solution for hazards management. It does offer, however, opportunity to manage both existing and future developments on hazardous sites by providing a formal means of sharing the loss should disaster strike. For existing communities threatened by coastal hazards this is significant since at present they are not able to obtain such cover and must rely on civil defence and taxpayer generosity if disaster strikes. No doubt these would continue to apply if insurance were available, but the distinct difference is that insurance would assist in the long-term recovery of communities and its residents once the peak of the disaster has passed.

The availability of insurance is not seen as encouraging future development on inappropriate sites. Use of sections 641, 641A and 684 of the Local Government Act 1974, and relevant sections of the Town and Country Planning Act 1977, concerning the siting of developments support this view. Further the increasing acceptance and use of hazard zone identification methods and associated controls in planning schemes give additional weight to this belief. A national building code, if adopted, would also assist in ensuring future developments were prudently sited. It also acknowledges the need to consider the related factors of

(i) land structure, geology and processes affecting these;

(ii) the siting of developments; and

(iii) the type of structure permitted and the standards it must meet.
Use of singular hazards responses, whether of an engineering or planning type, have not provided satisfactory results in many instances. Although this does not mean such responses by themselves are not appropriate in some cases, it would be useful to consider alternatives that complement these approaches. Insurance is one such alternative. In this manner it becomes possible to promote multiple adjustments to a hazard and offers a more co-ordinated approach that integrates short- and long-term management.

The policies of NWASCA and the SCRCC for natural hazards could be expanded to include the above view. For example, the existing policy on natural hazards and limitations to land-use (NWASCO, 1982) could include an additional statement to the effect that investigation and promotion of alternative hazards responses by local and central government agencies should be made before a finalised management approach is adopted. Such alternatives may involve a combination of responses if appropriate.

Depending upon which of the insurance approaches previously outlined was adopted, the insertion of an additional policy statement may be a compulsory matter. Adoption of a government-insurance industry approach or government-local authority approach, for instance, could make the insertion and implementation of such a statement a condition of government consent to endorse the approach.

Whatever approach(es) may be finally adopted it is stressed that insurance offers an excellent opportunity for decision-makers to consider a wider range of possible hazards responses and for a more comprehensive method of management.

7.5 SUMMARY

The major participants involved in coastal hazard zone management were identified; these were:

(i) the insurance industry;

(ii) Government agencies with a statutory duty and/or interest;
(iii) local authorities; and
(iv) affected residents.

For each participant the manner in which they were involved was outlined as well as ways in which they could contribute towards improved management approaches.

This led on to a discussion of four different management alternatives based on combinations of the above participants, using insurance as the key factor. These alternatives were:

(i) cover offered by a government-private individual;
(ii) cover offered by a government-insurance industry;
(iii) cover offered by a government-local authority; and
(iv) cover offered by the insurance industry-private individual.

The implications of insurance for coastal hazards policy were then examined. It was emphasized that insurance was not the definitive management solution but it does offer opportunity to manage both existing and future developments on hazardous sites as well as being complementary to other responses that may be considered. In this way it increases the choices open to decision-makers when considering appropriate strategies to adopt and provides a co-ordinated approach to short- and long-term coastal hazard zone management.

To end, the final chapter reviews the findings of the study and presents conclusions.
CHAPTER EIGHT

CONCLUSIONS

The objective of this study was to examine the issues, conflicts and implications posed by the current management approaches for existing and potential hazard sites, and to develop alternative approaches which would assist in resolving the identified problems.

The study has achieved this objective by firstly outlining and discussing the key issues raised by the present management responses for coastal communities threatened by an erosion hazard. From this critical examination of the major issues a number of alternative management approaches, based on insurance, were developed. The alternatives proposed would be relevant to both existing and future coastal hazard sites as well as being complementary to other hazards responses adopted. In this manner the study has provided a useful contribution towards the resolution of the matters raised, and has pointed to the potential benefits of a more integrated approach to coastal hazards management.

Two major reasons were identified why this study would be relevant and timely. First, it was suggested that current coastal hazard zone management approaches do not provide positive assistance or assurance to residents living within identified hazard areas should a severe event strike. Considering the number of sites around the New Zealand coast presently faced with a coastal erosion hazard, threatening valuable public and private assets, this poses a significant management issue.

The second major reason concerned the proposition that although promotion of hazard area delineation techniques and relevant legislation are eminently useful in limiting future development on hazardous sites, their use poses particular problems. Principally these include the implementation, administration and associated implications for local authorities and affected residents.
In utilising both the delineation techniques and the provisions of the relevant legislation, there has been a shift in emphasis from reliance on a 'technological fix' approach to one of land-use management using planning controls. However, many of the problems posed by the technological approach, such as cost effectiveness and unanticipated side effects, have re-emerged with the current commitment to a planning response. This was clearly illustrated by the findings of the case-study on Wainui Beach, Gisborne.

As a contribution towards resolving some of the conflicts and issues raised by present management approaches it was suggested that it would be useful to broaden the range of alternatives available for decision-makers to consider. Insurance was proposed as one such alternative.

Insurance for loss of use of land caused by coastal erosion was suggested as a management approach that could encompass both existing and future hazard sites as well as providing a complement to other hazards responses, whether they are of a technological or planning nature. In this manner it would become possible to propose hazard adjustments applicable through time and also across a range of approaches. The adoption of such a suggestion would also bring the coastal erosion hazard into line with other hazards presently covered by insurance, offering the opportunity of providing a more comprehensive approach to natural hazards management.

This study has also raised some general points concerning the relation between the theoretical aspects of natural hazards research and the types of coastal hazards responses adopted in New Zealand.

It has been noted that response to natural hazards is influenced by two major factors. The first is perception of the hazard. For both communities and individuals threatened by a hazard perception of the impacts of a severe event may vary according to many factors, such as hazard frequency, personal experience of a hazard event, or threat to personal
assets. The second major influence governing hazards response concerns the awareness of opportunities to make adjustments. Thus, if decision-makers are aware of a wider range of possible adjustments, it is likely they will formulate management approaches that are more appropriate to the situation. This could involve the use of a combination of hazards adjustments at the same time if it is deemed desirable.

In New Zealand there has been a recent shift in emphasis from reliance on a purely technical type of hazards response to one of relying on land-use management, and particularly planning controls. Whilst use of singular management approaches are appropriate in certain circumstances, this study has pointed to many of the problems associated with this type of management approach. Of special significance is the suggestion that the limited investigation and consideration of alternative hazards responses has meant that decision-makers are reviewing a restricted range of adjustments based on either an engineering or planning approach. Thus, management responses are being constrained since decision-makers are not considering a wider range of possible hazards adjustments that could be implemented. This is a particularly important point since it appears that the current hazards approaches tend to be more suited towards ensuring future development on hazardous sites does not occur. For existing coastal communities threatened by an erosion hazard, however, the approaches do not seem to offer any positive assistance or assurance should a severe event strike.

The relevant hazards legislation enacted in New Zealand and the policies of administering agencies also emphasize restricting future development on inappropriate sites. When viewed together, however, the legislation appears to provide statutory opportunity for agencies to consider implementing multiple hazard adjustments, based on a combination of technical and planning responses. Such adjustments could be used for managing both existing and future hazard sites.
Thus, the legislation provides decision-makers with the statutory discretion to review the majority of adjustments suggested by the hazards theory. These adjustments include those that modify loss potential (by for instance, planning controls), those that modify the hazard (through say, protective works), and those that affect the cause of the hazard (by influencing activities or location in the hazard area). The only adjustment that decision-makers have not seemed to consider is that of adapting to the loss, through insurance or relief and rehabilitation measures.

Adapting to losses is an important omission because it is the only adjustment that deals explicitly with the implications of the post hazard-event phase. All the other adjustments seek to reduce people's vulnerability to the hazard event, whether in response to previous damage or to reduce the impacts of future potential damage, without suggesting measures that could assist in the long-term reconstruction of community and individual well-being. In view of the number of existing and potential hazard sites on the New Zealand coast, and the value of assets at risk, it would be timely to incorporate this type of adjustment along with those already considered by decision-makers.

Thus, it appears that one deficiency of the present coastal hazards management approach in New Zealand is the limited range of adjustments being implemented. As noted above this is disturbing considering the number of sites that are presently, or may in future be, threatened by an erosion hazard.

A further deficiency concerns the types of policies adopted by the hazards management agencies. These policies tend to stress mutually exclusive approaches despite the apparent opportunity provided by the relevant statutes to utilise a combination of adjustments. A better appreciation of this opportunity, reflected in an agencies' policy statements, would give decision-makers explicit discretion to consider a wider range of management responses.
To address these deficiencies further work could usefully be done on a number of topics.

It appears that there is a large gap between the findings generated by natural hazards researchers and translating these findings into effective public policy (Olson and Nilson, 1982). Study of ways in which this gap could be narrowed would be particularly relevant given the increasing number of disciplines involved in natural hazards research, and the degree to which private versus public interest need to be reconciled when formulating hazards policy.

This raises another topic that could be usefully researched - the relevancy and significance of national policies on natural hazards at the local level. This suggestion recognizes that in some instances a general policy may not provide much useful guidance to those agencies charged with the day-to-day planning and management for hazard areas, so that although the policy statements purport to provide a set of guidelines for local authorities to use the very broad objectives contained in such statements might not be of much assistance at the local council or catchment board decision-making level.

A further topic, associated with the above suggestion, concerns the desirability of promoting a wider consideration of management approaches as part of any policy on natural hazards. It would be useful to provide decision-makers with flexibility when choosing among management approaches, and this would depend on technical staff being encouraged to investigate a wider range of approaches than is currently provided for in the NWASCA hazards policy. The development of other hazards adjustments additional to engineering works, planning controls, and insurance is advocated, particularly in view of the suggestion that response to natural hazards is influenced to a large degree by an awareness of alternative strategies.

The present study developed four alternative management approaches based on insurance. It would be relevant to
study further the economic implications of establishing each alternative, as well as the manner in which each could be translated into public policy. There are not only costs and benefits associated with each option, but also there are a number of different policy types available to administer the options. Nilson and Olson (1982), for example, have identified four different policy types, each with different implications.

Finally, this study has identified issues, conflicts, and associated implications of the present hazards management approaches and developed a number of options that address those matters. On the basis of the points raised, consideration and debate of the alternatives presented would seem appropriate in view of the opportunity insurance could provide as a contribution towards comprehensive coastal hazard zone management.

So then, beach, bluff, and wave, farewell!
I bear with me
No token stone nor glittering shell,
But long and oft shall Memory tell
Of this brief thoughtful hour of musing by the Sea.

John Greenleaf Whittier: "Hampton Beach"
ACKNOWLEDGEMENTS

This study would not have been completed without the co-operation, assistance, and interest of a large number of people. I would like to take this opportunity to express my appreciation to these people for their time and efforts.

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Valuation Department, Gisborne District Office (1984): Valuation Files for Wainui Beach, Gisborne.


APPENDIX I

CASES CITED
CASES CITED

Cases cited in this study are referenced according to the conventional legal notation. Accordingly, the format for cases is:

year. title of publication where the case is reported. page number where case starts.

For example: [1971]2 NZLR 106 means that the case is reported in the 1971 copy of the New Zealand Law Reports (volume 2), starting at page 106.

The following abbreviations have been used for cases cited:

All ER - The All England Law Reports
NZLR - The New Zealand Law Reports
NZTPA - New Zealand Town Planning Appeals

Anns v London Borough of Merton [1977]2 All ER 492.
Dutton v Bognor Regis Urban District Council [1971]2 All ER 1003
[1972]1 All ER 462
Fellowes v Rother District Council [1983]1 All ER 513
Hope v Manukau City Council [1976] New Zealand Recent Law 324
Junior Books Ltd v Veitchi Co. Ltd [1982]3 All ER 201.
Mount Albert Borough Council v Johnson [1979]2 NZLR 234
[1980] New Zealand Recent Law 35
Pirelli General Cable Works Ltd v Oscar Faber and Partners [1983]1 All ER 65
Southland County Council v Southland County Council (1981) 8 NZTPA 61
APPENDIX II

PLANNING MAPS FOR THE
WAINUI BEACH EROSION HAZARD AREA

Source: Cook County Council (1982)
### KEY TO MAPS

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**PUBLIC WORKS**

- C 116: PUBLIC WORKS OF THE CROWN
- GC 209: PUBLIC WORKS OF THE GISBORNE CITY COUNCIL
- CC 308: PUBLIC WORKS OF THE COOK COUNTY COUNCIL
- FS 402: PUBLIC WORKS OF THE NEW ZEALAND FIRE SERVICE
- PD 501: PUBLIC WORKS OF THE EAST COAST PEST DESTRUCTION BOARD
- PB 601: PUBLIC WORKS OF THE POVERTY BAY ELECTRIC POWER BOARD

**SPECIFICALLY IDENTIFIED COMMUNITY USES**

- 101: CHURCHES
- 203: HALLS
- 306: MARAE
- 404: PRIVATE RECREATION FACILITIES
- 507: SHOWGROUNDS
- 601: RACECOURSE
- 701: SALEYARDS

**RESERVES**

- R 42: RESERVES CONTROLLED BY THE COOK COUNTY COUNCIL
- R 107: RESERVES CONTROLLED BY THE CROWN
- R 212: RESERVES CONTROLLED BY OTHER BODIES
- R 301: GAZETTED WALKWAYS

**AREAS OF SPECIAL VALUE**

**ROADS**

- CATEGORY A ROADS
- EXISTING ROADS (For Zoning See 5.2.1.)
- PROPOSED ROADS
- MAIN TRAFFIC ROUTES
- LIMITED ACCESS ROADS

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**COOK COUNTY DISTRICT PLANNING SCHEME**

**PROPOSED REVIEW No. 1**