

**Public participation:  
its role in the management of  
the Waimakariri floodplain**

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## SUMMARY

### 1 Background

Despite increasing investment in flood protection works over time in New Zealand the costs of flood damage have continued to rise (Fig. 1.1). Research into this phenomenon resulted in the National Water and Soil Conservation Authority's (NWASCA) 'Urban Flood Loss Reduction Policy' which was released in November 1984. Underlying the policy was the understanding that instead of solely 'keeping water away from people', as much attention should be paid to 'keeping people away from water'.

This policy change has necessitated a different approach to floodplain management. The Urban Flood Loss Reduction Policy under which approvals are now granted requires the consideration of three broad classes of adjustment options available for flood hazard response. These classes are:

- i. **modification of the flood**, which includes stopbanks, channel improvements, catchment treatment and detention dams;
- ii. **modification of damage susceptibility**, which can include land use management mechanisms such as zoning, building regulations, land acquisition, and floodplain development policies and plans;
- iii. **modification of the flood loss burden**; included in this class is insurance, relief funds, and rehabilitation services.

The Waimakariri River Improvement Scheme 1960 is scheduled for completion in 1989. The approach to the flood hazard posed by the Waimakariri for the next 30 years (1990-2020) is at present being considered. National funding for the project development was approved in terms of the Unified Flood Loss Reduction Policy.

Under existing economic policies the Government has significantly reduced the funds that it will make available to catchment boards for floodplain management. In the future, those who benefit from floodplain management are expected to bear the costs in direct proportion to the benefits that they obtain.

Consequently, the North Canterbury Catchment Board will now need to know what risks the community is prepared to accept and what risks it wishes to pay to have mitigated. Whereas in the past the design of flood protection schemes was a technical matter from which the public was largely excluded, present design demands that the process deal explicitly with both **statistical risk** and **perceived risk**.

### 2 Why participate?

There is a significant divergence between statistical perceptions of risk held by technical personnel and the popular perceptions held by non-expert floodplain occupants. Experts are interested in predicting the probability of a natural event occurring and providing protection from large infrequent events.

In contrast, lay perception of flooding is more complex. The major factors that appear to influence this perception are:

- i. knowledge and past experience of the event;
- ii. interpretation of various physical characteristics of the hazard, including flood magnitude and frequency;
- iii. geographical situation of the floodplain occupant;
- iv. personality traits, for example, attitudes to nature, fate, God.

### **3 Who should participate?**

A proportionate equality model of public participation was used to determine who should participate in the floodplain management decision-making process. One important assumption underlying the model was that New Zealand is a pluralist society. In pluralist theory, democracy can be defined as political equality in the making of political decisions.

The model requires that individuals be treated differently from one another depending on the degree of immediacy of their interests. Political equality is seen to be achieved when persons or groups have an equally large degree of influence over immediate issues such as those affecting their locality or occupation and an equally small degree in less immediate issues.

A broad range of groups likely to be affected by floodplain management was identified. These include:

- i. those who live, work and/or own property (ratepayers) on the Waimakariri floodplain,
- ii. those who do not live, work or own property on the floodplain but rely on Christchurch as a service centre,
- iii. recreational,
- iv. environmental,
- v. Maori cultural and spiritual,
- vi. future generations.

### **4 Where to participate?**

Opportunities for participation were examined both in the electing of representatives on to decision-making bodies and in the Waimakariri Floodplain Management Plan decision-making process per se.

Broad residential, commercial and farming interests will be represented in a general way in the new regional decision making structures. Maori participation in local and regional decision-making structures is being considered by the Government at present during the local government and



resource management law reforms (Ministry for the Environment, a, p.24). Environmental and recreational interests and the needs of future generations may not be explicitly represented.

A model of the floodplain management decision-making process was used to determine where opportunities for participation might exist. Components of this process were:

- i. Awareness or conviction that a problem exists, that is, floodplain occupants need to cross a flood hazard perception threshold before they can respond to planning initiatives.
- ii. A search for adjustment options to address the flood problem (for example, stopbanks, flood hazard maps, floodproofing).
- iii. The choosing of decision criteria upon which adjustment options are considered.

There has been no opportunity for public participation in the problem definition (that is, crossing the risk perception threshold) and search for options stages of the Waimakariri Floodplain Management Plan decision-making process. This was carried out by technical experts.

Opportunities have been offered to ratepayers living on the Waimakariri floodplain. Opportunities for other affected interests to participate have not occurred to date.

## 5. How to participate?

A number of participatory techniques were examined, including surveys, a Floodplain Management Liaison Group, a community advisory group, charrettes, pamphlets and newsletters, and public meetings.

A random survey was carried out of ratepayers on the Waimakariri floodplain. The survey report appears as a companion publication by the same author (Blackford, 1989).

## 6. Conclusions

A hiatus in risk perception exists between technical experts and lay floodplain occupants. A one-way flow of information is not sufficient to overcome this divergence. Public perceptions of risk must be incorporated into the Waimakariri Floodplain Management Plan before the Urban Flood Loss Reduction Policy can be successfully implemented. Support for flood protection works relies on the public's perception of risk and their willingness-to-pay for protection from that risk.

Because there was no public participation at the stage of defining the problem, nor in the selection of design criteria, it is difficult to anticipate the degree of public acceptance of the Waimakariri Floodplain Management Plan that could be expected.

The success of a public participation exercise will largely depend on how representative of the floodplain community are the interest groups that are invited to participate in the decision-making process.

## **7. Recommendations**

- i. The establishment of a community advisory committee would provide a satisfactory vehicle for enabling a wide range of community perceptions of risk to be incorporated into the decision-making process. Such a committee could have representation on a Floodplain Management Liaison Group.
- ii. The problem definition should be reconsidered with the public's perception of risk incorporated. The public would need to cross the threshold of risk perception before this could take place satisfactorily.

## **8. Future investigations**

Floodplain occupants may still be constrained by other factors from responding in a rational manner to floodplain planning policies. These factors can be demographic, economic, political, social, geographic or historical.

Perceptions of risk held by members of the planning profession might need to be examined. It is crucial that they also understand the implications of planning for events with specific frequencies and magnitudes.

## CHAPTER 1 Background to the problem area

### 1.1 Introduction

Despite increasing investment in flood protection works over time, New Zealand's flood loss costs have continued to rise (see Fig. 1.1). Annual investment in flood protection since 1970 has been between \$40 and \$50 million, on average. Yet since 1968, national flood losses have reached \$1.5 billion.

In 1977 the National Water and Soil Conservation Authority (NWSCA) commissioned Dr Neil Ericksen, Geography Department, Waikato University, to undertake a research project entitled "Urban floodplain occupancy: a unified flood loss reducing policy for New Zealand". Recommendations contained in Ericksen's report were presented to the Authority and formed the basis for NWASCA's 'Urban Flood Loss Reduction Policy' which was released in November 1984 (Bewick, 1988, Section 3, p.1).

Underlying the policy was the understanding that instead of solely 'keeping water away from people', as much attention should be paid to 'keeping people away from water'.

This policy change has necessitated a different approach to floodplain management. The Urban Flood Loss Reduction Policy under which approvals are now granted requires the consideration of three broad classes of adjustment options available for flood hazard response. These classes are:

1. **modification of the flood**, which includes stopbanks, channel improvements, catchment treatment and detention dams;
2. **modification of damage susceptibility**, which can include land use management mechanisms such as zoning, building regulations, land acquisition, and floodplain development policies and plans;
3. **modification of the flood loss burden**; included in this class is insurance, relief funds, and rehabilitation services.

Class 1 is also referred to as structural options while Classes 2 and 3 are referred to as non-structural options.

Central Government policies are attempting to remove past biases towards structural and relief options and to encourage catchment authorities to consider a much wider range of planning options. Particular emphasis is now placed on adjustment options that modify damage susceptibility.

The review of flood protection schemes is a cyclical process that has taken place approximately every 30 years. The Waimakariri River Improvement Scheme 1960 is scheduled for completion in 1989. The approach to the flood hazard posed by the Waimakariri for the next 30 years (1990-2020) is at present being considered. National funding for the project development was approved in terms of the Urban Flood Loss Reduction Policy.

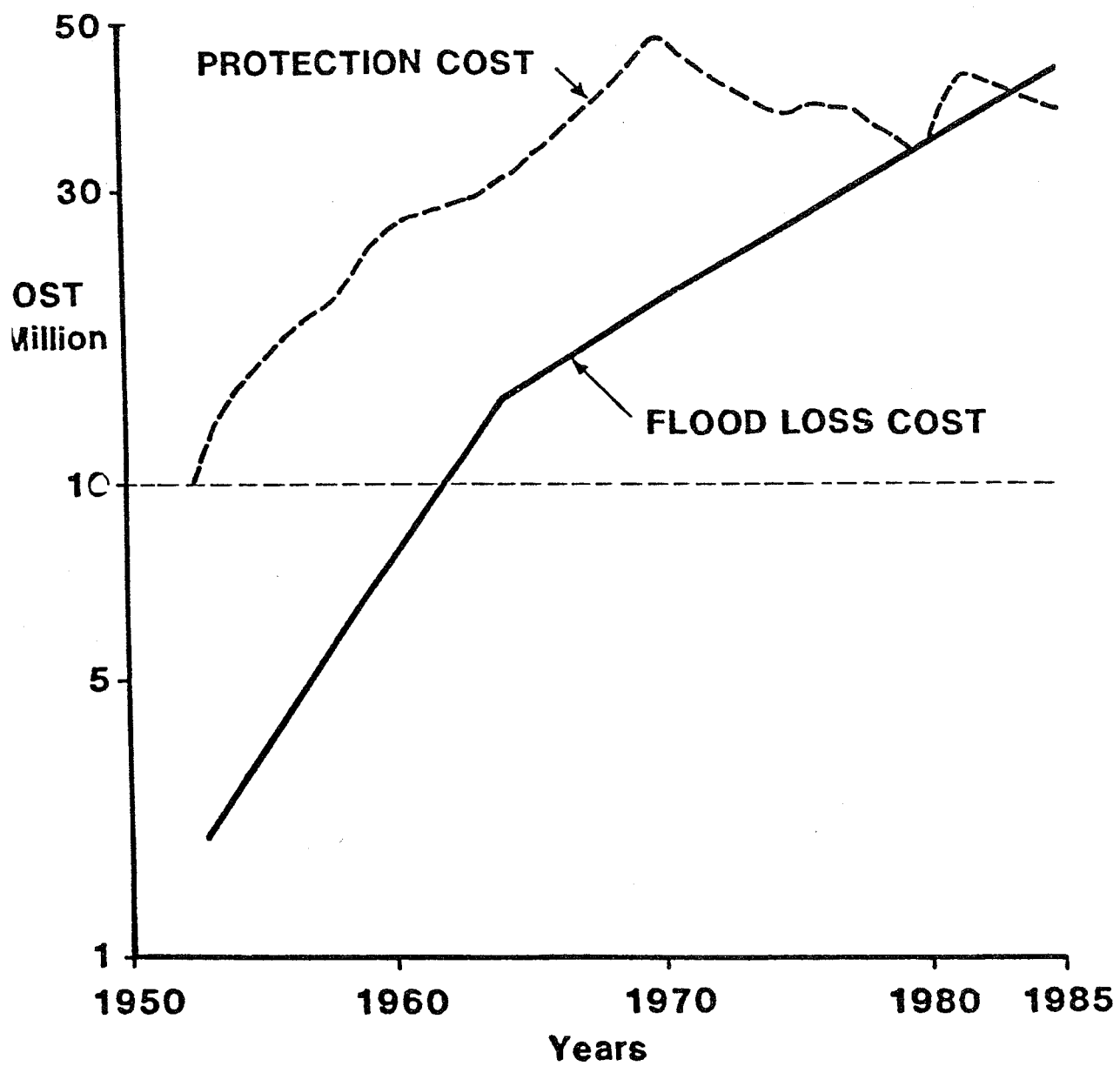


Figure 1.1 National flood losses and protection costs 1950-1985.  
 Source: Ericksen, 1984, p.204 (modified by NCCB).

There are three phases of planning for the new scheme.

**Phase 1.** Preparation of a Floodplain Management Plan to evaluate structural and non-structural options for flood management. This will include strategies for implementing a floodplain management programme plus policy recommendations.

**Phase 2.** The formulation of a Scheme proposal for floodplain management from the options considered in Phase 1.

**Phase 3.** Adoption and implementation of the Scheme Proposal as the new protection system.

The funding basis for the 1960 Scheme was a \$3 subsidy from central Government for each \$1 of regional/local cost. The local share was raised by rates levied on a graduated scale according to a benefits classification of the land at risk.

However, under existing economic policies the Government has significantly reduced the funds that it will make available to catchment boards for floodplain management. In the future those who benefit from floodplain management are expected to bear the costs in direct proportion to the benefits that they obtain.

This change of economic policy has required the North Canterbury Catchment Board to further modify its approach to flood hazard management. For example, the 1960 Scheme was designed around an analysis of statistical risk for which Government funds paid 75% of costs. However, in the future the local share will be much closer to the total cost than the previous 25%. This redistribution of costs automatically raises the questions, "What are local people prepared to pay for and how much are they prepared to pay?"

In its design process the Board will now need to know what risks the community is prepared to accept and what risks it wishes to pay to have mitigated. Whereas in the past the design of flood protection schemes was a technical matter from which the public was largely excluded, present design demands that the process deal explicitly with both statistical risk and perceived risk.

Where the community's perception of risk has not been incorporated into design plans there may be a failure to gain local support for flood protection schemes. For example, a loan poll was called by ratepayers in Golden Bay in October 1985 to determine whether they (the ratepayers) approved of the Nelson Catchment Board's intention to raise a loan to help finance a comprehensive flood relief scheme for the Takaka River. The poll was defeated by 821 votes to 389.

A survey was commissioned by the Nelson Catchment Board to determine factors that influenced voters' responses (Mitchell Research, 1986, p.1). Findings relevant to the present report were - 1) that "the survey should have been held before scheme details were prepared at considerable cost," (Ibid., p.6) and 2) of 374 responses, 209 ratepayers stated that the community had not been consulted sufficiently during scheme planning while 87 believed they had been consulted sufficiently (Ibid., p.15).

The term 'public participation' has, in recent years, been used loosely to describe processes that range from public relations to full participation in

decision making. For the purpose of this study, public participation is defined as a process that will enable information from organisations, groups and private individuals who occupy the floodplain to be incorporated into the design and decision-making processes in a systematic manner and at clearly defined stages. This process will have the added benefit of extending the catchment for information and reducing the possibility of overlooking future flood hazard response options.

## **1.2 Objectives**

This study is intended to provide the Catchment Board with a rigorous and disciplined approach to public participation that will yield information that is essential to the design process. The Board needs to have information about the community's perception of risks in order to implement a scheme that has the community's understanding and support of the Urban Flood Loss Reduction Policy. It also needs to know what the community is willing to pay for structural protection against the risk it perceives.

The objectives of this study are:-

1. To develop and apply a methodology that will yield information about public perceptions of risk and the public's willingness-to-pay for protection from those risks.
2. To identify the 'public' or community that should participate in the design of the Waimakariri Floodplain Management Plan,
3. To identify the stages in the decision-making process that public participation should take place,
4. To investigate participatory techniques that allow the public perception of risk to be incorporated into the design process.
5. To structure the outcomes in a manner that could form the basis for planning a future programme of public education/awareness/flood preparedness.

## **1.3 Approach**

The study is based on a comparison of expert (statistical) and non-expert lay perceptions of risk. A brief literature review will identify measurements of risk to provide a context for the examination of public perceptions of risk. Divergence in perceptions will be explored.

Before the public can be involved, there is a need to determine the interests that should be taken into account in this particular decision-making situation. The author has selected a proportionate equality model within which public interests and public participation can be determined. This model was used because its assumptions provide the closest approximation to the reality that the Catchment Board faces, namely, that of a number of groups each with different interests affected differently by particular decisions made with regard to the Waimakariri. These groups are not mutually exclusive; their memberships overlap and they may share common interests.

A second model, that of floodplain management decision making developed by Kates (1970), is used to identify interests that are not currently represented or have no opportunity for input under the existing institutional arrangements.

Important aspects of the present process will change after a new regional council is elected in October 1989. For this reason a brief outline of the decision-making process for the 1960 Waimakariri River Improvement Scheme will demonstrate where decisions were made in the past. Kates' decision-making model will then be used to identify specific stages where public participation should take place.

Participatory techniques are developed that are appropriate to the different aspects of the public participation process. A random survey of floodplain occupants (see Appendix I for questionnaire) provides an information basis for a) the formal consultative aspect of participation, that is liaison between the wider community and the Floodplain Management Liaison Group (FMLG) and b) an on-going informal public relations/education exercise. This will serve to 'market' the Waimakariri Floodplain Management Plan (WFMP), and may also form the basis for planning a future programme of public awareness/flood preparedness. The survey report by the same author entitled Public perceptions of risk from the Waimakariri River appears as a companion report.

The contingent valuation method of non-market valuation is used in the random survey to determine if and how much floodplain occupants are willing to pay for an enhanced level of flood protection.

North American and Australian techniques are investigated for their applicability to the New Zealand situation.

#### 1.4 Summary

The incapacity of humans to imagine natural disasters in a familiar environment affects the management of resource use. "Where disbelief in the possibility of ... a flood is strong, the resultant damages from the event are likely to be greater than where awareness of the danger leads to effective precautionary action" (Burton & Kates, 1964, p.412).

Under the new 'user pays' policy, floodplain occupants in New Zealand will now be expected to pay a significant proportion of any structural flood adjustments options, the design of which is customarily based on a specific flood frequency and magnitude. They will have to bear the costs of an under- or overestimation of statistical risk predictions. Experts will have to persuade the public that statistical frequency of risk is "correct".

## CHAPTER 2      Why participate?

### 2.1 Floodplain management policy and funding changes

National funding for the new Waimakariri flood protection scheme will be obtained in terms of the Urban Flood Loss Reduction Policy. In the past hazard event modification and relief have been given the greatest priority. Research into the flood phenomenon, however, indicates that despite increases in funding to these options over time, losses have also kept increasing at a similar rate (Fig. 1.1). Less expensive measures embraced by the modification of hazard-loss susceptibility have been largely ignored (Ministry for the Environment, 1989, p.17).

The Urban Flood Loss Reduction Policy aims to "move catchment authorities away from their traditional bias for flood control works towards a neutral stance that would encourage local authorities to use all appropriate measures that would lead to an optimal hazard management programme for flood prone communities" (Ministry for the Environment, 1988, b, p.8) Provision for financial support requires the preparation of a Floodplain Management Plan in which all options are appraised.

Until the present, funding for catchment works has been obtained through a 3:1 subsidy from the Soil Conservation and Rivers Control Council/NWSCA (Reid and Dick, 1960, p.2) and through "classified rates" collected as specified in Part V of the Soil Conservation and Rivers Control Act 1941.

These arrangements changed substantially when the incumbent Labour Government announced its Budget on 18 June 1987. One application of its 'user pays' philosophies was intended to significantly reduce Government funding of catchment authority activities progressively over the following five years (NCCB, 1987, a, p.1). "Annual block grants will be made subject to an overall maximum average grant rate of 35% (nationally) and a maximum cash level equal to the Estimates provision for such grants" (Minister of Works and Development, 1987, p.1).

Authorities will bid for subsidies. The new policy now requires the maximum possible contribution of the non-Government share from direct beneficiaries where they can be identified (Ibid., p.2). In effect the Government has said that the cost of water and soil works must be borne more by the regions than in the past. Ratepayers of the Waimakariri River floodplain will have to pay more than they did before for flood protection schemes that involve structural control works.

### 2.2 Natural hazards and risk

"Flooding in rivers is a natural, recurring but unpredictable phenomenon" (Bewick, 1988, Appendix A, p.12). It is only when human occupation coincides with such natural events that a hazard situation is perceived.

Burton and Kates (1964, p.413) propose a definition of natural hazards as being "those elements in the physical environment, harmful to man and caused by forces extraneous to him". Risks can be described as the "quantitative measures of hazard consequences" (Gough, 1988, p.8).



The characteristics of risk have been identified as a choice of action, a magnitude of loss, and a chance of loss. (Gough, 1988, p.i). The probability, or chance of loss is the characteristic with which the present study is concerned. It can be measured in a number of different ways, namely, real risk, statistical risk, predicted risk and perceived risk. The term 'actual' risk usually refers to statistical risk or predicted risk (Ibid.).

Starr et al (1976, p.629) recognize the existence of four different evaluations of future risk:

- (1) **Real risk** is determined by future circumstances when they eventually occur or develop fully.
- (2) **Statistical risk** is determined by currently available historical data, typically measured actuarially (for insurance purposes). It is based on observed frequencies that can be evaluated by normal statistical means.
- (3) **Predicted risk** is predicted analytically from systems models structured from historical data.
- (4) **Perceived risk** which is seen intuitively by individuals.

Statistical and predicted risk, although often referred to as objective estimates, can contain "considerable subjective bias as a result of lack of raw data and the need for assumptions in the estimation process. Perceived risk is often known as a subjective estimate" (Gough, 1988, p.12).

### 2.3 Technical approach to future risk

Engineers quantify risk associated with hazardous events. In order to derive statistical estimates of risk, a sound data base for the event is needed. Indices for measuring characteristics of the flood event have to be specified.

Ericksen (1986, pp.18-24) summarises a number of factors that describe the physical flood phenomenon: the size of magnitude, speed of onset, flood-to-peak interval, duration, velocity and load, areal extent, and seasonality. Generally these factors can be measured during the passage of an event. A final factor, that of flood frequency, is of vital consequence in floodplain management. It is important for measuring flood magnitude and predicting the likelihood of future occurrence.

Two approaches are used by flood analysts to predict the magnitude and frequency of extreme flood events, namely, the deterministic approach and the probabilistic approach. The deterministic approach relies on empirical methods while the probabilistic approach uses statistical methods.

Deterministic methods such as the unit hydrograph derive flood magnitudes from rainfall and catchment characteristics. Estimates can be made of a design discharge (select peak flow) for a given recurrence period (Ibid. p.24).

Ericksen describes the aim of flood frequency analysis as needing to "find the magnitude of a probable flood which will be equalled or exceeded in an interval of time called the recurrence interval or return period. The analysis is based on the assumption that future events will be the same as the distribution of observed events" (Ibid.). Figure 2.1 demonstrates that if frequencies of the largest observed annual floods are plotted against their

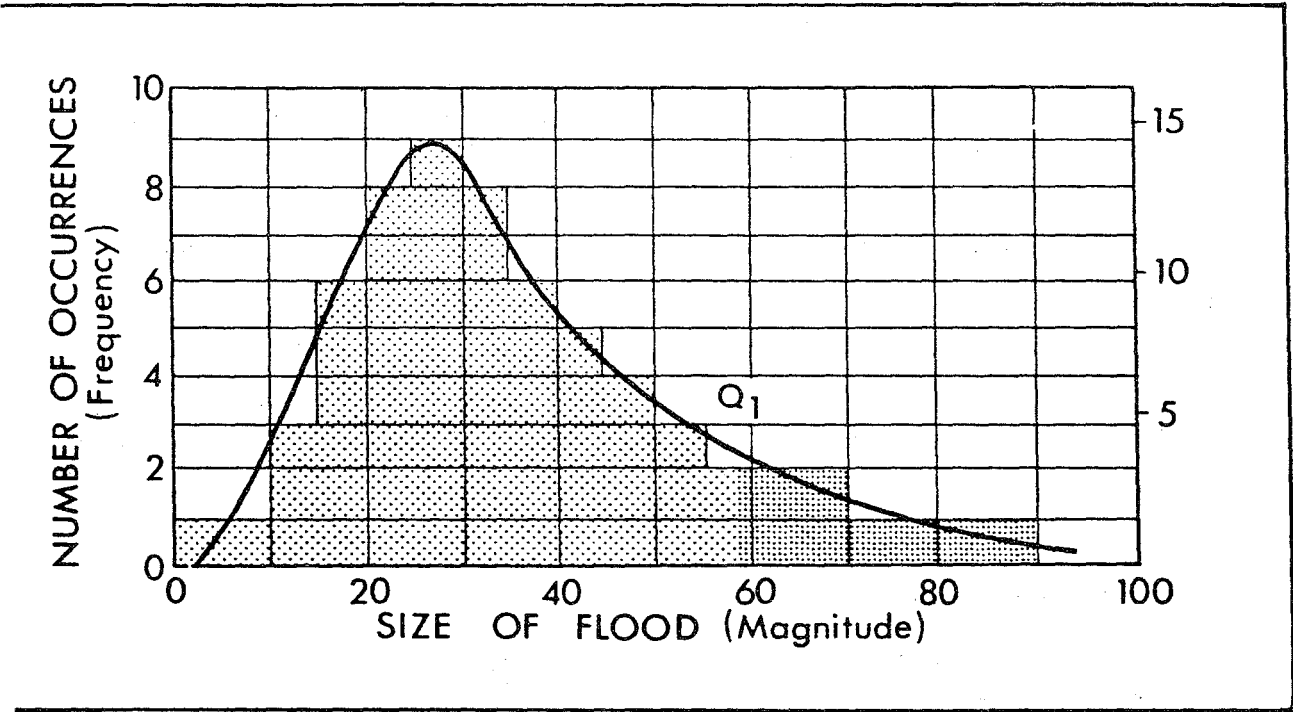


Figure 2.1 A hypothetical flood frequency curve  
 Source: Adapted from Ericksen, 1986, p.25

magnitudes a frequency curve can be derived. The mode indicates the most likely annual flood while the upper and lower limits show that very large and very small floods occur infrequently.

Ericksen (1986, p.27) provides a graph (Fig. 2.2) where the probability (percent), return period, and the length of period being considered are related. Time horizons for individuals, communities and the nation illustrate their relative significance for decision making (Ibid.).

A specific frequency is often selected as a basis for planning for various adjustment options. The magnitude and frequency of a specific base flood will determine the design of structural options and the area of land that should be subject to flood related development and building controls (Bewick, Section 1, pp.1-2).

#### **2.4 Hazard perception of floodplain occupants**

"Perceived risk is the individual or group, judgement or valuation of the magnitude and likelihood of the possible 'bad' outcomes which may result from an action. Our willingness to take a risk is measured by the subjective probabilities which we place upon the alternative actions and our judgement as to the possible magnitude of these outcomes, which depends upon the environment in which the actions are taken" (Gough, 1988, p.16).

Burton and Kates (1964, p.417) identify the "hiatus between popular perception of hazard and the technical-scientific perception. To many flood-plain users, floods are preventable, i.e. flood control can completely eliminate the hazard. Yet the technical expert knows that except for very small drainage areas no flood control works known can effectively prevent the flood-inducing concentration of precipitation, nor can they effectively control extremely large floods of very rare occurrence".

The authors (Ibid. p.430) refer to interviews they carried out over a number of years with both technical people concerned with floods and with floodplain dwellers. While none of the technical people discounted the possibility of a flood occurring again in a valley that had been previously flooded, nearly half of the floodplain occupants interviewed did not believe they would be flooded in the future.

It was concluded that such views could be attributable only in very small part to ignorance of the hazard. Nor could the differences in perception be explained in terms of irrationality. Burton and Kates (Ibid., p.431) believed the divergence had arisen primarily out of evaluation of the hazard. They offered a number of explanations for this inconsistency.

- (1) For some resource users/floodplain occupants the differences in perception may simply reflect differences that exist among scientific and technical personnel themselves.
- (2) For others, they suspected the divergence in hazard perception reflected differences in basic attitudes towards nature. While technical-scientific perceptions of hazard assume the neutrality of nature, popular perceptions viewed nature as malevolent or benevolent.
- (3) The authors were convinced that for many the divergence could be explained in terms of basic attitudes towards uncertainty.

Time horizons for individuals, communities, and the nation have been added to indicate their relative significance for decision making. (Source: Created from data in Table 6.1 in Ward, 1978, 81.)

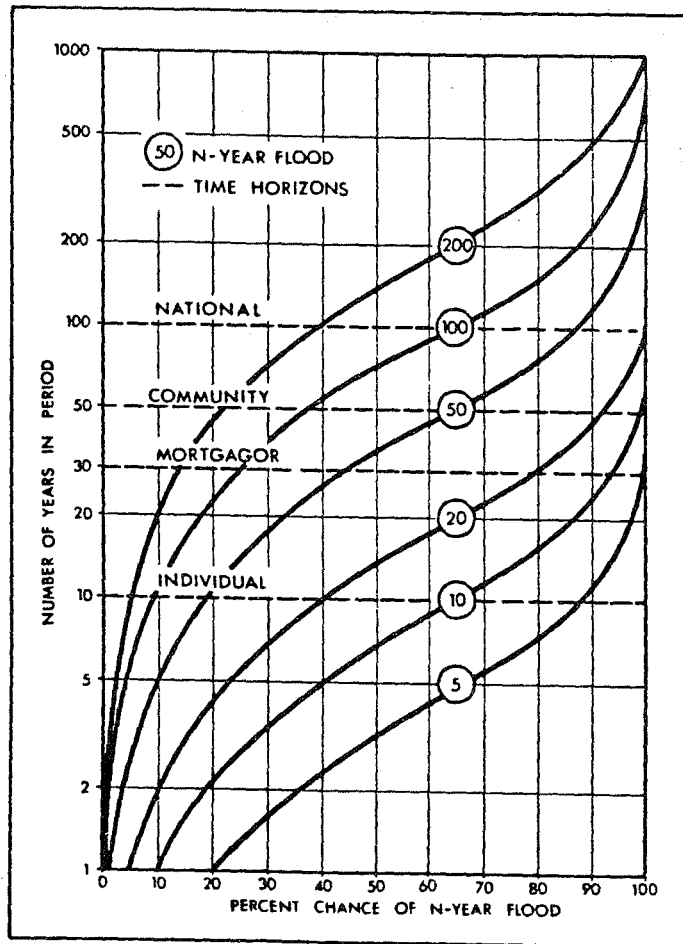


Figure 2.2 Percent probability of the N-year flood occurring in a given period. Source: Ericksen, 1986, 28

"Increasingly the orientation and formal training of scientific personnel emphasizes an indeterminate and probabilistic view of the world. Common research techniques involve the use of estimates that reflect imperfect knowledge, and stress is placed on extracting the full value of partial knowledge" (Ibid., p.433). They claimed to have "considerable social science and psychological theory and some evidence that resource users are unwilling or unable to adopt this probabilistic view of the world and are not able to live with uncertainty in such a manner as to extract full value from partial knowledge".

- (4) One position identified by Burton and Kates (Ibid., p.435) denies completely the knowability of natural phenomena; all is in the hands of God or gods.

Perception, or social perception specifically, is "the process by which a person gives meaning to what they see ... (It) is the filter through which the external environment is given meaning by a person" (Ericksen., 1986, p.39). Factors that influence the process include past experiences; existing attitudes, values and motivation; personality; and future expectations. These are shaped by social and cultural conditions such as family, education, occupation, religion, and age (Ibid.).

Ericksen (Ibid., p.40) suggests that, based on the findings of past research, four main factors can influence lay perception of hazards (in this case flooding):

- (1) knowledge and past experience of the event;
- (2) interpretation of various physical characteristics of the hazard, including flood magnitude and frequency;
- (3) geographical situation of the floodplain occupant;
- (4) personality traits.

Research indicates that there is a dominant relationship between past experience and expectation of future flood events; a greater past experience is more likely to yield more accurate views of the probabilities of past and future flood distributions.

However, there are important exceptions to this rule. Factors such as the magnitude and frequency of past flooding and how that affected the individual in a temporal and spatial manner can influence and distort a person's perception of past events.

Ericksen compares perceptions of rural and urban floodplain occupants. He has found that closeness to nature tends to align farmers more closely to scientists in their views of flooding.

The fourth factor, that is, personality traits, affects the attitudes people have towards natural events. These are referred to in observations by Burton and Kates above.

## 2.5 Summary

There is a significant divergence between statistical perceptions of risk held by technical personnel and the popular perceptions held by non-technical floodplain occupants. Experts are interested in predicting the probability of a natural event occurring and providing protection from large infrequent events. Lay perceptions reflect their attitudes towards nature and the belief that flooding can be prevented.

Ericksen's factors that influence flood perception of hazards will provide the basis of the survey investigation. These are: knowledge and past experience of the event; interpretation of various physical characteristics of the hazard; geographical situation of the floodplain occupant; and personality traits.

Research into techniques that produce quantitative representations of risk attitudes and perceptions involved an approach termed the psychometric paradigm. It is used to develop a taxonomy for hazards that can be used to understand and predict responses to risks associated with those hazards (Slovic, 1987, p.281).

"Perhaps the most important message from this research is that there is wisdom as well as error in public attitudes and perceptions. Lay people sometimes lack certain information about hazards. However, their basic conceptualization of risk is much richer than that of the experts and reflects legitimate concerns that are typically omitted from expert risk assessments. As a result, risk communication and risk management efforts are destined to fail unless they are structured as a two-way process. Each side, expert and public, has something valid to contribute. Each side must respect the insights and intelligence of the other" (Ibid.).

## CHAPTER 3 Who should participate?

### 3.1 Setting the boundaries

The previous chapter addressed the issue of why the public should be involved in the Waimakariri Floodplain Management Plan decision-making process. We now need to establish boundaries around a population to determine who should have the opportunity to participate.

One obvious boundary is that of the floodplain - the geomorphic features on the landscape that provide historical evidence of the past courses and flood flows of the Waimakariri (see Fig. 3.1). An alternative boundary could be drawn round the North Canterbury Catchment Board (NCCB) district (see Fig. 3.2). Board members are elected from within this area and participate in decision making with regard to the Waimakariri River. Another boundary could be New Zealand's national borders; people from other parts of the country might be concerned with the management of one of our large scenic rivers.

In order to determine who should participate, a proportionate equality model has been used. It was selected because its assumptions closely reflect the decision-making environment that is faced by the Board, namely, that New Zealand is a pluralist society comprising groups with differing interests.

### 3.2 A proportionate equality model of public participation<sup>1</sup>

Debate about the purpose of public participation does not always involve the examination of theories of democracy and their underlying assumptions. Participationist theories of democracy emerged in the 1960's and '70's and have been closely associated with recent environmental and social impact analysis. These theories define democracy as the direct participation by all members of a society in the activity of decision making (Nelson, 1970, p.3). It is assumed that maximum participation is synonymous with democracy.

Democracy may be defined from other perspectives. In pluralist theory, democracy can be defined as political equality in the making of political decisions (Mulgan, 1984, b. p.112). This definition of democracy is used in this study to address the purpose of public participation.

Professor Mulgan of the University of Otago has broadened the concept of political equality using a proportionate model which requires that "... individuals be treated differently from one another depending on the degree of immediacy of their interests" (Ibid., p.121). The significance of this definition for participation is that overall political equality could be maintained if a proportionate model was used. Each person or group would have an "... equally large degree of influence over immediate issues such as those affecting their locality or occupation and an equally small degree in less immediate issues" (Ibid. p.122). The input of some groups would be weighted so it was given greater emphasis when particular points are considered.

Professor Mulgan's model has built on the work of Ronald Dahl (1956) who examined the relationship between political equality and democracy in a pluralist framework. Dahl's work was criticised in the 1960's and '70's as elitist but more recent research has highlighted the importance of the problems Dahl identified. Alan Ware of the University of Warwick, (1981, pp.

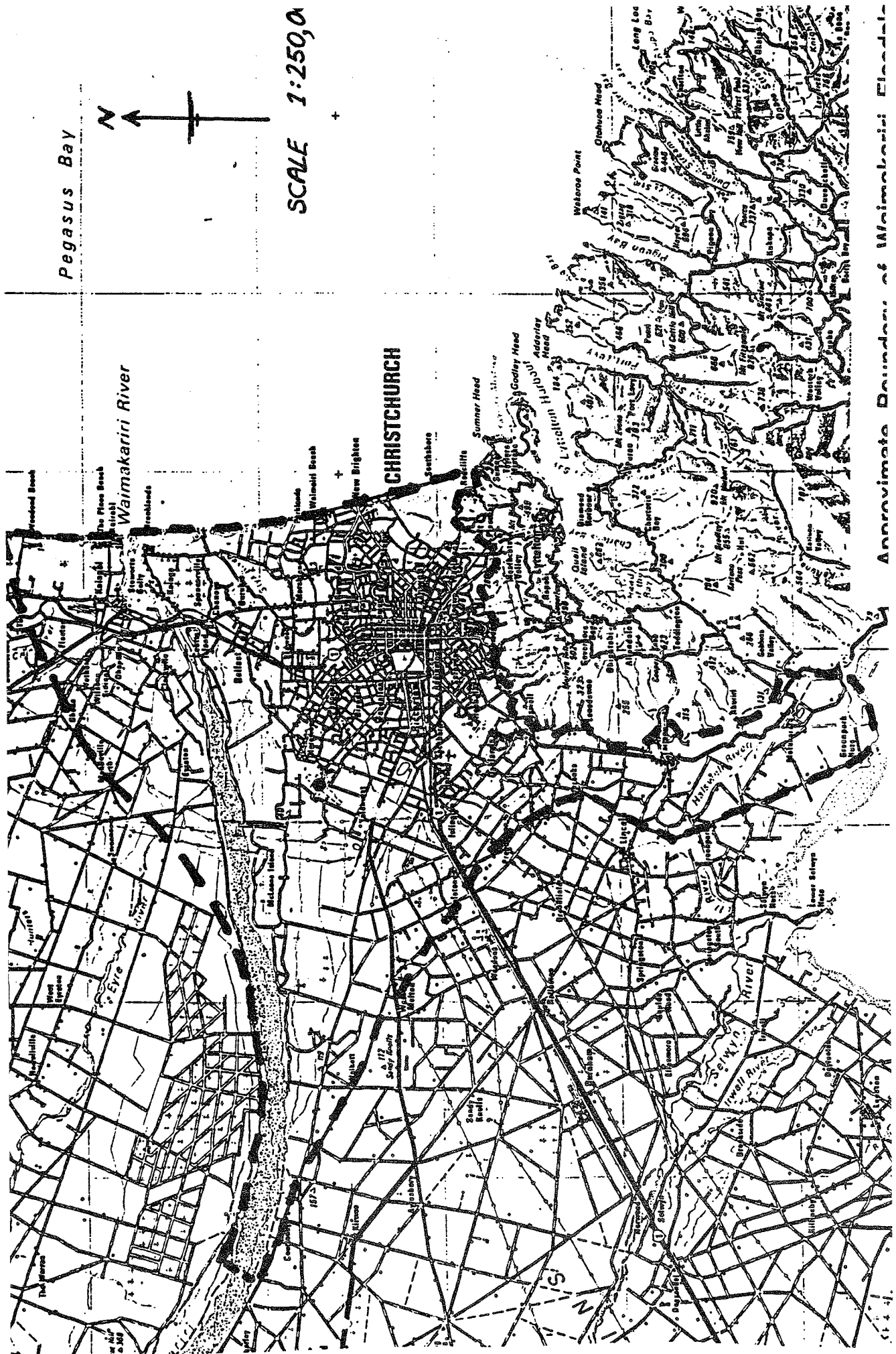
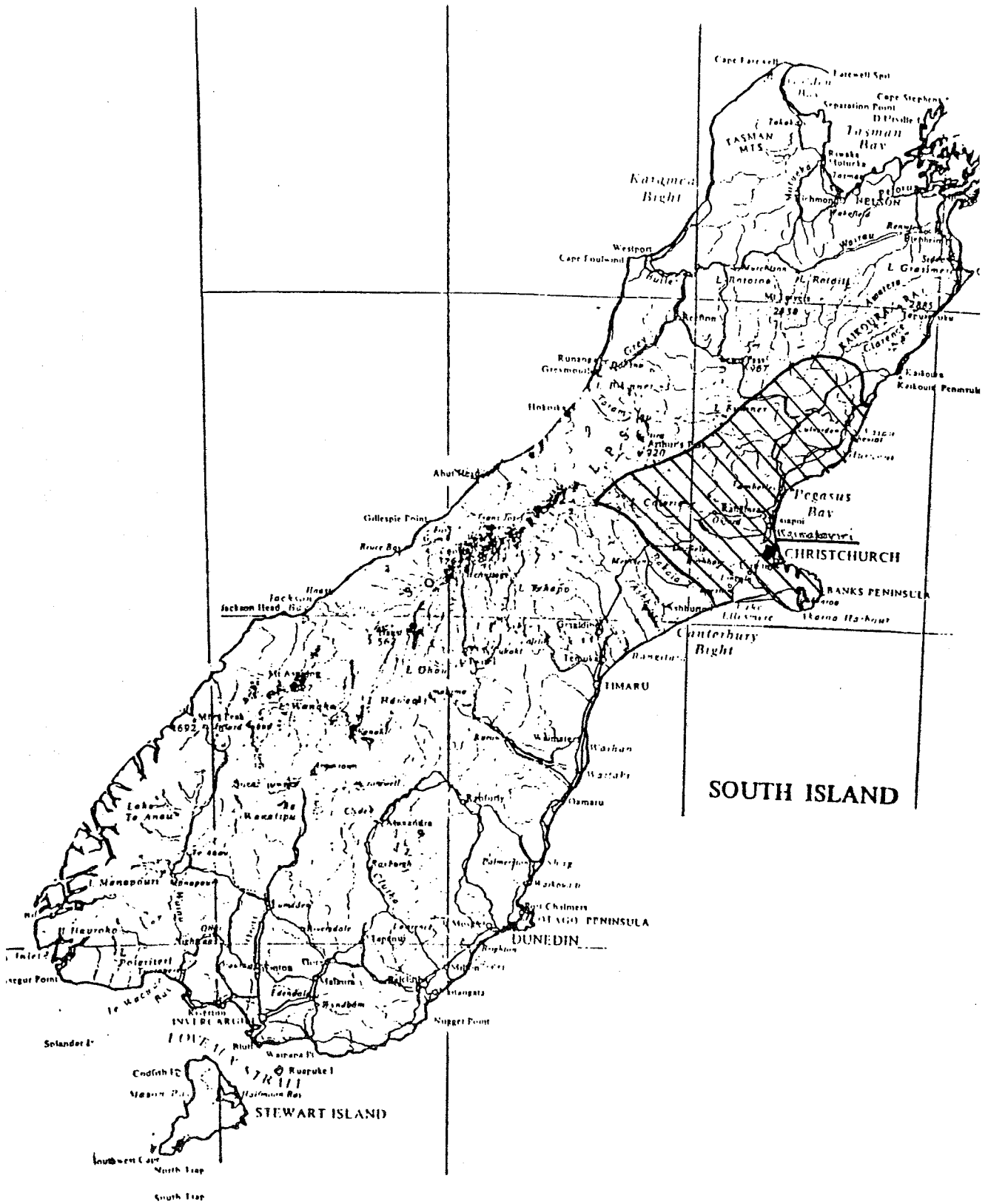


Figure 3.1 Approximate boundary of Waimaka floodplain. Source: NCCB,





# North Canterbury Catchment Board District

Figure 3.2 North Canterbury Catchment Board District

392-406) has re-examined the issues raised by Dahl and directed his research towards Dahl's question: "... if citizens of a democracy are to be political equals, on what principles should values be distributed?" (Ibid., p.392).

A major assumption underlying this study is that New Zealand is a pluralist society differentiated into a number of groups each with differing interests and each affected to differing degrees by any decision. These groups are not mutually exclusive; their memberships may overlap and they may share common interests (Mulgan, 1984, b, p.113). Given this plurality of groups with different interests, Mulgan asks whether "... everyone who is entitled to have a say should have an equal say or whether those with differing degrees of involvement may not deserve differing degrees of influence over decisions" (Ibid., p.112).

A proportionate model of political equality has two considerations.

The first is the question of the basis on which an individual has a right to participate in any decision. On what grounds should some interests be included and others excluded from participation? In national elections people living beyond national borders are excluded from a constituency. However, in public decision making within national boundaries the questions of inclusion and exclusion are less easily settled. Mulgan addressed the issue with a modification of Dahl's principle of affected interest. The principle of affected interest states that "... everyone who is affected by a decision of a government should have the right to participate in that government" (Mulgan, 1984, b, p.124). For example, residents living on a floodplain are likely to be affected by floodplain management policies.

A second consideration is that of weighting. Difficulty arises, in practical terms, of recognising and accounting for differing intensities of interest amongst participants. Some attempts have been made to recognise that different groups are more immediately affected by a decision than others. Immediacy is a subjective concept reflecting a degree of involvement in an issue. It can have temporal, spatial, spiritual or economic dimensions. A political system is faced with the dilemma of either counting preferences expressed by the majority of those affected or it may want to weigh the preferences of those more immediately affected in some way.

While the practical difficulties of assessing proportionate influence may cause administrators to select a simpler, if cruder strict equality of one person one vote, Mulgan argues that the reality of giving two individuals or groups the same degree of influence over a particular decision may not be any easier than giving one twice as much weight as another (Mulgan, 1984, b, p.123).<sup>2</sup>

In summary, a model of proportionate equality distinguishes those who should participate as being those interests that are affected by a decision. It also allows for differing intensities of interest or immediacy being taken into account but does not attempt to explain how this could be implemented.

The next step is to apply this model to the Waimakariri River floodplain to determine which interests might be affected by flooding.

### 3.3. Affected interests on the Waimakariri floodplain

Figure 3.1 provides the approximate boundaries of the Waimakariri River floodplain. These boundaries can be attributed to historical flood flows and river channels.

Geomorphic evidence provides historical information to flood analysts as to the maximum extent of previous flooding. The information will pertain to events prior to human settlement on the floodplain. The probability of the flood event is determined by counting the observed occurrence of similar events (Burton and Kates, 1964, p.424). In other words, if a flood has occurred in the past, experts would be unlikely to discount the possibility of a flood occurring again (Ibid., p.430).

The first distribution of interests likely to be affected falls within the boundaries of the floodplain. Those living, working, and/or owning property there would be likely to be affected by major flooding.

A second identifiable group of interests likely to be affected is that of people who live and/or work outside the floodplain but depend on Christchurch as a service centre. These could be people living and or working in the Lyttelton Harbour basin or on Bank's Peninsula or those living north, south or west of the floodplain boundary.

A third group of interests is that of people involved in recreational pursuits. The implementation of structural control works in the past has modified their ability to be involved in pursuits such as fishing, picnicking, swimming, pleasure driving, boating, trail bikes and four-wheel drive vehicles, game shooting, club activities, and outdoor experiences. Some impacts have been positive, some negative. (Blakely and Mosley, 1987, pp.48-74).

Potential impacts on recreational pursuits during major flooding can be identified in The Waimakariri River Improvement Scheme: 1982 review (North Canterbury Catchment Board, 1982).

On another level, interests relating to environmental and cultural values can be observed.

Implementation of the Waimakariri River Improvement Scheme (WRIS) has caused changes in the river channel, vegetation in the riparian zone, on groundwater flows, on wildlife (including birds and fish) and on water quality (Blakely and Mosley, 1987).

Legislation enacted since the implementation of the WRIS (1960) requires such recreational and environmental impacts to be taken into account. The Water and Soil Conservation Amendment Act 1981, s.14(3) states that adequate account must be taken of "... [community water supplies, all forms of water-based recreation, fisheries and wildlife habitats, and of the preservation and protection of the wild ... and other natural characteristics of rivers ..]."

The Environment Act 1986 also requires that views on impacts on the environment be taken into account in decision making. The Act explicitly states that:

"... full and balanced account is taken of -

- The intrinsic values of ecosystems; and
- All values which are placed by individuals and groups on the quality of the environment; and
- The principles of the Treaty of Waitangi; and
- The sustainability of natural and physical resources; and
- The needs of future generations

In addition to environmental values, the Act requires that Maori cultural values plus the needs of future generations must be considered in the decision-making process.

As the basis for further investigations and consultation in the Resource Management Law Reform exercise, the Government has "agreed that legislation should provide for the protection of Maori cultural and spiritual values associated with the environment (Ministry for the Environment, 1988, a, p. 24). Taylor (1950, pp.34-56) identifies sacred Maori sites and food gathering areas along the banks of the Waimakariri River.

Interests likely to be affected by major flooding include those of people living and/or working on the floodplain; those not living or working on the floodplain but who use Christchurch as a service centre; environmental and recreational; Maori cultural and spiritual; and the needs of future generations. We now need to examine where weighting of these interests might occur.

### **3.4 Weighting of interests**

Those who live and/or work on the floodplain are likely to be affected in different ways. One subset of floodplain occupants is property owners (usually ratepayers). They are likely to be affected to a greater extent economically than those who are not property owners.

However, s.101(3) of the Soil Conservation and Rivers Control Act 1941 does not require that these interests be weighted now although it did in the past. Prior to 1986 the Act referred to special loans that could be raised by the Board with the consent of the ratepayers in a defined part of its district. The weighting provision was repealed by the Local Government Amendment Act 1986, s.7(69,70) which extended the franchise to all electors.<sup>3</sup>

Property owners or ratepayers can be further broken down into property owning classes, namely, residential, commercial, and farming in the main. Weighting of interests might be considered desirable.

Proximity to the flood hazard might be another weighting factor. Those who live closest to the river are more likely to be affected or affected to a greater extent than those who live a considerable distance away.

Those who live outside the floodplain but depend on services are likely to be affected by major flooding but in a lesser way than floodplain occupants.

No explicit weighting of environmental, spiritual or cultural interests nor those of future generations is indicated in the Environment Act. Wright (1988, p.5) highlights the difficulties inherent in the requirement to take a 'balanced view' of these concerns.

An examination of potential weighting of interests allows sub-groups of affected interest to be defined. The Board can decide whether and to what extent it wishes to recognise immediacy of interest.

### **3.5 Summary**

A broad range of interests likely to be affected by floodplain management decision-making has been distinguished. These include property owners and non-property owners living and working on the floodplain; property owners and non-property owners who live beyond the floodplain boundaries but rely on Christchurch as a service centre. Environmental and Maori cultural and spiritual values and recreational interests need to be taken into account, as do those of future generations.

Possibilities for weighting of interests have been delineated. The Board must decide whether it wishes to explicitly do so in order to achieve a situation of proportionate equality as proposed by Mulgan.

The following section will examine whether the groups with affected interests identified above have the opportunity to participate.

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#### Notes

1. This section is based upon a paper presented by the author and Bronwyn Hayward, Department of Parks Recreation and Tourism, Lincoln College, to the VII Annual Meeting of the International Association for Impact Assessment, Brisbane, July 1988. The title of the paper is Proportionate equality and public participation: who should have a say in impact assessment?

2 Kendal and Carey, (1968, pp.5-24) propose an alternative view of weighting. They examine the concept of immediacy or intensity of interest in terms of democratic theory. They propose that a political system must have "built-in facilities for correct reciprocal anticipations, on the part of groups, and ultimately, of individuals, of the intensity of each other's reactions, favorable or unfavorable, to the alternative courses of political behavior open to each" (Ibid., p.16). In other words, any group may not wish to jeopardise future co-operation it may require from other groups. It may attempt to anticipate the degree of displeasure other groups might feel towards particular proposals and modify them accordingly.

Kendal and Carey suggest that the condition does not require a democratic system to weigh preferences instead of counting them. It requires that 'the counted' should be able to reckon, in advance of voting, the intensity of the reaction of other groups to the use they make of their votes. Correct reciprocal anticipation clearly requires a high degree of mutual knowledge and understanding of the preferences of other participants (Ibid.).

3 It is believed that this was done for reasons of convenience and not equity. It should not be seen to reflect a deliberate move away from weighting.

## CHAPTER 4 Where to participate?

### 4.1 Introduction

Groups with affected interests have been identified above. The next task is to investigate whether opportunities exist for these groups to participate in floodplain management decision making under existing or future institutional arrangements. If these opportunities do not exist, specific stages in the process will be identified where participation could occur.

Two levels of participation will be considered: electoral opportunities to select decision makers, and participation within the specific Waimakariri floodplain decision-making process.

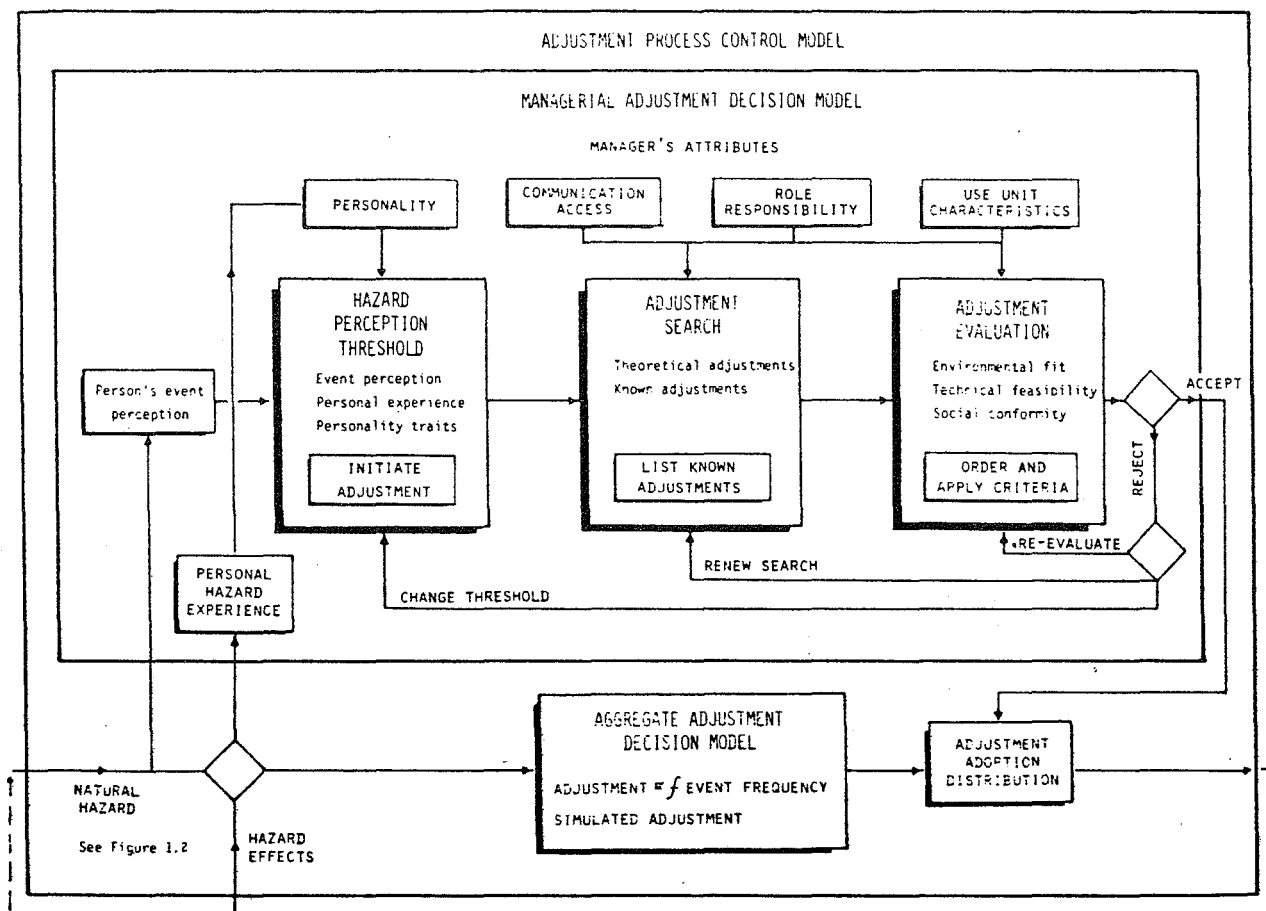
A floodplain management decision-making model proposed by Kates (1970) and extended by Ericksen (1986, p.8) will be applied to the current Waimakariri Floodplain Management Plan decision-making process to examine existing opportunities for public participation. In the event that opportunities for participation do not exist or are at inappropriate stages in the present decision-making process, Kates' model will be used to determine where participation could occur.

As the decision-making process is likely to change in some respects because of the Local Government Reform and Resource Management Law Reform exercises, an outline of the previous decision-making process for the Waimakariri River Improvement Scheme 1960 will also be given. A comparison of the two decision-making processes may assist in identifying where likely changes in opportunities for public participation could be anticipated in the future.

### 4.2 Floodplain management decision-making model

A model for floodplain management decision making has been developed by Kates (1970). He proposes three main sequential components of the decision-making process that lead to the adoption of adjustment options in response to the flood hazard.

1. Before people can act they need to cross a **flood hazard perception threshold**. They need to be sufficiently aware or convinced that a **problem** exists, that there is a risk of flooding, and have the willingness to respond to the problem (Ericksen, 1986, p.8) (see Fig. 4.1).
2. The second component of the process involves a **search for adjustment options** to address the flood problem. This cannot begin until the hazard perception threshold has been exceeded. However a full theoretical range of possible adjustments is rarely canvassed; options considered are more likely to reflect recent flood experiences, future expectations, typical availability and social acceptability (Ibid., p.9).
3. The third component of the process is the **decision criteria** upon which adjustment options are considered. "The most important constraints on the adoption of perceived alternative adjustments



The decision process of adjusting to floods. In this model, manager refers to any decision maker whose actions influence flood-loss potentials, e.g., home-owners, entrepreneurs, public officials and technical experts. (Source: Kates, 1970, 18; 1971, 444 and 447, Figures 3 and 4. Adapted by permission.)

Figure 4.1 The decision process of adjusting to floods.

Source: Ericksen, 1986, 9

include: technical feasibility; economic gainfulness; social acceptability; and environmental compatibility" (Ibid.). These constraints should be broadened to include cultural and spiritual perspectives that pertain to the New Zealand context.

Perception or understanding of risk needs to be imparted to the public before future options can be discussed by the NCCB. The public needs to be involved at the stage of defining the problem; if the community perception of risk is not taken account of at this point the selection of adjustment options will be skewed towards the perceptions of hydrologists, engineers, etc.

#### **4.3 Historical decision-making process - Waimakariri River Improvement Scheme 1960**

##### Election of decision makers

Public participation at the electoral level has consisted of electing Catchment Board members every three years. At present the Board consists of 10 elected members with provision for five non-elective representatives. In the past, representatives from government departments whose activities related to water and soil conservation objectives were appointed to the Board (Soil Conservation and Rivers Control Act 1941, s.44(1)). These have included the Ministry of Agriculture and Fisheries and the Department of Scientific and Industrial Research. This allowed for particular interests to be taken into account in decision making.

Representation on catchment boards is based on the relative populations and relative values of rateable properties within districts, and the amount of rates likely to be levied within the districts (Soil Conservation and Rivers Control Act 1941, s. 41). Representation on the North Canterbury Catchment Board at present is: Christchurch City, Riccarton Borough and Lyttleton Borough three members; Waimairi District Council one member; Paparua County, Heathcote County and Mt Herbert County one member; Rangiora Borough, Kaiapoi Borough, Rangiora District, and Eyre County one member; Malvern County and Ashburton County one member; Hurunui County and Oxford County one member; Amuri County and Cheviot County one member; and Ellesmere County, Wairewa County and Akaroa County one member (New Zealand Gazette, 1978, p.1568). Figure 3.2 shows the North Canterbury Catchment Board District.

Electors must 18 years of age and over who have lived in New Zealand for one year or more.

##### Decision-making process

The Waimakariri (Hayes No. 2) scheme came under review during the 1950's. The Board stated that it was preparing a major control scheme days after major flooding of the Waimakariri ("Star Sun", 9.1.58).

The only 'outside' advice sought was from Mr Henderson, University of Canterbury, on a special hydraulics problem (Henderson, 1960). Engineering, economic and catchment reports were sent to the Soil Conservation and Rivers Control Council (SCRCC) for comments and suggestions ("Christchurch Star", 2.12.60). The Waimakariri River Improvement Scheme was adopted by the SCRCC and sent to Treasury and Cabinet for approval and to establish the rate of subsidy ("Press", 6.10.62). Formal approval of the Scheme under the Soil Conservation and Rivers Control Act 1941 s.128 was granted by the



Minister of Works and the SCRCC ("Press", 2.3.63). Figure 4.2 illustrates the decision-making bodies that pertained before the Ministry of Works and Development was disestablished in 1988 under the Government's state restructuring programme.

In the event that there had been the need to raise a special loan for protection works, only ratepayers would have been permitted to vote (Soil Conservation and Rivers Control Act 1941 s.101(3)).

In summary, those meeting the electoral qualifications were able to participate in selecting the decision makers, that is, members of the Catchment Board. Certain interests were granted non-elective representation on the Board. There is no evidence that the public was involved in any of the components of Kates' decision-making model, namely, in defining the problem, the selection of flood management options, or choice of design criteria.

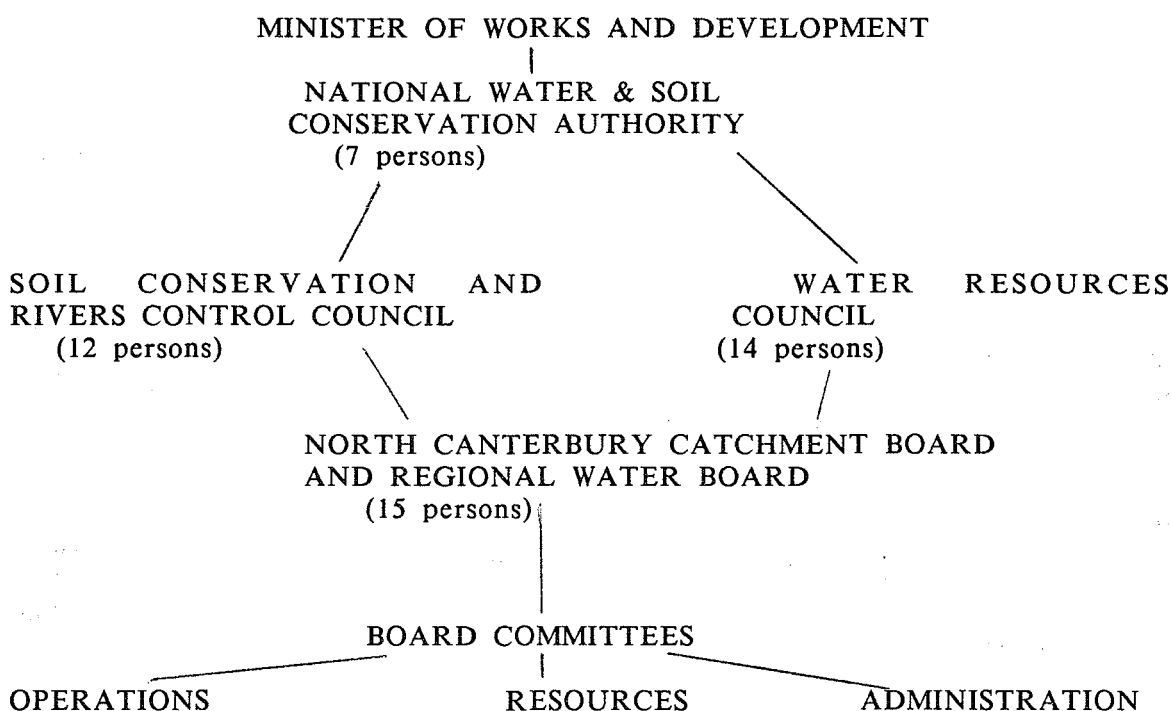


Figure 4.2 Historical water resource management decision-making bodies.

Source: Neeson, 1983, pp.62-63.

#### 4.4 Current decision-making process - Waimakariri Floodplain Management Plan

##### Election of decision makers

Catchment boards will cease to exist from 31 October 1989 as a result of the reform of the statutory base of New Zealand local government. The Local Government Amendment Act (iii) 1988 removes the functions, duties or powers from existing territorial and special purpose authorities.

The functions, duties and powers of Catchment Boards and Regional Water Boards under the Soil Conservation and Rivers Control Act 1941 and Water and Soil Conservation Act 1967 will be assigned to new elected regional councils (Ibid.). Depending on the outcome of the Resource Management Law Reform, these duties may be altered or modified.

A Canterbury Regional Council will be established with boundaries of several water catchments (see Fig. 4.3). The Council will comprise 17 members directly elected from seven constituencies. The North Canterbury constituency will elect two members; Selwyn one; the Fitzgerald and Godley constituencies will elect five members each; Ashburton one; South Canterbury two and Waitaki one ("Press", 13.6.89, p.4).

Representation will be on a population basis with no particular interests represented. Of the 17 members to be elected, 10 will represent Christchurch City. (Each metropolitan delegate will be representing more than 150,000 people (Ibid., 21.6.89, p.4)). This will change the character of the groups elected. New members will have to represent a much wider range of interests than did those serving on the Catchment Board in the past.

Parliamentary electors with appropriate residential qualifications (that is, be 18 years of age and over who have lived in New Zealand for one year or more and have lived in a particular local body district for one month prior to enrolment) are qualified to vote for catchment board members (Local Government Amendment Act, 1986, s.7 (69, 70)).

Statutory provisions exist for all interests (apart from those under 18 years of age) to participate in the political process at the regional level. These include the interests of property owners and non-property owners living and working on the floodplain, and property owners and non-property owners who live beyond the floodplain boundaries but rely on Christchurch as a service centre.

However, "(T)he question of opportunity for greater Maori participation in local and regional government is still to be looked at in the context of the reform of local and regional government" (Ministry for the Environment, 1988a, p.24). At present there is also no provision apparent for explicit representation of specific interests such as those of future generations (those under 18 years of age and those as yet unborn), recreational and environmental concerns in the new decision-making structures.

##### Decision-making process

"It is established practice around the world to reinvestigate, and usually revamp, major river protection schemes every 25 or 30 years. The need to revamp arises because both river regime and river management techniques change, as now, with the recent move by NWSCA towards a more neutral policy of flood hazard response involving the removal of bias towards structural measures, extant in some previous policies" (North Canterbury Catchment Board, 1986, Appendix IV).

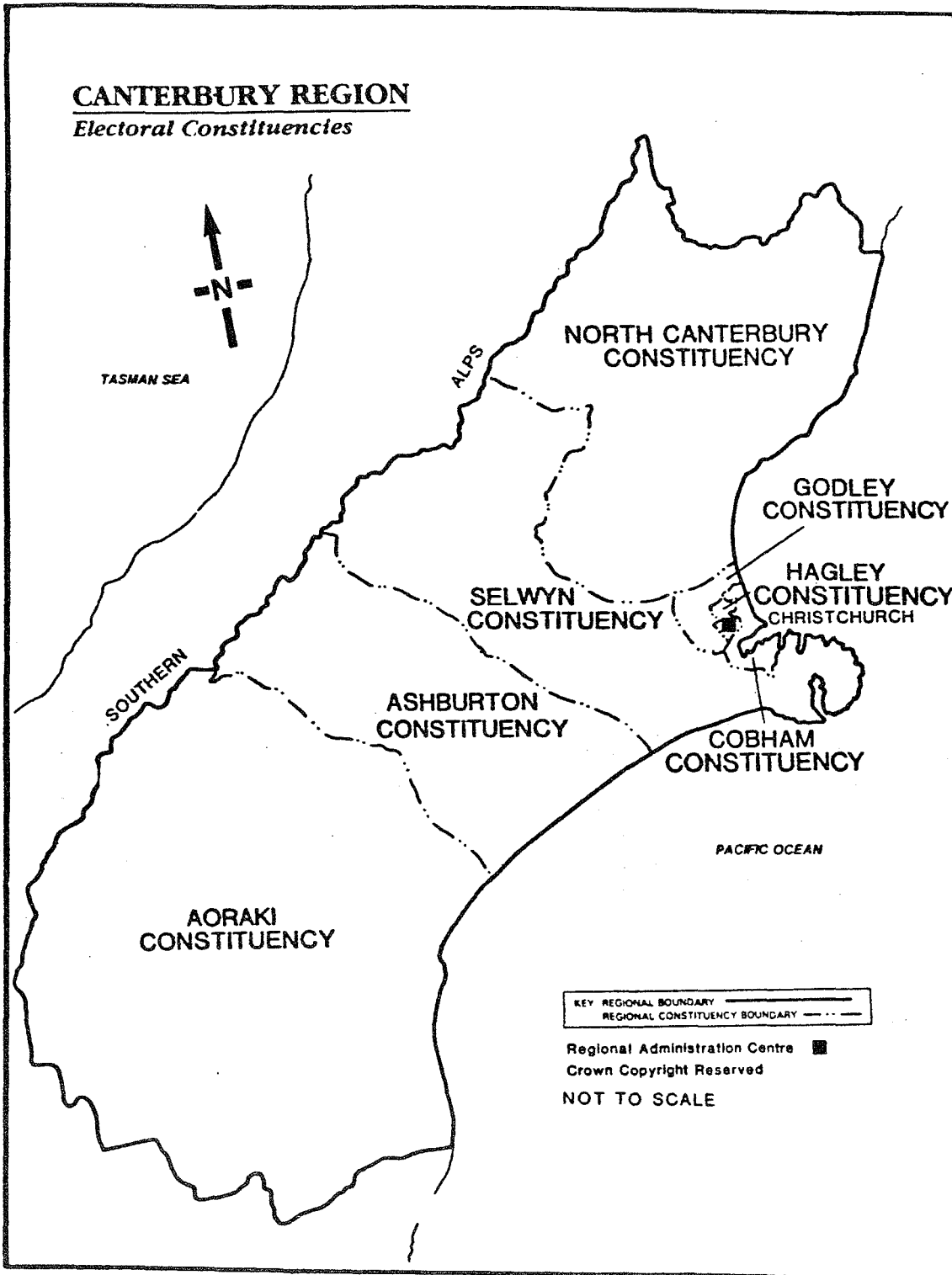


Figure 4.3 Canterbury region electoral constituencies  
Source: "Press", 24.1.89, p.15

As the Waimakariri River Improvement Scheme (WRIS) is scheduled for completion in 1989 the question of future prevention, mitigation and avoidance of flooding needs to be addressed. In December 1986 funding was approved by NWSCA for Phase 1 of the investigation, that is, the preparation of a Waimakariri Floodplain Management Plan. Figure 4.4 illustrates the schedule of tasks for the proposed investigation on which the approval was based. Appendix I lists the major steps in the development of the new Waimakariri River Floodplain Management Plan.

The most important responsibility of the NCCB under the Waimakariri River Improvement Act 1922 and the Soil Conservation and Rivers Control Act 1941 is the reasonable protection of the Waimakariri floodplain (Christchurch, Kaiapoi and Districts) from flooding (Ibid.). The specific management problem the Board now faces is to determine whether existing flood protection is sufficient to fulfil this responsibility.

The Board has to determine an acceptable and practical degree of risk, and consequent design standard of flood protection (Ibid.). However, as the floodplain community will now be making a greater financial contribution to flood protection works, these people will have to be persuaded as to what is an acceptable and practical degree of risk.

In July 1987 contracts were issued to elicit investigations of various aspects of the Floodplain Management Plan including economic, nature and causes of the problem, hydrology, and hydraulics. Specification for the contract on the nature of the problem and its causes was biased towards physical considerations (NCCB, 1987c). In December 1987 the basic problem was redefined by Board staff in discussion with outside consultants as the interaction between flood events and human use of the floodplain (Ibid.).

Hydrological results to date indicate that design discharge for the WRIS 1960 is estimated to have a return period of at least 300 years, and not 100 years as was believed in 1960. Over the life of the Scheme (30 years) this equates with a risk of one chance in 10 of getting a flood that exceeds the design capacity. The response of the Board at present is to "reduce the gamble even further, at least in the most potentially dangerous reaches of the river, to a level where the risk is 'vanishingly small', say, less than 1% or one chance in 100 over the next 30 years. This corresponds to a return period of thousands of years ..." The flood hazard assessment analysis currently being undertaken is expected to provide an objective answer to the problem (North Canterbury Catchment Board, 1988b, pp.2-3).

A Technical Advisory Group (TAG) was set up by the NCCB in September 1987. The role of this group is to provide independent and regular analysis, examination and review of the objectives, nature, scope, direction and progress of the project; and to offer logistic, technical, administrative or any other advice and comment that may assist the Board in carrying out its investigation on the Waimakariri River Floodplain Management Plan (North Canterbury Catchment Board, 1987, Agenda, Technical Advisory Group Meeting, Christchurch, 9.9.87). The group is composed of technical and planning experts.

At the first meeting of this Group there was agreement on the need for advice on presentation and public participation in the Waimakariri Floodplain Management Plan. This study addresses these issues.

In March 1988 a pilot study was carried out by Catchment Board staff on possible options for flood control (see Appendix II). No public input was solicited in the search for options stage of the decision-making process.

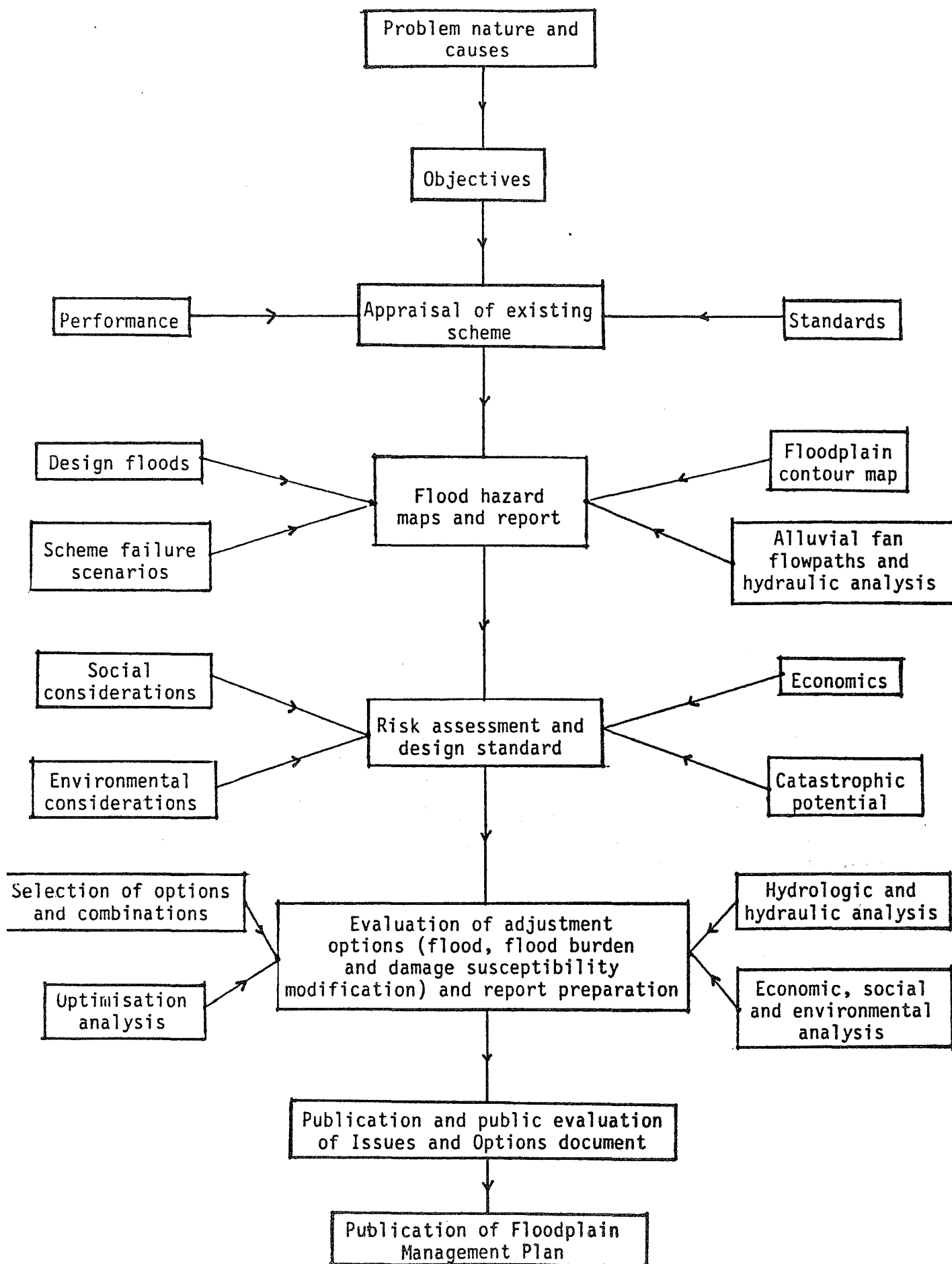


Figure 4.4 Schedule of tasks for proposed investigation

Source: NCCB, 1988.

Reference to Figure 4.4 again indicates that the design criteria, that is, social, economic, and environmental considerations are to be incorporated into the risk assessment and design standard. These investigations are to be carried out by consultants.

The first opportunity for public participation in the Waimakariri Floodplain Management Plan occurred with a survey of ratepayers of the Waimakariri River floodplain conducted by the author in the period October to December 1988. Their perceptions of risk and preferences for flood management options were investigated. No opportunities were afforded to the other affected interests identified in Chapter 3.

The next opportunity where public participation may occur is with the representation of community views on a Floodplain Management Working Group (FMWG) that the NCCB proposes to establish. The establishment of such groups is proposed in the Guidelines for Floodplain Management Planning Studies (Bewick, 1988, Section ii, p.2). The Group would be likely to evolve from the existing Technical Advisory Group. The role of the FMWG would be to provide assistance and advice to the Board concerning the selection of flood reduction measures. The Group's membership would include some community representatives (North Canterbury Catchment Board, 1988a).

A further opportunity for participation will arise after the publication of an Issues and Options document. Public submissions will then be called for.

Phase 1 of the investigation will conclude with publication of the Waimakariri Floodplain Management Plan. Phase 2 will involve the formulation of a Scheme proposal for floodplain management from the options considered in Phase 1.

Once a Scheme proposal has been formulated approvals are required. If central Government monies are to be sought, then approval must be gained from the Ministry for the Environment. (Town and country planning and water and soil conservation legislation and policy functions previously held by the Town and Country Planning Directorate (MOWD) have gone to the Ministry for the Environment.) Approvals for Scheme proposals that do not require central Government funding will be granted by the regional council.

Discussion is taking place within the context of the Resource Management Law Reform on regional resource and environmental plans (Ministry for the Environment, 1988d, pp.6-10). Decisions would be made by regional councils or their delegates with some national decisions being binding. Well-publicised public participation is an anticipated part of the process. At present there are no firm guidelines as to how this would take place nor is there agreement on the question of standing, that is, which interests will be permitted to participate.

At present s.2(3)d of the Town and Country Planning Act 1977 allows, inter alia, "... any body or person representing some relevant aspect of the public interest ..." the right to object. However, the Town and Country Planning Act 1977 is one of the laws that is being reviewed in the Resource Management Law Reform exercise. One of the issues underlying the reform is the lack of consistency between Acts on the question of standing.

#### 4.5 Summary

Opportunities for participation have been identified at a number of stages in the current decision-making process. All interests will have representation on

the new regional decision-making bodies. However, Council members will have to represent a much wider range of interests than did Catchment Board members in the past. Environmental, Maori cultural and spiritual values, recreational interests and the needs of future generations may not be explicitly represented on decision-making bodies.

To date the problem has been defined by technical experts. When the flood hazard assessment analysis has been completed there may be an opportunity for public participation in the **problem definition** stage of the process. However, the public will have to cross a **risk perception threshold** first.

There has been no opportunity for participation in the **search for options** stage of the Waimakariri Floodplain Management Plan decision-making process. This was carried out by technical experts. Establishment of **decision criteria** is to be carried out by consultants.

Opportunities have been offered to ratepayers living on the Waimakariri floodplain with the survey that has been recently carried out. Opportunities for other affected interests could occur in the event of a Floodplain Management Working Group being established.

All interests will be able to comment on the Management Plan and the Scheme Proposal when these are made public.

## CHAPTER 5 How to participate? Surveys

### 5.1 The survey as a participatory technique

In Chapter 4 opportunities for some affected interests to participate in the stage of defining decision criteria were identified. A sample of floodplain property owners was invited to take part in a survey that was designed to gain information on their perceptions of risk of flooding from the Waimakariri River over the next 30 years. A summary of findings of the survey will be presented in Section 5.2.

"Surveys are a useful way of involving a wide range of people who would not be reached in any other way. They are able to show both the range of opinions throughout a sampled group, and also the weightings of particular viewpoints. Surveys usually produce a data-base which can be relied upon as a reasonably correct expression of the public's viewpoints, providing the technical requirements are adequately met" (Ministry of Works and Development, 1978, p.69).

Apart from providing information, surveys can provide a basis for planning. They describe what exists, they can analyse relationships between descriptive facts, and can predict possible outcomes. They can be used to educate the public (Gardner, 1978, pp.1-9).

Surveys can provide an information base for a community under study. They can be used for other methods of public participation such as advisory committees and citizens registers (Working Party, Undated, p.52).

Three methods of collecting the information are 1) the use of documents and observation; 2) mail questionnaires; and 3) interviewing. The Waimakariri survey involved mail questionnaires.

Although a mail questionnaire may not achieve as high a response rate as the personal interview, Moser and Kalton (1986, p.256) argue that its merits may be strong enough to weigh the balance in its favour. Mail questionnaires are cheaper to send out than interviewers; this is the trade-off that is to be made against a lower response rate than the interview. Other advantages of mail questionnaires include the value of being able to reach a scattered population at a uniform cost; this is not the case with travel expenses associated with interviewing (Ibid., p.257).

Interviewer errors may seriously undermine the reliability and validity of survey results; this can be avoided with the mail questionnaire (Ibid., p.258).

Mail surveys leave people to respond freely in their own time with less pressure to provide what they imagine an interviewer to be 'the correct' answer. Personal or embarrassing questions may be answered more accurately in the absence of an interviewer while leisurely household-consultation may provide more accurate information (Ibid.).

Apart from the question of non-response, Moser and Kalton (pp.260-261) identify a number of other disadvantages to the mail questionnaire method.



If the questions are not simple, confusion or misunderstandings can result in information that is not useful.

There is no opportunity to check on ambiguities or lack of response; the answers have to be accepted as final. The mail questionnaire is therefore seen to be an inflexible method.

When the respondent fills in the questionnaire all the questions can be seen before any are answered. The different answers cannot therefore be treated as independent.

Before the major findings of the Waimakariri survey are presented, two other instances where surveys have been carried out will be briefly discussed. The first was in the City of Keene, New Hampshire, United States of America, and the second in Opotiki, East Cape, North Island. The positive aspects of gaining information on floodplain residents' attitudes towards flooding are seen to have contributed to the overall planning success of the exercises discussed.

#### City of Keene survey

A comprehensive floodplain management plan was developed for the City of Keene in line with policies that encourage projects focussing on non-structural options for reducing damage. Community attitudes were investigated through questionnaires, interviews with community leaders, and interaction with a community advisory committee (Wood, *et al.* 1985, p.417).

"The distinguishing characteristics of this study include the focus on nonstructural measures and the close interaction with community residents and officials ... The high degree of community interaction was intended to lead to a flood plain management plan that would meet federal water resources planning criteria and the needs and preferences of the local residents." (Ibid., p.418).

A structured survey of residents was undertaken in 1979 to identify the attitudes and opinions of Keene's citizens about the various approaches to managing the city's flooding problem. The opinions of these people were held to be of great importance because they bear the brunt of flood damages, and are also expected to bear a proportion of the costs of measures taken to reduce these damages (Wood *et al.* 1988, pp.4-1 - 4-3).

A recommended floodplain management plan was developed that took into account measures that fit the physical situation in Keene and those that were acceptable to local residents. One important aspect of the study method was the attitude surveys and the interaction with local citizens. This "allowed the project team to become familiar with the needs and desires of the populace and to incorporate them into the planning effort" (Wood *et al.* 1985, p.431).

#### Opotiki survey

As part of the Waioeka-Otara Catchment Management Study a survey of 10% of Opotiki households was carried out in 1987. Eighty-seven households were interviewed. The intention of the survey was to assess the public perception of flood risk in Opotiki, whether residents felt they were getting 'value for money' from their rates, and the extent of their insurance cover and knowledge of civil defence procedures.

The public perception of risk was found to equate positively with the views of the technical experts employed by the Board. There was found to be a general lack of awareness of civil defence procedures.

The Board was satisfied that tentative conclusions drawn from the preliminary findings "will be of great benefit to the direction the Waioeka Otara Catchment Study will be taking next year" (East Cape Catchment Board and Regional Water Board, 1987, 1).

## 5.2 Waimakariri floodplain survey

Previous chapters refer to the need for public perceptions of risk to be incorporated into the design of the Waimakariri Floodplain Management Plan. A survey of one group of affected interests (Blackford, 1989) (ratepayers on the Waimakariri floodplain) was selected as one method of allowing a wide range of views to be tapped at a relatively low cost.

A mail questionnaire was sent to 850 floodplain occupants (Fig. 3.1). Four hundred and ninety eligible questionnaires were returned representing a response rate of 58%.

The state of public awareness of the flood hazard posed by the Waimakariri River and floodplain occupants' attitudes towards risk were examined in this study. Insights were also sought into what the community is prepared to pay for flood protection. Information was required on the public's familiarity with management options that keep water away from people and those that keep people away from water. These options had been previously identified in a pilot study carried out by Catchment Board staff.

It was found that many (71%) floodplain residents perceived themselves to have been safe from flooding of the Waimakariri River over the past five years. Fewer (58%) feel safe from flooding over the next 10 years. Forty per cent are confident in the safety of the greater Christchurch urban area over the next thirty years. Uncertainty towards the future was apparent.

Factors that appear to influence lay perception of risk (see Chapter 2.4) were tested. Past experience of the event (flooding of the Waimakariri but not elsewhere) and geographical situation of the floodplain occupant did influence their perceptions while personality traits did not. Knowledge of the event did not appear to do so. This could be attributed to the fact that major flooding of the Waimakariri River is a rare occurrence; the last major flooding occurred in 1957.

Participants were also asked directly the reasons for their responses. Reasons given for feelings of safety were a widespread faith in structural flood controls and in the capacity of the river to contain floodwaters, and the fact that there had been no previous problems.

Floodplain residents were found to be more familiar with structural options than non-structural. Despite this, they appear to favour both categories being used on the Waimakariri. Stopbanks were greatly preferred to channel alteration. Order of preference for non-structural options were; floodwarnings and evacuation procedures, flood hazard maps (this option is not a key component of the pilot study referred to above) and zoning. Floodproofing of buildings was seen to be desirable for property at high risk.

Findings indicated that people are willing to pay for flood management measures in proportion to the risks they perceive and the benefits received from protection from flooding. Those who expressed the attitude that there was a neutral to extreme risk of flooding by the Waimakariri over the next 10 years were willing to pay significantly more for flood protection than those who feel safe or completely safe.

Floodplain residents appear to be familiar with flood disaster warnings but not with civil defence procedures.

### 5.3 Summary

The survey proved successful in gaining diverse views from a wide range of people facing different levels of risk. The response rate demonstrated a relatively high degree of community interest in the issue of flooding and flood protection with regard to the Waimakariri River.

The Catchment Board now has information on the public's perception of risk that needs to be taken into account in the design of a flood hazard management plan. The Board has a clear indication of the risk the community is prepared to pay to avoid. It can also have confidence in the fact that floodplain occupants will find favour with a management plan that comprises both structural and non-structural options.

The information gained provides a data base to be used for further participation by a community advisory committee, for example. It can also be used as a basis for future community flood awareness/preparedness programmes. The findings indicate where specific elements of such a programme should be focused.

The next chapter will examine other participatory techniques where other affected interests can be incorporated into the Waimakariri Floodplain Management Plan decision-making process.

## **CHAPTER 6 How to participate? Other techniques**

### **6.1 Introduction**

In Chapter 4 we identified opportunities for some groups of affected interests to participate in defining criteria for use in decision making about floodplain management. The previous chapter discussed one participatory opportunity, the Waimakariri Floodplain Survey. This chapter will investigate means by which other affected interests identified in Chapter 3 might participate. These include a Floodplain Management Working Group, a Community Advisory Group, the charrette, pamphlets, and public meetings.

### **6.2 Floodplain Management Working Group**

The Board has requested advice on the establishment of a Floodplain Management Working Group (FMWG) which would co-ordinate the Waimakariri Floodplain Management Plan and assist in its development and implementation. It should cater for the interests of floodplain occupiers, probably by direct representation because, according to the Board, public opinion must be seen to be able to exert influence on the formation of policy for the Waimakariri River floodplain (NCCB, Pers. comm., 8 June 1988).

Draft guidelines for floodplain management planning studies prepared by the Water and Soil Directorate, Ministry of Works and Development (Bewick, 1988, Section 1, pp.2-3) recommend the setting up of floodplain management working groups. The role of these groups would be to co-ordinate the advice and expertise available from various sources and to assist councils in the development and implementation of a floodplain management plan.

The guidelines suggest a balanced representation could include an elected member of council, council and catchment authority staff (planner, engineer, sociologist), a local community representative, and a representative from the local Civil Defence group. An officer representing central government (e.g. from the Ministry for the Environment) could be co-opted to the FMWG as and when required (Ibid., Section 4,p.2).

These guidelines have drawn heavily on those designed by the New South Wales Government (New South Wales Government, 1986, p.6). A basic difference is their recommendation that several local community representatives rather than one be included in the Group's membership. Neither the New Zealand nor the New South Wales guidelines give any guidance as to which interests the local community members might represent. However, the New South Wales guidelines suggest that ecological and social factors, including the needs of the local community, are considerations that should be taken into account.

Floodplain management committees in New South Wales have the following composition (Heath, 1988, Pers. comm. Metropolitan Water, Sewerage and Drainage Board, Sydney).

**Warringah Council.** Two alderpersons, several Council employees (shire engineer, drainage engineer, environmental engineer, chief town planner, chief health and building inspector), representatives of the Public Works Department (PWD) and the Department of Water Resources (DWR), state emergency services controller

and two members of the public.

The two members of the public were chosen by Council as: one person from a local action group and one person with no affiliations. This body was chosen by advertising in the local newspaper for expressions of interest. Respondents had to state why they wanted to be on the Committee and had to have some experience of flooding.

"The constitution of the committee has been good and the public representatives have been valuable members of the committee" (Ibid.).

**Gosford Council.** 1 representative from each of the following groups: Council Alderman, City Engineer's Department, Town Planning Department, Health & Building Department, NSW Public Works Department, NSW Department of Environment & Planning, Real Estate Institute, Gosford City Combined Progress Association, the Law Society, Central Coast Region Flood Action Group, and the Gosford District Environment Foundation.

Contributions from community representatives are mainly by way of introducing to the Committee the opinions, ideas and problems of the community on these issues and the reasons behind Council's Flood Policy. The Council has been pleased with the success of the Committee and believes it to be worthwhile (Bruderlin, 1988, Pers. comm.). The committee composition was chosen by the Council. A decision was made to exclude public groups likely to agitate (Heath, 1988, Pers. comm.).

**Shoalhaven Council.** Council staff (city engineer, flood mitigation engineer, city planner, city health and building inspector and town clerk rep.), PWD, three alderpersons (appointed), other alderpersons as interest dictates and two members of the public. These two were chosen by Council as they had a history of interest in the area. One is a surveyor and flood-prone resident, the other is a flood-prone farmer. Environmental groups and vested interest groups were excluded. The contributions made by the public representatives have been considered valuable (Ibid.).

**Fairfield Council.** Council staff (flood mitigation engineer, town planner, and chief building inspector), city engineer, one alderperson, DWR, PWD, Master Builders Association, and one representative from two of three local action groups. These latter two were chosen by Council; the third group being less appropriate. The contributions from the public were valuable (Ibid.).

Draft guidelines for the establishment and operation of Catchment Coordinating Groups in rural Victoria, Australia (Ministry for Planning and Environment Victoria, 1988, p.4) state that membership needs to be broad enough to ensure representation from the key areas involved in catchment management. Membership should comprise representatives from: municipalities, relevant Government agencies (such as Department of Conservation, Forests and Lands, Rural Water Commission, Department of Agriculture and Rural Affairs, Department of Industry, Technology and Resources, Ministry for Planning and Environment), Regional Planning Authorities, River Improvement Trusts and/or River Management Boards, and key community groups. The last category may include land-holders' groups, conservation groups, and recreational bodies.

Approximate sizes of existing groups are 21, 27 and 22; however, each Group operates with a smaller "core group". Other members may be co-opted from time to time but it is felt that the size of a Group should not exceed 30 people if it wishes to retain a strong sense of identity. Where a Group is a fairly large body, say over 20 members, 'sub-committees' or 'working groups' need to be

established. They undertake the day-to-day work of the Groups while a full Catchment Co-ordinating Group would meet between two to four times a year (Ibid., 5).

Although trans-Tasman floodplain management policies have similar objectives, subsidisation of structural control works is quite different. Funding for flood mitigation activities in New South Wales follows a ratio of 2:2:1 for Federal:State:Local Government contributions (Lees & McGlynn, 1985, p.100). As has been stated in previous chapters, the 'user pays' economic philosophy of New Zealand's Labour Government means that local ratepayers/residents can expect to meet closer to a 75% share of the costs of structural controls. For this reason New South Wales models may not be entirely appropriate to the New Zealand situation. A greater proportion of community representatives might be required on a floodplain working group in this country to represent the range of affected interests that have been identified.

### 6.3 Community Advisory Committee

It is unlikely that one or two community representatives on a liaison or working group would be able to express sufficiently clearly the preferences of a wide range of affected interests. The following sections investigate alternative means of having a wide range of preferences taken into account in the decision-making process; the intention is to complement the efforts of a floodplain working group.

In Chapter 5 a study carried out for the City of Keene, New Hampshire was discussed. Reference was made to a citizen's advisory committee that was appointed to improve communication between the project team for the study and the community involved (Wood et al. 1985, 419). "A good working relationship developed between the Committee and the project team, and in the end the Committee was prepared to support the recommended plan and to work for its implementation".

The Committee was selected by the Mayor of Keene and was intended to represent varied interest groups e.g. business, development and conservation/environmental. The Mayor's stated purpose for the composition of the Committee was to allow a knowledgeable, interested, and varied perspective of the plans as they were developed such that the community's interests would be represented (Pronovost, 1988, Pers. comm.).

Members of the Advisory Committee included: the City Planner whose job it is to encourage prudent developments in town; a contractor who built small retail stores, condominiums, and offices; an insurance broker who was a long-term resident and was used to periodic inundation from the local river; a real estate broker (woman); a housewife from the League of Women Voters; a middle manager from a manufacturer located in the floodplain; a retired fireman and long-term resident; and a plumber who was politically active (Wood, Noonan, 1988, Pers. comms.).

The study team met regularly with the Committee, holding 'mini' hydrology and hydraulics seminars. "Everything was simplified, but we felt a need to get these people thinking about the scientific reasons for their flood problem... As we moved further and further into the study, we held frequent (once every two months) meetings to get their feelings, likes, dislikes regarding some of the alternatives. The input was valuable" (Noonan, 1988, Pers. comm.). "The members ideas were incorporated in terms of pragmatic acceptance of alternatives irregardless (sic) of their benefit/cost ratio characterization... The

Committee helped the consultant convince the (U.S. Army) Corps of Engineers that the technically most effective plan was not necessarily implementable" (Wood, 1988, Pers. comm.).

"As alternatives were developed by the technical team they were reviewed and discussed with the Advisory Committee at monthly evening progress meetings. Importantly these meetings allowed the technical team to clearly demonstrate the technical feasibility and the advantages and disadvantages of all alternatives... At the conclusion of the study the support of the committee in its recommendations to the mayor allowed the plan to proceed past several nay sayers who had influenced earlier flood reduction plans" (Pronovost, 1988, Pers. comm.).

We propose that there are distinct advantages in establishing a Community Advisory Committee similar to the one outlined above. A wide range of affected interests would be taken into account. Two or more of the members could also stand on the Floodplain Management Liaison Group to facilitate a two-way flow of information between community representatives and the technical experts involved.

Interests that could be included in such a Citizens Advisory Committee are: ratepayers on the floodplain (residents, business/commercial, farming), non-ratepayers on the floodplain, those who live beyond the floodplain but use Christchurch as a service centre, environmental, recreational, Maori cultural and spiritual, and those of future generations.

#### 6.4 Charrettes<sup>1</sup>

The charrette concept is "an activity that brings residents and people of expertise together, under the pressure of limited time, for the study of specific community problems. It is a period of brainstorming and the establishment of basic communication between groups... The concept of citizen participation is fundamental to a charrette... (it) sets the charrette apart from the more usual methods of planning and problem solving that tend to involve professional experts and politicians but exclude the people" (Riddick, 1971, pp.1-5).

A charrette is useful for developing specific designs but its success depends on 1) how representative of the community those involved are (the method of selection is important here) and 2) how closely the problem is seen to relate to the lives of the participants. It is a learning process for both experts and lay people and serves to open up communication between them. The charrette process also speeds up the process for reaching an agreed decision whereas the Citizens' Advisory Committee would exist over a relatively long time period.

A steering committee is generally set up initially and will then form an executive committee to deal with the basic functions such as finance, publicity, graphics, venue, inviting citizens, professional experts etc. Riddick suggests that a professional consultant should be hired to act as the Charrette Manager. It is recommended that this position not be filled by a local person as he or she must be able to identify with all segments of the total community (Ibid., pp.19-29).

Possible disadvantages are the requirement of in-depth preparation which could be costly in terms of time and materials. There may be a need to meet some of the expenses of participants, e.g. child care, travel costs, if a wide community representation is required. Technical people inhibit people from saying what they think. Participants may not represent the whole community

and some potential participants may be left out (Working Party, Undated, p.45).

### **6.5 Pamphlets and newsletters**

The Sydney Metropolitan Water, Sewerage and Drainage Board has established a public relations group that liaises closely with consultants employed to assist in consultations with the public over a flood protection project that is being undertaken for the Warragamba Dam. Form letters and glossy coloured pamphlets are sent out in response to enquiries. They are also available at the Board's offices. The pamphlets outline the aims of the flood protection programme, the need for such a programme, options being considered, information on flood prediction and flood damage studies, and details on opportunities for the public to influence the final form of the programme. Six-monthly community participation newsletters are also distributed by the consultants (Heath, 1988, Pers. comm.).

Fifty-two per cent of those surveyed in the Waimakariri Floodplain Questionnaire saw pamphlets as their first or second preference for finding out about information on flooding. Pamphlets and newsletters provide information to those known to be interested and can indicate forthcoming opportunities for involvement. They encourage and stimulate public awareness and involvement in planning but may afford only a one-way flow of communication unless letters, etc. are solicited. This can be a costly means of communication in terms of staff to produce newsletters, printing and mailing expenses (Working Party, Undated, p.45).

### **6.6 Public meetings**

Results from the Waimakariri Floodplain Survey showed that only 5% of respondents indicated that meetings would be their first or second preference for obtaining information about flooding. However, they were asked about obtaining information, not about participating in an exchange of views.

There are dangers that public meetings may be unrepresentative. Those who feel strongly about an issue may seek to make that issue the subject of discussion and preclude the opportunity for other views on other issues to be heard (Ministry of Housing and Local Government, 1970, p.29). A number of well-organised groups may give the impression that they are representing the views of a wide range of interests.

It was concluded by the East Cape Catchment Board and Regional Water Board that while public meetings can be useful forums for debate, they do not compare with interview/survey methods as a means of gathering information (East Cape Catchment Board and Regional Water Board, 1987, p.1).

The Sydney Metropolitan Water, Sewerage and Drainage Board employs consultants who assist in consultations with the public over a dam project that is being undertaken at present. The consultants have compiled an extensive list of groups and individuals who are invited to planning focus meetings (Heath, 1988, Pers. comm.).

### **6.7 Summary**

Guidelines for floodplain management (Bewick, 1988) recommend the establishment of a Floodplain Management Working/Liaison Group. However, suggestions for only one community representative may fail to allow a sufficient



range of groups of affected interests to have their views clearly heard. Techniques such as a community advisory group or a charrette exercise could provide that opportunity. (Information collected in the survey could provide a data base for the establishment of such groups or exercises.) It was suggested that representatives from a community advisory group could be elected or appointed to represent the group's views to the FMWG.

Information dissemination techniques such as pamphlets and public meetings were examined. These are generally passive exercises that do not permit a two-way flow of information.

This chapter has examined mechanisms by which the community's perception of risk can be incorporated into the design process together with technical and planning perceptions of risk. Greater public acceptance of the final proposal can be expected if the public has been seen to exert influence over the choice of options to minimise damage by flooding.

The success of the public participation exercise will largely depend on those selected to formally participate in a consultative capacity being representative of the floodplain community. The long-term use of such a grouping will be dependent on how influential the members themselves and the community, see the group as being.

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## Notes

1 The word 'charrette' has an interesting origin. It is an architectural term of French derivation. "It implies a brief period of intense activity, if not round-the-clock to accomplish a given task within a specific period of time.

The instructor of an architecture class in the old French university would assign projects to his students. After a specific period of time he would climb into his 'cart', in French this word is 'charrette', and go to the various areas where students were working to collect the drawings. If a student had not finished, he would climb in the back of the cart and continue to work as long as possible. The other students referred to those in the cart and to the process by which they were operating as 'Charretting'" (Riddick, 1971, p.1).

## **CHAPTER 7 Conclusions, recommendations and future investigations**

### **7.1 General conclusions**

Despite increasing investment in flood protection works over time, flood loss costs have continued to rise in New Zealand (see Fig. 1.1). In the past hazard event modification and relief have been given the greatest priority. Planning measures which attempt to modify hazard-loss susceptibility have maintained a low profile. The approval of floodplain management plans is now based upon the Urban Flood Loss Reduction Policy which attempts to move away from the past bias towards structural options. Equal consideration of both structural and non-structural options is aimed at reversing the trend in flood loss costs.

Before the community can respond to policy initiatives it needs to cross a risk perception threshold. Only then is it able to evaluate management options designed to reduce flood damage and to make trade-offs between structural and non-structural options.

Chapter 2 examined the differences in risk perception between technical experts and the general public. These differences are significant when attempts are made to implement floodplain management policy. Findings from the Waimakariri Floodplain Survey substantiate the suggestions made in the literature that differences in risk perception exist between technical experts and floodplain occupants. Very few comments were received from survey respondents on the fact that risk is always present whereas statistical risk is based on this notion. Many floodplain occupants believe that structural options such as stopbanks offer them sufficient protection from flooding.

Educating the public about the flood hazard is only one aspect of floodplain management. The success of this exercise relies on a two-way process. "Each side, expert and public, has something valid to contribute. Each side must respect the insights and intelligence of the other" (Slovic, 1987, p.281).

"Good predictions of the future choices of resource managers (users) are likely to be based on an understanding of their perception and the ways in which it differs from that of the technologists" (Burton and Kates, 1964, p.440).

One of the critical tasks of floodplain management planning is the selection of a level of risk from which the community should be/may wish to be protected. The magnitude and frequency of a specific base flood will determine the design of structural options and the area of land that should be subject to flood-related development and building controls (Bewick, Section 1 pp.1-2).

In Chapter 4 we saw that the Board was examining the possibility of reducing the chances of flooding to a 'vanishingly small' level of risk. This becomes significant in view of fundamental changes in funding for structural adjustment options. The beneficiaries of flood protection works will have to make a greater contribution to their costs than they have in the past. Experts may wish to design flood protection schemes to reduce the risk associated with extreme rare events. On the other hand, floodplain occupants may be willing to accept certain levels of risk while being prepared to pay to reduce or avoid other levels of risk.

The public acceptance of a specific flood frequency for planning purposes is therefore of particular importance. It may be difficult to persuade individuals

who perhaps work to a 10-year planning horizon to be concerned with longer-term community and national time planning horizons.

The stated purpose of the Local Government Official Information and Meetings Act 1987 s.4(a) is to "provide for the availability to the public of official information held by local authorities ... (i) to enable more effective participation by the public in the actions and decisions of local authorities; ..." This legislation does not prescribe how this should be implemented. It also assumes a one-way process. This report has provided a methodology whereby public perceptions of risk can be incorporated into the design process of the Waimakariri Floodplain Management Plan.

The public's perceptions of risk and willingness-to-pay for protection from those risks was determined by:

1. examining the hiatus in perceptions of risk between technical experts and lay floodplain occupants which provided a purpose for attempting to improve processes for public participation. Both statistical and perceived risk need to be incorporated into the design process.
2. developing a model of proportionate equality to determine who (that is, which members of the public) should be participating. It was found that all those who could be affected by flooding, that is, those living or owning property on the floodplain; those who depend on Christchurch as a service centre but live beyond the floodplain boundaries; Maori cultural and spiritual interests associated with the floodplain; recreational and environmental interests, plus those of future generations, should be able to participate in the decision-making process.
3. referring to a decision-making model by Kates which provided a theoretical perspective on where public participation should take place in the decision-making process. Three sequential components include:
  - i. The problem definition stage when a flood hazard perception threshold has to be crossed;
  - ii. The search for adjustment options phase;
  - iii. The selection of decision criteria stage.

No opportunities for public participation appeared in the search for adjustment options phase nor have they appeared in the selection of decision criteria stage. However, using the findings from the survey and potential community representation on the FMWG could allow the public's perception of risk to be incorporated into the problem definition. The public's view on decision criteria could also be obtained in this way.

4. examining participatory techniques to find how public views could be incorporated in that process. The survey, a Floodplain Management Working Group, a Community Advisory Committee, charrettes, pamphlets and newsletters, and public meetings were discussed. A survey has already been carried out.

It is difficult to anticipate the degree of public acceptance of the Waimakariri Floodplain Management Plan and subsequent Management Proposal if the public does not participate when the flooding problem is defined. The decision-

making model specified that participants need to cross the threshold of risk perception and believe that the threat of flooding does exist before they can be in a position to evaluate alternative courses of action.

The success of the public participation exercise will largely depend on those selected to participate formally being representative of the floodplain community. However, if the public's views have been taken into account, there is a greater likelihood of the Management Plan being accepted than if the public had not been involved.

## 7.2 Recommendations

### 1 Establish a Community Advisory Committee.

The establishment of a Community Advisory Committee would provide a satisfactory vehicle for tapping a wide range of community perceptions of risk and attitudes towards selected adjustment options. These would be gathered by the Committee members and reported to the FMWG. In turn, information on adjustment options could be disseminated to Committee members who would report to the interest groups they were representing. The public would be participating in local decision making that affects its well-being and livelihood.

Membership of a Community Advisory Committee could be derived in the following ways.

- (1) Leaders of existing community organisations such as residents' associations from various locations on the floodplain. Selection could depend on relative levels of risk faced by different localities. One member from each side of Waimakariri River in highest risk area, one from Christchurch City in medium risk area, and one from low risk area,
- (2) Representatives from North Canterbury Federated Farmers (Ohoka and District Branch, Waimairi Branch) and the Canterbury Growers Society Ltd,
- (3) Representatives from the Canterbury Manufacturers Association and the Merchants Association or representatives of businessmen's associations in specified districts,
- (4) Leaders of existing community organisations such as residents' associations from various locations beyond the floodplain that rely on Christchurch as a service centre,
- (5) Representatives of recreational and environmental interest groups, e.g. Outdoor Recreation Information Centre; the Royal Forest and Bird Society,
- 5) Representatives of the tangata whenua, eg. Ngai Tahu Trust Board,
- 6) Representative from the Christchurch (Secondary Schools) Youth Council,
- 7) Advertisements could be placed in newspapers as the Warringah Council, New South Wales, did.

## 2 Problem definition.

The problem definition, that is, the nature and extent of flood events being planned for, should incorporate the public's perception of risk (refer to Kates' model in Chapter 4.3). The public would need to cross the threshold of risk perception before this could take place satisfactorily. Definition of a community problem by the community itself or a community understanding of the event that is being planned for would ensure greater support for the final selection of adjustment options.

In order to reduce vulnerability to flood loss the public must understand why a particular flood frequency and magnitude is chosen for planning purposes. If it does not, a public outcry could take place when zoning boundaries and flood hazard maps are made public and insurance companies react to this information. The problem redefinition exercise could take place through the medium of a Community Advisory Group.

### 7.3 Future investigations

The Urban Flood Loss Reduction Policy requires the consideration of non-structural planning options. If national policy guidelines are to be successfully implemented at the local level, planners will also need to understand the implications of planning for a specific frequency and magnitude of hazard event. In addition to the perceptions of risk held by technical experts and laypeople of the floodplain, those of the planning profession might profitably be examined. Ericksen (1986, pp. 44-45, 224-225) refers to comments made by people associated with the planning profession. They indicate a lack of knowledge of flood hazard statistical terminology.

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Appendix I: WAIMAKARIRI RIVER FLOODPLAIN MANAGEMENT PLAN .

MAJOR STEPS IN PROJECT DEVELOPMENT<sup>1</sup>

<u>Date</u>	<u>Step</u>
July 1985	Memo to Management Committee recommending that a Technical Group be formed to prepare a brief for review of the Waimakariri River Improvement Scheme 1960 (WRIS 1960).
October 1985	Brief prepared which proposed a review of the standard and performance of WRIS 1960, presentation of options for future protection measures and preparation of a Scheme Proposal for 1990 - 2020.
December 1985	Application for NWASCA Grant (PATS GA38), based on above brief, forwarded to MWD. Grant sought = \$287,550 for 1986 - 1989.
February 1986	Application for NWASCA Grant declined. Application under flood loss reduction policy suggested.
October 1986	Application for NWASCA Grant for WRFMP forwarded to MWD. Grant sought = \$280,750 for 1987 - 1990.
December 1986	Grant Application approved by NWASCA.
May 1987	Board approves local share of funding for WRFMP for 1987/88
June 1987	Memo to Management Committee for engagement of consultants approved.
July 1987	External contracts let for economics, geomorphology, hydraulics and hydrology.

<sup>1</sup> Reference: File 8/14/WRFMP and summary "WRFMP - major items in project development" on that file (17 May, 1988)

<u>Date</u>	<u>Step</u>
September 1987	Inaugural meeting of Technical Advisory Group
December 1987	Public participation consultant engaged
December 1987	Quarterly Newsletter No. 1 issued
February 1988	Photogrammetric mapping contract let to DOSLI
March 1988	Quarterly Newsletter No. 2 issued
April 1988	Pilot Study completed
May 1988	External contract reports all received.

## **Appendix 2. WAIMAKARIRI RIVER FLOODPLAIN MANAGEMENT PLAN.**

### **PILOT STUDY**

The purpose of the pilot study was to determine the scale of the project by forecasting key components of a floodplain management plan for the Waimakariri River. This was achieved by examining and analysing a list of options previously considered to merit study for possible inclusion as a policy or a strategy in the WRFMP. Feasibility was judged on the basis of economic, environmental, social and technical considerations. The outcome is six distinct components. These are detailed broadly below, without combinations and sub-options, and represent optimal responses at this stage. The components, which are evolutionary rather than revolutionary, build on the Waimakariri River Improvement Scheme 1960, largely in the non-structural arena.

### **KEY COMPONENTS**

#### **1. MAINTENANCE AND REFINEMENT**

Maintain and locally refine the structural system of the existing protection scheme. Grass the stopbanks to improve their resistance to scour. Further reduce the possibility of stopbank erosion in the reach between Old Crossbank and Halkett by brush and tree planting on the berm.

Local refinement might include, for example, removing McLeans Crossbank to improve floodway capacity and flow alignment. River behaviour in the Crossbank-Halkett reach poses the greatest threat to Christchurch.

#### **2. STRUCTURAL EXTENSIONS**

- (a) Extend the stopbank system from Halkett Groyne upstream as far as the natural terrace near Intake Road. This action would provide continuous structural protection on the south side and match present conditions on the north bank.**
- (b) Construct a secondary stopbank from Old Crossbank downstream to the Christchurch Northern Motorway.**

This action, which provides a secondary flow path and detention area, would increase structural protection of northern Christchurch, Belfast and Kaiapoi to a level similar to that already enjoyed by northwest Christchurch.

A suggested line for the secondary bank is from the southern extent of Old Crossbank along the right bank of the Old South Branch taking advantage of an existing stopbank north of McLeans Island Road and a natural terrace north of Johns Road. The presumption underlying the secondary bank proposal is that degree of structural protection should be proportional to potential for flood damage.

#### FLOODWARNING AND COMMUNICATIONS

Complete installation of the AQUITEL telemetry system for floodwarning and develop a quantitative flood forecasting system. Review the operation of the Board's flood control and monitoring station. Review the nature, means and effectiveness of flood related communications with the New Zealand Meteorological Service, Police and Civil Defence.

The review of the Board's flood station would include staffing requirements and care of staff families during emergencies.

#### FLOOD HAZARD ZONING

Zone the highest risk area of the floodplain as a flood hazard zone. Allow development within the zone if it is unable to be located elsewhere; but ensure that new construction meets appropriate flood proofing standards.

The high risk area parallels the river, at about a 3 to 4 kilometre width, from Eyre Diversion to the coastline on the north bank, and from Halkett to the coastline on the south. The proposed zone would reinforce greenbelt provisions of the Canterbury United Council Regional Scheme and groundwater protection provisions of the Christchurch Groundwater Management Plan.

## 5. TECHNICAL ASSISTANCE PROGRAM

Develop a technical assistance program to enable floodplain occupiers to determine the risk of flooding at their location and obtain advice about appropriate damage reduction measures.

The variable nature of risk over the floodplain would need to be mapped. Examples of damage reduction measures are sealing of doors and windows on ground floors, raising floor levels and installing capital intensive equipment above predicted flood levels.

## 6. COMMUNITY AWARENESS PROGRAM

Establish an ongoing flood preparedness program for floodplain occupiers. This would co-ordinate and maintain the effectiveness of the Technical Assistance Program and the floodwarning system.

The program would be structured to meet the needs of differing occupier groups - industry, local government, residents etc. It would educate people about the likelihood and dangers of flooding, and would advise them of what to do both in anticipation of flooding and should flood warnings be issued.