



BIBLIOGRAPHIC REFERENCE

Stewart, C.; Becker, J. S.; Coomer, M.; Wilson, T.; Davies, A., Hume, T. 2007. Coastal management in the Waikato region: a study of the views of Coromandel beachgoers and residents on coastal erosion and its management, January 2007, *GNS Science Report 2007/21* 130 p.

C. Stewart, Private Consultant, Brooklyn, Wellington

J.S. Becker, GNS Science, PO Box 30368, Lower Hutt

M. Coomer, GNS Science, PO Box 30368, Lower Hutt

T. Wilson, Natural Hazards Research Centre, University of Canterbury, Private Bag 4800, Christchurch 8140

A. Davies, Environment Waikato, PO Box 4010, Hamilton

T. Hume, National Institute of Water and Atmospheric Research, PO Box 11115, Hamilton

This report was prepared for Environment Waikato using data collected by GNS and NIWA as part of collaborative research jointly funded by Environment Waikato and the Foundation for Research Science and Technology, New Zealand.



CONTENTS

ABSTRACT	V
KEYWORDS	VIII
1.0 INTRODUCTION	1
1.1 Study overview	1
1.2 Comparative geomorphic settings	3
1.2.1 Tairua	3
1.2.2 Waihi Beach	4
1.2.3 Whangapoua	4
1.3 Administration of the study areas	4
1.4 Approaches to coastal protection at the study locations.....	5
1.4.1 Tairua	5
1.4.2 Whangapoua	6
1.4.3 Waihi Beach	6
2.0 METHODS	8
2.1 Choice of methods.....	8
2.2 Questionnaire design.....	8
2.3 Sampling strategy and survey delivery details.....	9
2.3.1 Postal questionnaires	9
2.3.2 Face-to-face interviews	10
2.4 Data analysis and reporting	11
3.0 INTERVIEWS WITH BEACHGOERS AT WAIHI BEACH	14
3.1 Summary of responses.....	14
3.2 Valued features of Waihi Beach	15
3.3 Protection of valued features	15
3.4 Natural hazards affecting Waihi	15
3.5 Coastal erosion and its causes.....	16
3.5.1 Underlying causes.....	16
3.5.1.1 Unsure.....	16
3.5.1.2 Storms	16
3.5.1.3 Sea level rise.....	16
3.5.1.4 'Living too close'	16
3.5.2 Current seriousness of coastal erosion threat to Waihi Beach.....	16
3.5.3 Future seriousness of coastal erosion threat to Waihi Beach	17
3.5.4 Effects of sea level rise on Waihi Beach	17
3.6 Best approach to managing coastal erosion.....	17
3.7 Respondents' views on how coastal erosion is managed in Waihi.....	17
3.8 Respondents' views of the rock walls at Waihi Beach.....	18
3.8.1 Effectiveness at managing erosion.....	18
3.8.2 Attractiveness.....	18
3.8.3 Effects on beach usage	19
3.8.4 Drawbacks of rock walls	19
3.9 Opportunities for public involvement with coastal erosion management at Waihi Beach.....	20
3.10 General comments about managing the coast.....	20
3.11 Key points for Waihi Beach.....	21
4.0 INTERVIEWS WITH BEACHGOERS AT TAIRUA	22
4.1 Summary of responses.....	22

4.2	Valued features of Tairua’s Ocean Beach and surrounds	23
4.3	Protection of valued features	23
4.4	Natural hazards affecting Tairua.....	24
4.5	Coastal erosion and its causes	26
	4.5.1 Underlying causes	26
	4.5.1.1 Storms	26
	4.5.1.2 ‘Living too close’	26
	4.5.1.3 Sea level rise	27
	4.5.1.4 Other explanations or unsure	27
	4.5.1.5 Discussion	27
	4.5.2 Current seriousness of coastal erosion threat to Ocean Beach	28
	4.5.3 Future seriousness of coastal erosion threat to Ocean Beach.....	30
	4.5.4 Effects of sea level rise on Tairua’s Ocean Beach	30
4.6	Best approach to managing coastal erosion.....	30
4.7	Respondents’ views on how coastal erosion is managed in Tairua	31
4.8	Respondents’ views of the sand dune buffer maintenance programme at Ocean Beach	32
	4.8.1 Effectiveness at managing erosion.....	32
	4.8.2 Attractiveness	32
	4.8.3 Effects on beach access and usage.....	33
	4.8.4 Drawbacks of sand dune buffer zone	33
4.9	Whether participants felt well-informed about the dune buffer care programme at Tairua’s Ocean Beach before the project was implemented	34
4.10	Respondents’ awareness of development setback lines	34
4.11	Respondents’ other comments about the way the coast is managed in general.....	35
4.12	Key points for Tairua.....	35
5.0	INTERVIEWS WITH BEACHGOERS: WHANGAPOUA	36
5.1	Summary of responses	37
5.2	Background on Whangapoua	38
	5.2.1 Observations on long-term stability of coastline at Whangapoua.....	39
	5.2.2 Protection of sand dunes.....	40
	5.2.3 Views on development setbacks	41
	5.2.4 Other concerns raised by key informant group.....	41
5.3	Respondents’ awareness of coastal hazard issues when they bought their property.....	42
5.4	Valued features of Whangapoua’s coastline	43
5.5	Threats to valued features	43
5.6	Natural hazards affecting Whangapoua	44
5.7	Coastal erosion and its causes	45
	5.7.1 Underlying causes	45
	5.7.2 Current seriousness of coastal erosion threat to Whangapoua.....	46
	5.7.3 Future seriousness of coastal erosion threat to Whangapoua	46
	5.7.4 Respondents’ awareness of development setback zones.....	47
5.8	Preferred management options for the Whangapoua coastline	47
5.9	Involvement of respondents with local groups	48
5.10	Respondents’ views on whether coastal protection should be tackled as a community	48
5.11	Respondents’ views on coastal management in general.....	49
5.12	Key points for Whangapoua	49
6.0	DISCUSSION AND INTEGRATION	50

6.1	Objective 1: to investigate the value of the coast to communities (including visitors as well as residents).....	50
	6.1.1 Interviews	50
	6.1.2 Postal questionnaires	50
6.2	Objective 2: to investigate public perceptions of erosion.....	53
	6.2.1 Causes of coastal erosion	53
	6.2.1.1 Beachgoer interviews	53
	6.2.1.2 Postal questionnaires	54
	6.2.2 Understanding of coastal processes	54
	6.2.3 Perceptions of current erosion problems at Tairua and Waihi Beach ...	56
	6.2.3.1 Interviews with beachgoers	56
	6.2.3.2 Postal questionnaires	56
6.3	Objectives 3 and 4: general views on coastal erosion management.....	58
	6.3.1 Approval of different coastal protection options.....	58
	6.3.2 Best long-term approach to managing coastal erosion	59
	6.3.2.1 Beachgoer interviews	59
	6.3.2.2 Postal questionnaires	60
	6.3.3 Understanding of the pros and cons of different erosion management strategies	61
	6.3.4 Views on who should fund erosion control measures	63
	6.3.4.1 Private property	63
	6.3.4.2 Public property	65
	6.3.5 Views on development setbacks	66
6.4	Objectives 5 and 6: specific views on erosion management at each location	67
	6.4.1 Tairua	67
	6.4.1.1 Beachgoer interviews	67
	6.4.1.2 Postal questionnaire.....	68
	6.4.2 Waihi Beach	69
	6.4.2.1 Beachgoer interviews	69
	6.4.2.2 Postal questionnaires	70
6.5	Conclusion	76
	6.5.1 Summary of findings.....	76
	6.5.2 A comparison of methods used in this study	78
7.0	ACKNOWLEDGEMENTS	79
8.0	REFERENCES	79

FIGURES

Figure 1.1	Location of study sites in the Coromandel peninsula	2
Figure 2.1	Map of Tairua showing locations of postal survey respondents	12
Figure 2.2	Map of Waihi Beach showing locations of postal survey respondents	12
Figure 2.3	Map of Whangapoua.....	13
Figure 3.1	General view of the north end of Waihi Beach, looking north.....	14
Figure 3.2	Rock wall at Waihi Beach.....	19
Figure 4.1	Tairua's Ocean Beach, looking north from southern end	22
Figure 4.2	Trampling of sand dunes at Tairua's Ocean Beach	24
Figure 4.3	Proportion of samples of beachgoers nominating each hazard as one of two most likely to affect the local area.....	25
Figure 4.4	Views of Tairua's Ocean Beach	26
Figure 4.5	Views of Waihi Beach	26
Figure 4.6	South end of Tairua's Ocean Beach showing houses close to beach and within hazard zone	29
Figure 4.7	South end of Tairua's Ocean Beach showing rocks placed in an attempt to halt erosion	29
Figure 4.8	Fenced accessway at the north end of Tairua beach.....	33
Figure 5.1	Whangapoua Beach looking south-east.....	36
Figure 5.2	Whangapoua Beach looking north-west.....	37

Figure 5.3	Northwest end of Whangapoua beach with island visible	40
Figure 5.4	Beachfront at southeastern end of Whangapoua beach	41
Figure 5.5	Planted area around general store, Whangapoua beach.....	42
Figure 5.6	New Chums beach.....	44
Figure 5.7	Respondents' perceptions of the natural hazards most likely to affect each location.....	45
Figure 6.1	Valued features of Tairua and Waihi Beach for postal survey respondents (see questionnaires reproduced in Appendix 1 for full listing of valued features).....	51
Figure 6.2	Beachgoers' perceived causes of coastal erosion	53
Figure 6.3	Postal survey respondents' attitudes towards statements about coastal processes	55
Figure 6.4	Views of postal survey respondents on the severity of the erosion threat at each study location.....	57
Figure 6.5	Forms of coastal erosion management approved of by survey respondents	58
Figure 6.6	Survey respondents' views on the best long term approach to managing coastal erosion	60
Figure 6.7	Responses to incomplete statement about dune function	61
Figure 6.8	Responses to incomplete statement about the protection offered by seawalls	62
Figure 6.9	Responses to incomplete statement about the effects of seawalls on sandy beaches	62
Figure 6.10	Respondents' views on funding coastal erosion control where private property is at risk	63
Figure 6.11	Respondents' views on funding coastal erosion control where public property is at risk.....	65
Figure 6.12	Respondents' attitudes towards statements about coastal management at Waihi Beach (nb this graph sums the attitudes at each end of the scale where 'agree total' equals the proportion who chose 'agree strongly' plus those who chose 'agree'. Responses in the middle of the scale have been omitted).....	71
Figure 6.13	Respondents' views on the success of the dune buffer zones in addressing current erosion problems at the study locations.....	71
Figure 6.14	Waihi Beach respondents' views on success of rock walls in addressing current erosion problems	72
Figure 6.15	Effects of the dune buffer zone on beach usage at Tairua and Waihi Beach.....	73
Figure 6.16	Effects of rock walls on usage of Waihi Beach.....	74
Figure 6.17	Attitudes of Waihi Beach respondents to statements about the Shaw Rd rock wall (see Figure 6.12 for explanation of categories).....	75

TABLES

Table 2.1	Location, delivery dates and return rates for postal questionnaires	10
Table 3.1	Summary details of Waihi Beach beachgoers sample (n=29).....	15
Table 4.1	Summary details of Tairua beachgoers sample (n=30).....	22
Table 5.1	Summary details of Whangapoua beachgoers sample (n=19)	37

APPENDICES

Appendix 1	Questionnaires and interview sheets	82
Appendix 2	Additional photographs and recollections.....	113

ABSTRACT

Although beaches are highly valued and utilised resources, beach user opinions and preferences and community perceptions of coastal erosion have only rarely been studied in New Zealand. Even more rarely have they been used as input for directing coastal management strategies. To address this gap, we collected information on public perceptions of coastal erosion and on preferences for various erosion management strategies for three locations on the Coromandel coast, with the aim of being able to link the results of the study with long-term planning for those areas.

The study was carried out within a general framework of community involvement in coastal hazard mitigation. Its objectives were to investigate:

- the value of the coast to communities (including visitors as well as residents);
- public perceptions of erosion;
- public perceptions of different erosion management strategies (including planning tools such as development setbacks);
- public preferences for different coastal protection schemes, and reasons for these preferences;
- respondents' experiences with local coastal protection schemes at the contrasting study locations; and
- respondents' level of involvement with coastal protection schemes.

The study was carried out at Tairua, Waihi Beach and Whangapoua, on the east coast of the Coromandel. These locations were chosen as they illustrate a range of severity of current erosion threats, and of approaches to coastal protection. We adopted the dual approach of conducting face-to-face interviews with people encountered at the beach, and surveying local residents and property owners with a postal questionnaire. This report covers the findings from the interviews with beachgoers. The data from the postal questionnaire is reported in full in a companion volume (Becker et al. 2007), and findings have been integrated with the results of the beachgoer interviews to address the objectives of this study.

The main findings of the study are as follows:

Valued features

Investigating what people value about the coast was approached differently in the interviews with beachgoers (where an open-ended question was asked) from the approach used in the postal surveys (where respondents were asked to rate the importance of a list of valued features. Features valued by beachgoers at all the study sites were: easy access, clean beaches and good water quality, a safe swimming beach and the natural beauty of the surroundings. The open-ended nature of the question also provided insights into the unique characteristics of each location. Postal survey respondents were less concerned with amenity values and more concerned with natural character and preserving the wild, natural, undeveloped areas on the coast.

Perceptions of the causes of coastal erosion

The range of suggested causes of coastal erosion put forward by the beachgoers (storms, 'living too close' to the sea, and sea level rise) were all considered to be reasonable responses as the question asked did not distinguish between long and short-term timescales. Postal survey respondents at Tairua were more inclined to consider storms responsible for

coastal erosion; this may be a response to severe erosion that occurred after a major storm in 2003. A more commonly-held view among Waihi Beach respondents was that erosion problems are largely the result of building too close to the sea.

Understanding of coastal processes and options for coastal protection

The postal survey was a good medium for investigating these complex topics, with respondents asked for their views on a series of statements about coastal processes and the advantages and disadvantages of different coastal protection methods. Generally, people appreciate that erosion is a natural process, that there are cycles of erosion with rebuilding episodes in between, and that problems arise when development occurs too close to the shoreline. Similarly, there was a high level of understanding about the function of sand-binding plants on dunes in trapping wind-blown sand, and that sea walls offer only limited protection to the properties behind them.

Areas in which there may be scope to improve public understanding are:

- To emphasise that sand dunes can successfully be restored even after being removed;
- To correct an impression that dune plants will protect against sand being washed away in storms; and
- To describe 'end effects' associated with sea walls.

Approval of different forms of coastal protection

Among both the postal survey respondents and the beachgoers interviewed, the most highly-approved form of coastal protection was dune planting. Over 90% of the postal survey respondents were in favour of dune planting. Many respondents also indicated a willingness to consider a combination of approaches, with the options of managed retreat and beach nourishment the most popular in conjunction with dune planting. Respondents were noticeably divided on the option of sea walls and rock walls. Some felt that they offered the best protection against erosion, but others were vehemently opposed to them on a range of grounds. There was a marked difference between Tairua and Waihi Beach postal survey respondents with regard to approval of seawalls and rockwalls, with Waihi Beach respondents much less in favour of them. When asked to choose the *best* long-term approach for managing coastal erosion, postal survey respondents were clearly in favour of dune planting. This was also the case among the beachgoers interviewed.

Views on who should fund erosion control measures

Postal survey respondents were asked for their views on how coastal erosion management should be funded, for situations where public property is at risk, or private property is at risk. There was a clear difference between views for these two scenarios. For private property at risk, the majority consider that the private owners themselves should fund erosion control, with many of the comments received generally unsympathetic and suggesting that *caveat emptor* applies. In contrast, where public property is at risk, the overall view was that the costs of erosion control should be shared among central, regional and district levels of government. There was a general feeling that as beaches and beachfront reserves are a public asset the costs should be shared widely.

Views on development setbacks

Development setbacks were established for Coromandel beaches by Environment Waikato in 2002. The council also provided all beachfront properties with a copy of a report on the setback approach. A limited number of beachfront property owners were interviewed or surveyed in this study. Among this group of six beachfront owners, five were aware of the

setbacks. Two of this group also gave their views on setbacks; both were opposed, one strongly and one more moderately. However this sample size is much too small to determine acceptance of the setback approach.

Views on the erosion management approaches used at each location

At Tairua's Ocean Beach, a Beachcare group has been in existence since 1994, and was very active between 1995 and 2002 in establishing a good cover of native sand grasses along the entire beach. However, storms in 2003 caused very severe erosion at the south end of Ocean Beach, and removed most of the grasses that had been planted. As of January 2007, when this survey took place, replanting had not occurred because of a stand-off over the removal of exotic flowers from the dunes.

A similar picture of attitudes towards the dune planting scheme at Ocean Beach emerged from both the beachgoer interviews and the postal surveys. People were very much in favour of dune planting in general, but their views on the effectiveness and attractiveness of the dunes at Ocean Beach were probably at somewhat of a low point because at that stage the dunes had not been replanted or maintained. The situation has now changed; during 2007 a major replanting programme was carried out with a high level of community support.

At Waihi Beach, a combination of coastal protection measures are used, with two major stretches of rock wall protecting houses close to the shoreline, and dune restoration schemes operating along stretches of the beach. It was clear that Waihi Beach residents were not happy with the overall approach used at this beach and in particular, had strong objections to the rock walls. The majority of respondents did not consider rock walls to be the best approach to protecting the beachfront properties, considered that they spoiled the natural character of the beach and negatively affected beach access and usage. Particular reference was made to the loss of the beach at high tide in front of the rock walls. In contrast, people strongly supported the stretches of dunes that have replaced old sea walls and indicated that they wish to see more removal of rock walls to be replaced by dunes. However, this option may be unrealistic to protect houses which are too close to the shoreline.

Finally, when respondents were asked to recall the beach before the rock walls were constructed, it was clear that the outcome has been significantly worse than their expectations, with almost 80% disagreeing that 'it was a good idea to build the rock wall'. There was also a level of disenchantment with the consultation processes leading to decisions about options for coastal protection.

A comparison of methods

The different methods used in this survey complemented each other well. The key advantages of the face-to-face interview method were that the perceptions and opinions of visitors to the beaches could be investigated (these can be difficult to capture by other survey methods), and that issues could be explored in depth. This was particularly the case at Whangapoua, where in-depth interviews with knowledgeable local people were set up, and more generally in the other locations where we encountered people who were interested in or knowledgeable about coastal erosion and its management.

There were several major advantages of the postal survey method used at Tairua and Waihi Beach. This approach was successful in investigating complex issues, such as people's understanding of the causes of coastal erosion and their understanding of the advantages

and disadvantages of different management approaches. The surveys were able to yield both quantitative data (useful for drawing comparisons between the study locations, and also for establishing baseline data for long-term studies), and qualitative data, when respondents were asked to expand on their answers in an open-ended format. These free-response answers yielded considerable insight into the reasons for people's opinions and perceptions. The fact that so many respondents provided thoughtful and detailed comments on coastal management suggests that this survey fulfilled a useful purpose in providing an avenue for consultation with the public.

The other major advantage of the postal survey method was that that it solicited input from a substantial number of local residents and property owners (173 at Tairua and 179 at Waihi Beach), and enabled them to voice their opinions on topics important to them. People clearly appreciated this opportunity to have their say, and in the words of one respondent at Waihi Beach, *'this questionnaire is the first time my opinion has been sought'*.

KEYWORDS

Natural hazards, coastal erosion, Coromandel, coastal communities, community consultation, sea level rise, mitigation, coastal management.

1.0 INTRODUCTION

New Zealanders love living close to the coast – sometimes too close. Low-lying coastal communities are vulnerable to a range of natural hazards such as tsunami, flooding and coastal erosion that are accompanied by varying levels of risk to life and property. Use of Resource Management Act planning instruments by territorial authorities to limit coastal property development are usually contentious for local property owners and those who aspire to buy coastal property.

New Zealand coastal science is a relatively young field (post-1960s). A comprehensive review was published last decade by Hume et al. (1992), and more recently, Goff et al. (2003) have produced a text summarising coastal research in New Zealand. The long coastline (18,200 km), diversity of coastal environments (Brander et al. 2003) and lack of environmental monitoring (Rouse et al. 2003) all contribute to a situation where the underpinning science needed to support planning decisions is still qualitative and open to debate between scientists. This lack of information puts real pressure on scientists and engineers to deliver more quantitative risk assessments, while property owners, coastal residents and territorial authorities struggle with uncertainties and differences of expert opinion. Coastal residents can be inclined to argue that they understand the local situation better than ‘out-of-town’ experts. Issues of liability and insurability are further complications, and territorial authorities generally fall back on a precautionary approach which many perceive as being over-restrictive. This volatile mix is compounded by the prospect of sea level rise, with associated increases in storm surge events, flooding and coastal erosion (Bell et al. 2002).

Although there is now a reasonably substantial body of research about the New Zealand coast (see Goff et al. 2003 for a comprehensive summary), the great majority of this work has been concerned with physical coastal processes and coastal resources. There has been very little research on people who live at and visit the coast, their understanding of the natural hazard setting in which they live, work and recreate; their views of the various management options available; and their views on individual versus collective approaches. Considering that coastal erosion, for example, can be viewed as a problem caused by people ‘getting too close’ to the coast, this is a critical area of research. Dahm (2003) notes that, even considering the international literature, very few studies have explored social factors in their analysis of coastal erosion.

1.1 Study overview

A starting point for this study is Dahm’s (2003) key finding that although beaches are highly valued and utilised resources, beach user opinions and preferences and community perceptions of coastal erosion have only rarely been studied and even more rarely used as a contribution to management.

The general framework for this study is community involvement in coastal hazard mitigation. The overall aim of this study is:

'To identify the value of the coast to communities, to identify peoples' understanding of and interaction with beach management options, with the results of this study being able to contribute to the formulation of future planning strategies for coastal management.'

Specific objectives are to investigate:

- the value of the coast to communities (including visitors as well as residents);
- public perceptions of erosion;
- public perceptions of different erosion management strategies (including planning tools such as development setbacks);
- public preferences for different coastal protection schemes, and reasons for these preferences;
- respondents' experiences with local coastal protection schemes at the contrasting study locations; and
- respondents' level of involvement with coastal protection schemes.

The study was carried out at Tairua, Waihi Beach and Whangapoua, on the east coast of the Coromandel (Figure 1.1). These locations were chosen as they illustrate a range of severity of current erosion threats, and of approaches to coastal protection.

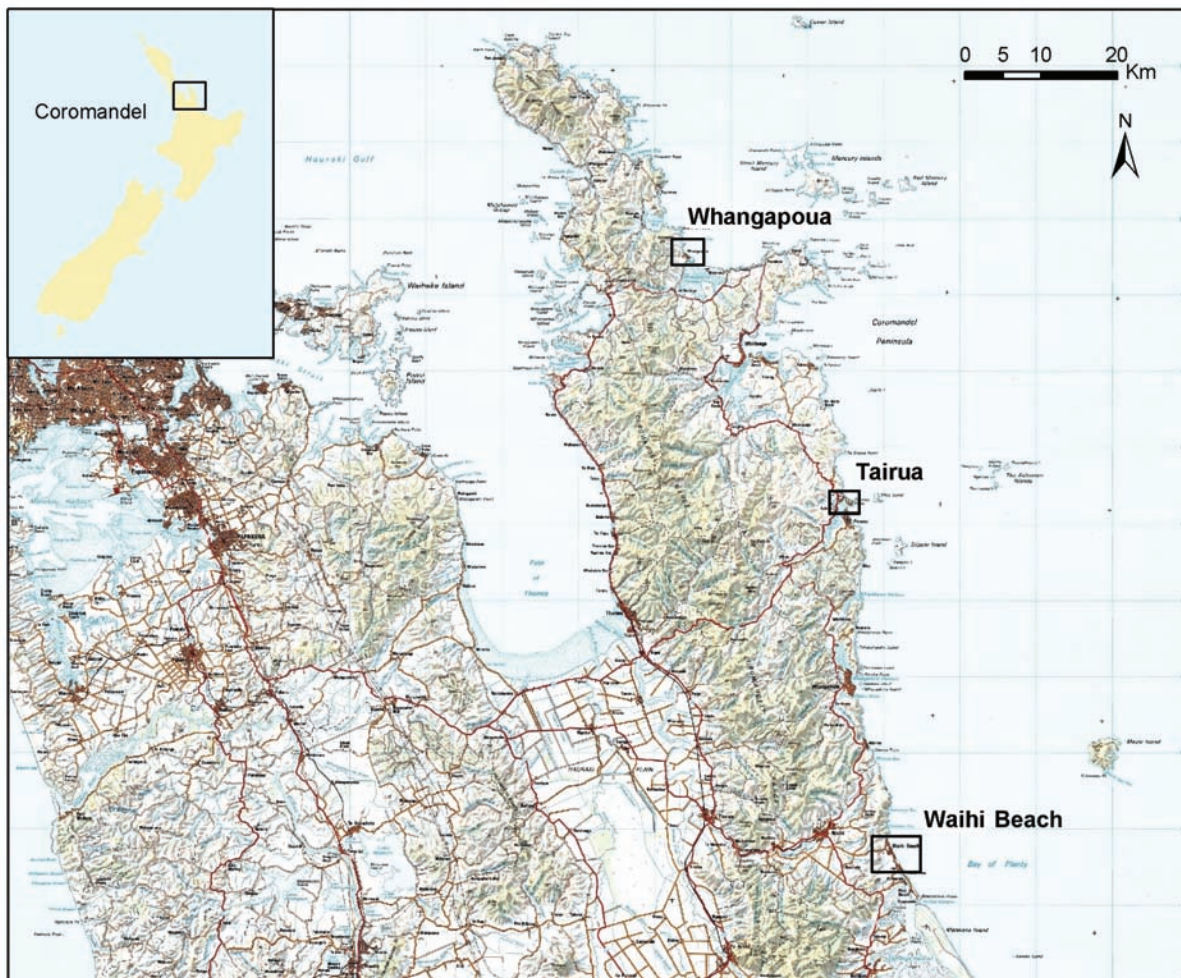


Figure 1.1 Location of study sites in the Coromandel peninsula

1.2 Comparative geomorphic settings

Whangapoua, Tairua and Waihi Beach lie on the eastern Coromandel and northern Bay of Plenty coast of the North Island of New Zealand (Figure 1.1). They are situated on a steep and rocky coastline indented by numerous small embayments, pocket beaches and tidal inlets that front a relatively narrow continental shelf some 15 to 20 km in width. Waihi Beach lies at the northern end of a long curved section of beaches extending south from the Coromandel Peninsula.

The geomorphic settings at Whangapoua, Tairua and Waihi Beach are sand barrier systems comprising dune ridges packed against the hinterland hills or separating estuarine water bodies from the sea. These barriers began to form approximately 6500 years ago, at about the time sea level rose to its present level. Since that time, sand coming ashore has built the barriers, dunes and beaches that we see today. The barriers built rapidly at first, but in the last 1000 years sand supplies have dwindled. A consequence of this is that there is little new sand entering the system to buffer the barriers against erosion.

Tides on the coast are diurnal and microtidal, with spring ranges on the open coast of approximately 1.5 m. Tidal currents are generally weak except at inlets and about the islands and generally play a minor role in sand transport. Waves are the major force moving sand about on the beaches and on lee shores the wave climate is primarily mixed storm and swell waves. The prevailing wind is west to south westerly associated with the passage of mid-latitude anticyclones. Strong onshore-directed east and northeasterly winds occur during storm events. These occur approximately 10 to 20 times per year, and are typically occluded cyclones and Tasman Sea depressions and more rarely decaying tropical cyclones. Waves arrive principally from the north to east sector. Islands and headlands provide some local shelter from waves for the beaches. Mean significant wave height and period, derived from a 20-year hindcast using a 20-year WAM wave generation model, are of the order of 0.86 m and 5.8 sec respectively (Gorman et al. 2003). Storms, particularly tropical cyclones, generate large waves (maximum significant wave height and period 7.0 m and 12.7 sec) and it is usually during such events that beach erosion takes place. Erosion on the shores is largely cyclic as sand is exchanged back and forth between the dunes, beach and nearshore bar systems. The prevailing wind is west to south westerly associated with the passage of mid-latitude anticyclones.

1.2.1 Tairua

Tairua Beach forms the northern part of the Tairua-Pauanui embayment. The embayment is 10 km long and bounded by rocky headlands to the north and south. A small headland (Paku) occurs in the central embayment at the entrance to a tidal inlet and Tairua Harbour. The Tairua catchment is large (280 km²), and floods combined with spring tides raise water levels which inundate the estuary shores. Tairua Beach is 1.2 km long and steep and reflective and comprised of shelly 0.4 mm medium sand. In contrast, Pauanui to the south is 2.7 km long and flatter and dissipative and composed of 0.2 mm fine sand. Offshore from the beaches the seabed is very fine sand with coarse-grained rippled sands in patches to 50 to 60 m depth. Tairua Beach is more exposed to the north and ocean swells than Pauanui which faces more to the east and is partially sheltered by Shoe Island. Although the Tairua

barrier is narrow (only 200 m wide) the dunes are high (>10m) protecting it from overwash except in the largest seas at the southern end (where it overwashed in July 1978). Erosion tends to be cyclic, and overall the beach is in a state of dynamic equilibrium with the shoreline advancing and retreating over 10 to 15 metres as conditions change. Erosion has periodically threatened several properties at the southern end of the beach. There have been no engineering works undertaken to protect the properties, although sand has been scraped up in front of the affected properties and Dunecare programmes initiated to vegetate the dunes and build up the buffer of sand. The Tairua catchment is large (280 km²), and floods combined with spring tides raise water levels which inundate the estuary shores.

1.2.2 Waihi Beach

Waihi Beach lies at the northern end of a 9 km long stretch of sandy beach that extends south to the Bowentown Heads and the northern entrance to Tauranga Harbour. Waihi Beach is an intermediate state sandy beach, with finer sand and a flatter and wider profile than Tairua which faces to the NE and is exposed to ocean swells. The sand barrier is attached to the hinterland. The barrier is tall (>10 m), protecting it from overwash except at the northern end where the dunes are very low. Although erosion tends to be cyclic and overall the beach is in a state of dynamic equilibrium, there has been a long history (decades) of erosion at Waihi Beach primarily due to properties being placed too close to the sea and there being little dunes to accommodate the erosion and accretion cycles. There is local erosion where two streams discharge onto the beach and meander back and forth cutting into the dunes. To combat the erosion there have been various measures undertaken including building rock walls and training the streams. More recently, Dunecare programmes to vegetate the dunes and build up the buffer of sand have been introduced.

1.2.3 Whangapoua

Whangapoua Beach forms the northern part of the Whangapoua-Matarangi embayment. The embayment is 7 km long and bounded by rocky headlands to the north and south. A small headland (Raukawa) occurs in the central embayment at the entrance to a tidal inlet and Whangapoua Harbour. Whangapoua Beach is 1.6 km long. Like Tairua, it faces to the NE and is exposed to ocean swell, although it is afforded some protection by Great Mercury Island offshore, and thus is not quite as steep and reflective as Tairua. The sand barrier is attached to the hinterland as the small estuary behind has largely infilled and now exists as a small stream at the north end of the beach. As at Tairua, the barrier is tall (>10 m) protecting it from overwash. Erosion tends to be cyclic and overall the beach is in a state of dynamic equilibrium with the shoreline advancing and retreating over approximately 10 to 15 metres as conditions change. The catchment is large (107 km²) and floods combined with spring tides raise water levels which inundate the estuary shores.

1.3 Administration of the study areas

Whangapoua and Tairua are administered at a regional level by Environment Waikato (EW), and at the district level by Thames Coromandel District Council (TCDC). Waihi Beach is administered by Environment Bay of Plenty (EBOP) at the regional level, and by Western Bay of Plenty District Council (WBoPDC) at the district level.

1.4 Approaches to coastal protection at the study locations

1.4.1 Tairua

At Tairua's Ocean Beach, a Beachcare group has been active since 1994. The strategic aims of this group are to:

*Repair dune damage as necessary;
Restore and maintain sand grass cover on dune face;
Promote and undertake appropriate backdune planting of native shrubs and ground covers;
Appropriately manage pedestrian and vehicle access;
Encourage the development of a dune care ethic in the local and beach user communities, through signage, information and participation in Beach Care events; and
Recognise the Surf Club and northern car park as areas requiring special consideration.*

(From Coastline Consultants and Economos report to EW, 2006.)

Particular issues for this beach identified in this report are an extensive cover of exotic species hampering the establishment of spinifex, and damage to the dunes caused by people not using the accessways provided. At the southern end of Ocean Beach, several properties have been threatened by erosion in the past. Recent plantings of sand grasses have helped stabilise the dunes in this area, but the unauthorised dumping of rocks along the base of the foredunes has been counterproductive as the sand at the ends of the rocks has been scoured out.

Jim Dahm has provided the following additional information (abridged slightly here) about the Tairua Beachcare group:

.. Tairua Beachcare was very active between 1995 and 2002 and during that period managed to restore a good cover of native sand grasses over the entire length of the beach – on what was previously a badly damaged dune. It was among our most active and well supported Beachcare groups. However, during 2003 there was very severe coastal erosion over the 250 metres south of the Surf Club. We don't know the return period of the erosion by available data suggests it may have been quite rare (probably 50 year return period or more). This erosion removed up to 15 metres width of dune along most of this area, including virtually all of the spinifex and pingao planted by the group at that end of the beach. This, despite the fact that the spinifex dune had advanced by nearly 10 metres in the 6-8 years the plantings survived. The storms cut the dune right back to a dense cover of exotic species (gazanias and arctotis) 12-15 metres further landward.

The group would probably have been willing to replant the eroded dune. However, I had to advise that we could not supply spinifex for replanting unless we could completely remove the gazanias and arctotis right back to the front boundaries of the properties. Otherwise our planting would have simply been lost once again at some future date – wasting the community effort and not inconsiderable expense. Unfortunately, the removal of the exotics was quite strongly resisted by a few parties. We even lost one couple from Beachcare and had complaints to local politicians simply because the group hand-pulled a few gazanias to create small bare areas for spinifex. We had discussions on the issue over an extended period, but those opposed were immovable – they liked the flowers and could not accept that they had to go.

The Beachcare group was able to do very little while this issue was going on and was reasonably frustrated. The dunes also looked awful compared to their previous state which was disappointing for the folk who had spent the previous 8 years restoring them.

However, things finally changed after a major windstorm earlier this year [2007] which inundated local beachfront properties with sand, due in large part to the absence of effective sand trapping vegetation further seaward. That changed the community dynamics entirely – we were very quickly able to get universal support to completely remove the exotics and replace them with natives.

[We] completely removed all the exotics in one go .. This left us a huge area to plant – a project we would normally allow 2-4 years for rather than do in one hit. We put a small article in the local papers about the need, and the entire area was planted in only 3 days with input from all sorts of locals (the Beachcare group, the local boarders club, beachfront owners who brought families and friends down to help, gardening clubs etc). So the group has good support when it needs it.

The outcome from my perspective is excellent – we now have owners who are very aware of the value of the native sand binders, widespread acceptance that these exotics have no place on dunes, were able to complete what would normally be very controversial work with complete community support, and have markedly increased support for Beachcare.

1.4.2 Whangapoua

At Whangapoua, a Beachcare group has been active since 2002 and has the following strategic aims:

*Restore and maintain sand grass cover on foredune;
Promote and undertake appropriate backdune planting of native shrubs and ground covers;
Appropriately manage pedestrian and vehicle access to the beach;
Encourage the development of a dune care ethic in the local and beach user communities through signage, information and participation in Beach Care events; and
Recognise the central car park as an area requiring special consideration.*

Prior to 2002, the foredunes along the central part of the beach were devoid of sand-binding plants (Coastline Consultants and Economos 2006). The local coordinators at this site have organised annual working bees to re-establish sand grasses on the seaward dune faces, and back dune plantings of native ground cover, trees and shrubs. This approach has reportedly been very successful at re-establishing native dune vegetation and enhancing natural dune repair. Elsewhere along this beach, beachfront property owners have generally planted their own frontages to stabilise the dunes. A feature of this community is the extent to which local property owners have taken responsibility for planting their own dunes, as well as undertaking considerable additional plantings outside of the annual working bees.

1.4.3 Waihi Beach

Waihi Beach currently has a 'package' of coastal protection measures in place, including two sections of rock wall, training and reinforcing of two creeks with sandbags, and a dune management scheme. According to Willem de Lange of Waikato University:

.. the first seawall was along Shaw Rd and was constructed in 1968 at a cost of \$100,000. It was a wooden fence backed with boulders and clay, and fronted by gabion basket groynes.

Over the next decade the boulders were continually topped up as the seawall deteriorated.

The original boulders were locally-sourced ignimbrite and rhyolite, which made them both susceptible to weathering and easily washed away due to their relatively low density. This seawall was eventually replaced by another rock wall which extended further along the beach. There is another stretch of rock wall along another road (The Loop) where houses are particularly close to the beachfront.

The Coast Care programme at Waihi Beach has had considerable success in restoring dunes along stretches of the beach. At Brighton Reserve, a dilapidated seawall was removed in 1998 and the area replanted; by January 2005 plants were growing vigorously and the dunes had built up. A similar project was undertaken at Coronation Park, with an old seawall removed in 2003 and the dune face planted with functional native dune species. By October 2006, the rocks which had been left behind on the beach were covered with accreted sand trapped by the spinifex planted. This area has now accreted about 8 metres of sand, which is an average of some 2.6 metres of protective new dune per year (Greg Jenks, Environment BOP, pers. comm.).

At the northern end of Waihi Beach, the dunes had been depleted and damaged by the unrestricted beach access. The low, flattened beach profile made the town frontage very vulnerable to storm surges. Coast Care volunteers have created accessways, planted native dune plants and fenced these planted areas to protect them; by January 2004, the beach was wider, covered with white sand and the town protected by taller dunes (Jenks, 2007).

2.0 METHODS

2.1 Choice of methods

Self-administered postal questionnaires (mail surveys) and face-to-face interviews were used in this project. Mail surveys were used in Tairua and Waihi Beach only, and face-to-face interviews were carried out at all three locations with additional, more detailed interviews carried out at Whangapoua.

Bartley (1999) describes advantages and disadvantages of different techniques for social investigations. The key advantages of mail surveys are that:

- they are a cost-effective way to gather data from geographically-dispersed populations;
- they are less intrusive because people can complete them at their convenience;
- much larger sample sizes can also be obtained; and
- in general, more complex issues can be covered in a printed questionnaire that people can read and complete at their leisure, in comparison to other survey methods such as telephone or face-to-face interviews. People are able to make considered responses to complex and interlinked questions.

Drawbacks of postal questionnaires are: their slowness, that no interviewer is present in person to clarify any confusion, the frequently low response rates, and the problem of respondent self-selection which introduces well-characterised demographic biases. This latter is probably the main disadvantage of this survey method, and is difficult to overcome.

Face-to-face semi-structured interviews were also used in this study, with interviewers recording responses on interview log sheets. The key advantage of this method is that the 'conversation' between interviewer and interviewee can range freely beyond the structure provided. However, in practice we found that this approach had a number of drawbacks. Many people approached at the beach, particularly at Waihi Beach, were casual visitors without much knowledge or interest in local issues such as erosion control, and were simply unable to comment in any detail on many of the questions. Another problem was that people approached at the beach were, in general, in 'holiday mode' and were often preoccupied with watching children in the surf, and were unwilling to devote much attention to the topics of concern to this project. Approaching beachgoers is somewhat intrusive.

At Whangapoua a slightly different approach was used. In addition to a series of semi-structured interviews with beachgoers, we also carried out 'key informant' interviews. These interviewees were found using a 'snowball' approach; one knowledgeable local person was approached initially, and she provided a list of contacts and suggestions for other useful people to talk to in the local community. This approach worked very well as these 'key people' were well-informed and provided insightful comments.

2.2 Questionnaire design

The questionnaire used for the 2003 National Coastal Community Survey was used as a basis for this study, although major changes were made and the section on attitudes towards

and understanding of coastal erosion expanded. For the coastal communities surveyed by postal questionnaire (Waihi Beach and Tairua), local information was obtained about the coastal management regimes used at each site from Environment Bay of Plenty and Environment Waikato staff respectively. A series of questions about respondents' knowledge of these schemes and their attitudes towards them were devised. Some questions were applicable to both study locations, while others were specific to Tairua or Waihi Beach.

Draft versions of the postal questionnaire were circulated to key staff at GNS Science, NIWA, Environment Waikato and Environment Bay of Plenty for their comments, which were then incorporated. Following this, the questionnaires were pilot-tested for clarity and readability on several general readers. The final versions contained 40 questions covering valued features of the coast, experiences of natural hazards, understanding of coastal processes, perceived threats from erosion, support for and against a range of coastal management options, and demographic information. Copies of both questionnaires are reproduced in Appendices 2 and 3.

The semi-structured interview schedules were adapted from the questionnaires for each location, with questions streamlined so that the questionnaire could be administered in approximately ten to 15 minutes. Key staff at Environment Waikato were consulted about the design of this schedule. Another interview schedule was designed for use at Whangapoua. It was generally similar to the versions for Waihi Beach and Tairua, but had a greater emphasis on long-term issues.

Copies of all postal questionnaires and interview schedules are included in Appendix 1.

2.3 Sampling strategy and survey delivery details

2.3.1 Postal questionnaires

Postal questionnaires were hand-delivered to letterboxes in Tairua on 10 and 11 January 2007. As the number of surveys (500) delivered was quite large in relation to the size of the township, two areas were chosen for blanket coverage, with surveys going to every letterbox. These included the area behind Ocean Beach (Ocean Beach Rd) and Paku, and the area to the south of the bridge across the estuary. The remaining surveys were delivered to the central part of Tairua, starting at Manaia Rd, which runs along the estuary shoreline behind the front-row properties, and working back inland. At each property, GPS coordinates were recorded. Locations in Tairua from which completed surveys were received are shown in Figure 2.1.

Because of time constraints during the planning and consultation stages of this project, (just before the Christmas holiday break), we were unable to finalise the questionnaire for Waihi Beach before our field visit in early January. Therefore, during our field visit we recorded GPS locations and addresses for 550 properties in Waihi Beach. We covered an area between the headland at the northern end of the beach and Glen Isla place (adjacent to Three Mile Creek reserve) at the southern end, and collected addresses for every property starting at the coast and working inland. Questionnaires were then mailed to these addresses in late January.

Unfortunately we encountered the problem that many of the front-row properties, and some further back also, do not have letterboxes, presumably because they are holiday homes. As a result, difficulties were experienced in successfully mailing out questionnaires to the database addresses, and a high number (283) were returned to sender. For reasons that are not well-understood, it is quite common to have a delivery failure rate of approximately 10% when using an address database, even when addresses are known to be valid.

To compensate for the high initial delivery failure rate, we repackaged 227 copies of the unopened questionnaires with another cover letter, and sent them to key volunteers at Waihi Beach. These volunteers distributed the additional surveys by providing them to local people within their social networks who hadn't already received one, and also by delivering them to properties without letterboxes along Shaw Road and The Loop (the closest streets to the beachfront). This approach worked well. The overall return rates for Waihi Beach and Tairua, as a proportion of surveys successfully delivered, are shown in Table 2.1.

The return rates obtained in this survey (35% for Tairua and 36% for Waihi Beach) are typical for voluntary postal surveys of this type. They are very similar to the return rates obtained for the 2003 National Coastal Survey for Coromandel beaches (37%, Stewart et al. 2005).

Table 2.1 Location, delivery dates and return rates for postal questionnaires

Location	Date delivered	Number delivered	Number returned	Return rate
Tairua	10-11 January 2007	500	173	35%
Waihi Beach ¹	Late January 2007	267	127	48%
Waihi Beach ²	Feb-March 2007	227	52	23%
Waihi Beach total	Jan-March 2007	494	179	36%

Notes

- 1 Of the 550 questionnaires originally mailed out to an address database in late January 2007, only 267 were successfully delivered.
- 2 To increase the sample size, a further 227 questionnaires were distributed by local volunteers, and delivered to properties without letterboxes, during February 2007.

2.3.2 Face-to-face interviews

Interviews were carried out on 8 January at Waihi Beach, on 10 January in Tairua, and on 11 and 12 January in Whangapoua, by two interviewers. People were approached randomly on the beach, and asked if they would be willing to participate; only a small proportion declined (perhaps 5-10%). Their responses were recorded on interview log sheets. As described in Section 2.1 above, five 'key informants' were also interviewed in Whangapoua. The same log sheets were used, but conversations ranged more freely and widely, and most of the interviews took an hour or more.

The total numbers of semi-structured interviews conducted were as follows: 29 at Waihi Beach, 30 at Tairua and 19 at Whangapoua. Five more detailed interviews were also conducted at Whangapoua.

2.4 Data analysis and reporting

On receipt of the completed postal questionnaires, data were entered into the statistical package SPSS. Analysis included calculation of response percentages for individual questions for the overall samples from Tairua and Waihi Beach. For Waihi Beach, the whole sample was also treated as two separate groups: firstly, from the initial 'blanket' mail delivery to all addresses, and secondly from the targeted delivery by volunteers. Means and standard deviations for the scale-response questions were also calculated.

A recommendation that arose from the previous (Stewart 2005) report on perceptions of coastal hazards in Coromandel coastal communities was that responses be broken down with respect to proximity to the beachfront. For this survey, several categories of location relative to the beachfront were created for the survey respondents. These were: houses on the beachfront or estuary front; one row back; two rows back; and everything further back.

The interview log sheets were collated and the responses analysed. As the level of detail provided varied considerably between interviewees, we treated the data as qualitative or, where warranted, as semi-quantitative.

This report presents and discusses findings from the face-to-face interviews with beachgoers at Waihi Beach, Tairua and Whangapoua. Reference is also made to findings from the mail surveys; these have been tabulated and presented in a companion volume to this report (Becker et al. 2007).

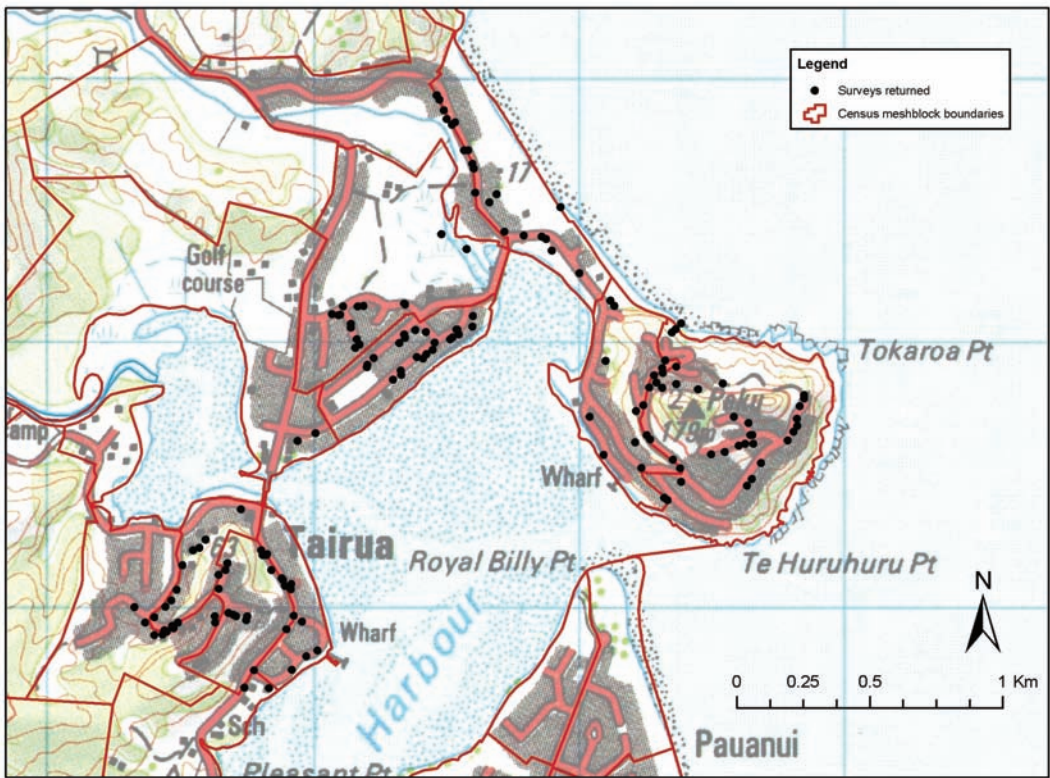


Figure 2.1 Map of Tairua showing locations of postal survey respondents

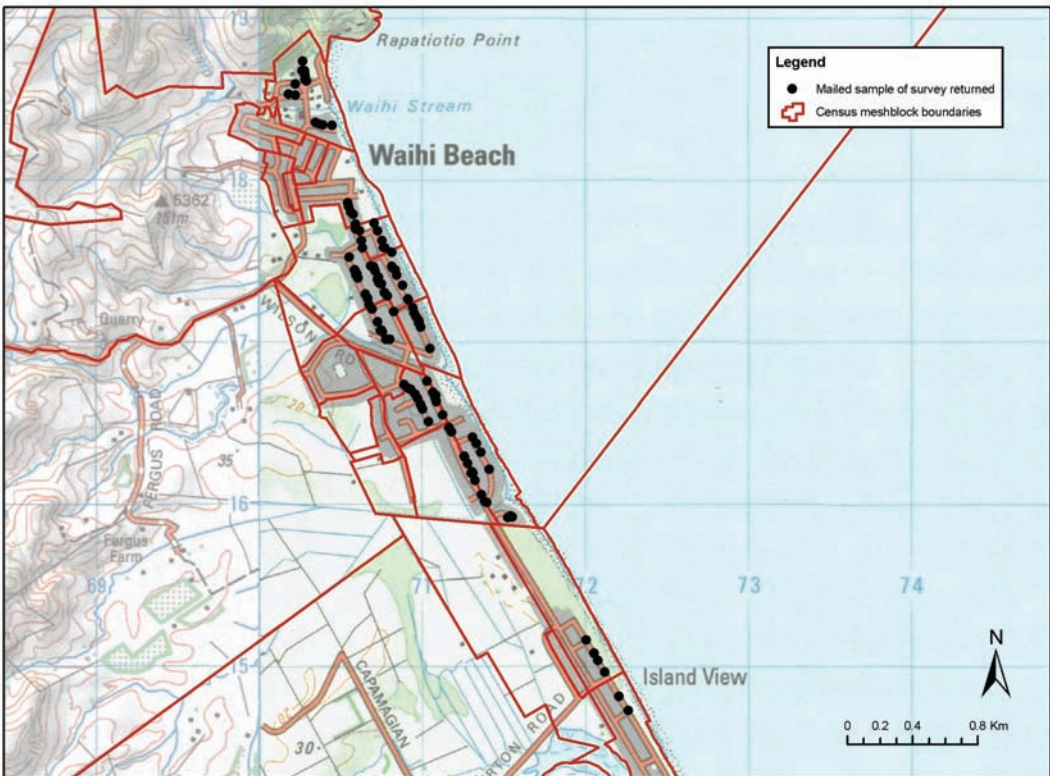


Figure 2.2 Map of Waihi Beach showing locations of postal survey respondents

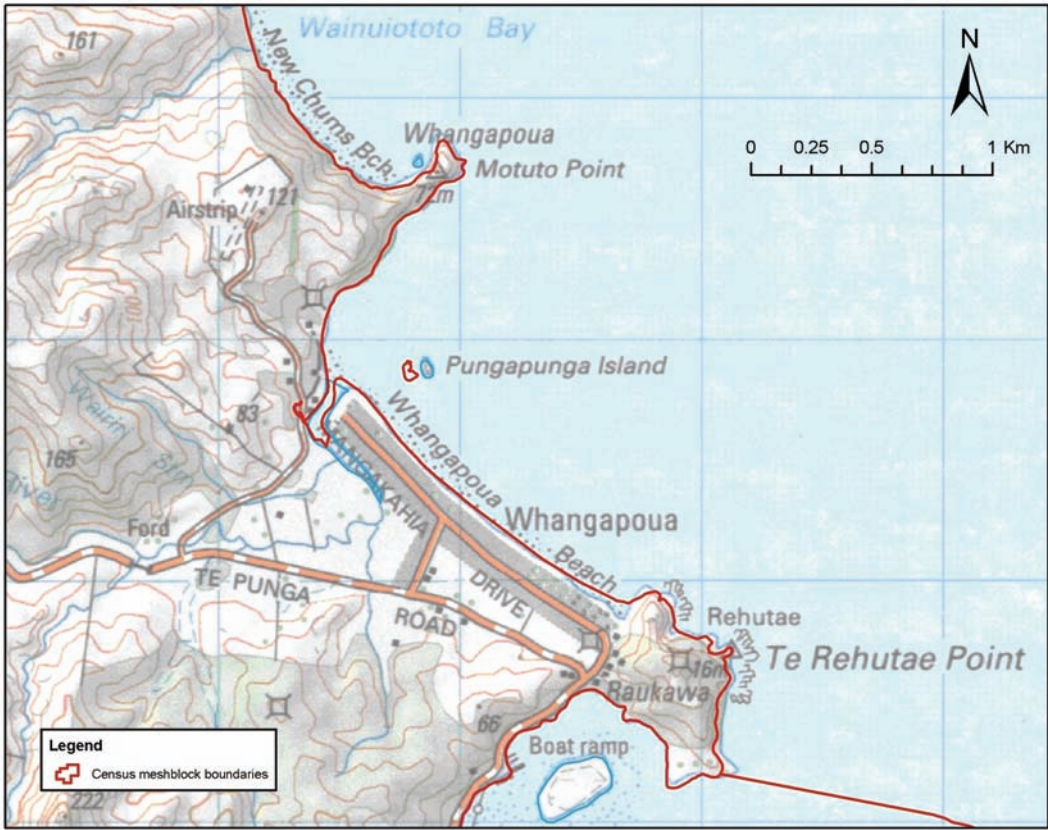


Figure 2.3 Map of Whangapoua

3.0 INTERVIEWS WITH BEACHGOERS AT WAIHI BEACH

Interviews with beachgoers were conducted on 8 January 2007, at Waihi Beach. We covered the beach from the northern end near the patrolled area down to Two Mile Creek (south of the Shaw Rd rock wall).



Figure 3.1 General view of the north end of Waihi Beach, looking north

3.1 Summary of responses

We interviewed 29 beachgoers. Of these, 28 were visitors and one was a resident of Waihi Beach (Table 3.1). There were seven property owners in the sample, at locations ranging from a front-row property at the very northern end of the beach to several kilometres inland. Many of the visitors were casual, short-term visitors rather than 'regulars', and were not well acquainted with the beach and hence not able to answer many of the questions in detail.

Table 3.1 Summary details of Waihi Beach beachgoers sample (n=29)

	Residents	Visitors	Total
Property owners	1	6	7
Non-property owners	0	22	22
<i>Total</i>	1	28	29

3.2 Valued features of Waihi Beach

Waihi Beach beachgoers we spoke to value a diverse range of features of the coast in this area, including the following:

- Safe swimming (including the lifeguards)
- Nice clean beach, white sand, little rubbish
- Natural beauty of this stretch of the coast, good views
- Unspoilt, natural character of beach, sense of space
- No cars allowed on beach
- Nice beach for walking on
- The relaxed, friendly, family-oriented atmosphere
- Easy access to the beach.

Our general impression was that people consider Waihi Beach to be a safe and family-oriented swimming beach. One respondent commented that they found it to be more 'laid-back and down-to-earth' than the beach at Mt. Maunganui, in Tauranga.

3.3 Protection of valued features

Respondents were then asked if any of the features they had nominated in the above question were currently under threat or in need of greater protection.

Answers indicated that people are generally happy with the status quo, with only a handful of respondents answering otherwise. Issues of concern mentioned by this group included some respondents being unhappy with the rock walls and preferring to see resources put into dune care programmes, and some respondents being worried about further development – such as new high-rise buildings – spoiling the beach.

3.4 Natural hazards affecting Waihi

Some respondents elected not to answer this question as they considered themselves insufficiently well-informed. Coastal erosion was the most commonly-chosen hazard, with 24 respondents considering it one of the two most likely hazards to affect Waihi Beach. This was followed by storms and tsunami, both nominated by 11 respondents, and flooding, nominated by five respondents. There is further discussion of these results in Section 5.7.

3.5 Coastal erosion and its causes

3.5.1 Underlying causes

When asked for their views on the fundamental cause of coastal erosion, beachgoers interviewed at Waihi Beach put forward a wide range of responses. The main categories are summarised below in decreasing order of prevalence.

3.5.1.1 *Unsure*

The largest group (14 out of the 29 respondents) either stated that they had no idea what the underlying cause of coastal erosion is, or gave vague answers such as 'nature' or 'time' or 'wave action'.

3.5.1.2 *Storms*

Six respondents indicated that they think that storms are the main cause of coastal erosion. Pilkey and Hume (2001) note that storms cause short-term jumps in shoreline retreat, but that rebuilding episodes occur in between storms so that over longer time spans, storms per se are not the underlying cause of overall shoreline erosion. As the question asked did not specify short-term or long-term time scales, this response could be considered a correct one.

3.5.1.3 *Sea level rise*

Four respondents nominated sea level rise as the underlying cause of coastal erosion; their responses were variously worded as 'the sea coming higher', 'sea level rise', 'global warming' and 'climate change' but were considered to indicate the same idea. Pilkey and Hume (2001) consider that sea level rise is likely to cause long-term shoreline retreat because the rising sea brings each storm a little further inland. It is relevant to note here that tectonic influences causing uplift or subsidence will also alter the sea level, in addition to any sea level rise caused by global warming (Berryman and Hull, 2003).

3.5.1.4 *'Living too close'*

Five respondents gave responses with the general sentiment that coastal erosion problems are primarily the result of people interacting too closely with the coastline. Views included the loss of sand dunes (or 'not enough protection from sand dunes', or 'lack of shoreline vegetation') as well as building too close to the coast.

3.5.2 Current seriousness of coastal erosion threat to Waihi Beach

Respondents were asked how serious a problem they think coastal erosion is for Waihi Beach at present. There were 23 responses to this question, with the remaining six identifying themselves as insufficiently well-informed to venture an opinion. Respondents can be split into two groups. The larger group of 13 respondents did not consider coastal erosion to be a serious problem for Waihi Beach at present. One respondent justified this view by saying that the beachfront was 'stable' over the 10 year period he has been visiting it. The other group of 10 respondents all considered erosion to be a current problem for Waihi Beach, with responses ranging from 'quite serious' to 'very serious'. Some respondents qualified their answers by specifying that erosion is a problem for beachfront property owners in particular, one respondent quantified his answer by rating the seriousness as '8 on a scale

of 1-10', and several respondents referred to their own observations such as signs of active erosion along the beach, and the presence of the rock walls.

3.5.3 Future seriousness of coastal erosion threat to Waihi Beach

A follow-up question asked whether they think it will become a problem in the future, and on what timescale. There were 21 responses to this question. Most people (18 out of 21) consider that erosion is likely to become more of a problem in the future for Waihi beach. Some respondents were not prepared to nominate a timescale, but of those who did, eight respondents considered relatively short timeframes (in the range of 10-30 years) to be most likely. A further three respondents chose longer timeframes in the range of 50-100 years. The remaining respondents declined to speculate.

3.5.4 Effects of sea level rise on Waihi Beach

There were 27 responses to this question. One respondent challenged the assumption, implicit in the question, that sea level rise will occur, and a further two, while accepting the possibility of sea level rise, considered it unlikely to cause any effects on the beach. Five respondents were unsure what might happen. The remaining 19 respondents all considered that sea level rise is likely to happen, and is likely to cause effects on Waihi Beach. Most people appeared to have a realistic grasp of probable effects; suggestions included 'significant erosion and inland movement of the shoreline' and that 'beachfront properties will be at risk'.

3.6 Best approach to managing coastal erosion

Most respondents had definite opinions on this topic. Approximately half the respondents were in favour of sand dune buffer zones, and suggested practical measures such as replanting programmes and fencing off dunes. These views were seen as being consistent with a respect for natural processes. Other respondents were more fatalistic and expressed doubts that any form of management intervention would be effective, and that nature would prevail. Several respondents suggested that stopping development on sand dunes, or otherwise too close to the beachfront, would be a good precautionary approach in future.

Respondents' views were polarised on the approach of building solid structures such as seawalls and rock walls. Over a third of respondents (11 out of 29) believe that seawalls or rockwalls will give the best protection from erosion. One respondent stated that 'beachfront owners should be able to do whatever is necessary to protect their properties'. Another respondent favoured rock walls over seawalls as being more 'natural'.

There were also some strongly negative views expressed about seawalls and rockwalls. Several respondents expressed views that these protection structures are 'not the answer', are not compatible with being in harmony with nature, and can damage the beach.

3.7 Respondents' views on how coastal erosion is managed in Waihi

Around a third of the respondents (10 out of 29) did not consider themselves to be sufficiently informed on the management of coastal erosion in Waihi Beach to venture an opinion on this

topic. The other respondents were generally happy with the current management regime. Several respondents mentioned that they particularly like the dune planting and fencing initiatives, and others said that they like the overall approach but dislike the rock walls. One respondent commented that 'time would tell' if the current management approach was on the right track.

An elderly respondent remembered visiting Waihi Beach on his honeymoon, and said that 'it used to be all sand dunes'. His belief was that many of the beachfront properties are too close to the sea and that managing the risk by building seawalls is likely to be futile.

3.8 Respondents' views of the rock walls at Waihi Beach

We asked respondents to rate the rock walls at Waihi Beach in terms of three aspects: effectiveness at managing erosion, attractiveness and effects on beach usage and access. We took care to specifically describe the two stretches of rock wall (along Shaw Rd and The Loop) so that respondents were commenting on these structures in particular rather than giving generic opinions. Some respondents were not familiar with the rock walls and did not answer this question.

3.8.1 Effectiveness at managing erosion

Six respondents had not seen the rock walls and did not want to comment on their effectiveness, or otherwise were unwilling to express an opinion. Of the remaining 21 respondents who answered the question, 13 considered them generally effective at managing erosion while a smaller proportion (8 respondents) had opposite views. Comments in support of rock walls were generally brief, with statements such as 'effective', 'pretty good', 'better than nothing' and 'good' typical of responses from this group. Respondents with negative views of the effectiveness of rock walls were more likely to expand on their views. Several respondents considered that rock walls are likely to make erosion worse, and that problems with scouring of sand from around the wall may damage the beach. Another view expressed was that rock walls are a waste of time and merely delay the inevitable.

3.8.2 Attractiveness

A higher proportion of respondents (14 out of 24) expressed negative views of the attractiveness of Waihi Beach's rock walls, compared to the group of 10 out of 24 who had positive or neutral views. Some strongly negative views were recorded, such as 'ghastly', 'terrible', 'unsightly', 'unacceptable', 'unfriendly' and 'visually jarring'. Respondents holding these strong views were also more likely to consider Waihi Beach's rock walls ineffective at managing erosion. However, respondents who considered Waihi Beach's rock walls an effective approach to managing erosion expressed a range of views on their appearance. Some considered them 'effective but ugly', whereas others were happy to accept the visual impact of the rock walls because of their practical purpose. One respondent said that rock walls were 'not as attractive as the natural environs, but better than the beach eroding'. A small group of respondents shared this view, which could be summarised by describing rock walls as 'a necessary evil'.

3.8.3 Effects on beach usage

The majority (20 out of 27) of respondents who answered this question did not consider Waihi Beach's rock walls to have negative effects on beach usage or access. One or two of this group qualified their answer by specifying the need for accessways or stairs over the rock walls at regular intervals. The other seven respondents did consider that the rock walls negatively affect beach usage. Specific comments from this group were that the rocks are unsafe for children to play on, and that the rock walls trap rubbish and debris.

Separating out the subsample of seven property owners from the others, we found that the views of this group were similar to the whole group and no major differences were evident. However, we did not interview any beachfront owners whose property was protected by the rock walls.



Figure 3.2 Rock wall at Waihi Beach

3.8.4 Drawbacks of rock walls

Respondents were asked whether they considered there to be any drawbacks to the use of rock walls as part of the approach to erosion control at Waihi Beach. Of the 25 people who answered this question, roughly equal numbers had opposing views on the drawbacks of rock walls. Respondents in the 'no drawback' camp typically had little to add to their comments, although small numbers supported their views with statements such as 'anything is better than nothing' and 'there's no alternative'. Respondents identifying drawbacks of rock

walls gave a range of supporting comments. Respondents' perceptions of the drawbacks of rock walls are as follows:

- That they are ugly and 'unfriendly';
- They can reduce access;
- They can cause scouring and increase erosion on other parts of the beach;
- They can trap rubbish;
- Old seawall structures such as metal waratahs are a hazard (this respondent suggested that it would be better to use natural materials such as sandbags if seawalls couldn't be avoided);
- They are expensive.

3.9 Opportunities for public involvement with coastal erosion management at Waihi Beach

Respondents were asked whether they felt that there had been enough opportunities for the public to get involved with the management of coastal erosion at Waihi Beach. Not surprisingly, as most beachgoers we spoke to were non-property-owning visitors, the level of response to this question was quite low with most people feeling unable to comment.

Separating out the seven property owners from the whole sample, five gave definite responses while the other two felt unable to comment. Three of the five property owners indicated that they do consider there to be enough opportunities for public involvement, even as absentee ratepayers. Respondents appeared reasonably satisfied with the level of notification and consultation provided by the council. The other two property owners were less satisfied; one commented that there had been meetings but that more feedback would have been welcome, and the other was unsure whether the council 'allows' participation.

A small number of non-property-owning respondents, visiting Waihi Beach, also offered comments on this topic. Their comments are presumably informed by talking to local people, so are repeated here. One person considers that there are 'ample opportunities for input, with very good meetings with locals being held', but two others were less positive, with one describing the council as 'a law unto themselves' and another stating that there is a poor level of public participation and insufficient avenues for it to happen.

3.10 General comments about managing the coast

The final question offered participants the chance to air any other comments or opinions about the way the coast is managed in general. People interpreted this question in different ways, with some commenting on management of the coast in the local area, and others commenting on more general issues such as whether climate change is being taken seriously by coastal management agencies.

Eighteen people answered this question, with the sample divided approximately evenly between those who had few concerns and were generally happy with the way in which the coast is being managed, and those who had concerns.

Typical comments from the first group were that they appreciate the clean, tidy and

accessible beachfront at Waihi Beach, consider EBOP's approach unobtrusive and 'minimal', and consider the approach to dune management appropriate and well-executed.

The comments from the other group were mostly generic rather than specific to Waihi Beach, with the exception of two respondents who thought that the beach should be cleaned with a sweeper, as is reportedly the practice at Mt Maunganui. However, the other respondents in this group were concerned with broader-scale issues. One respondent commented that the New Zealand coastline is managed by different agencies, 'some better than others'. This point was echoed by several other respondents, one of whom described the approach to coastal management as 'haphazard' and stating that each council 'does its own thing'. Another respondent suggested that there is a conflict in management approaches between EBOP and the local council (Western Bay of Plenty District Council), with EBOP having the more stringent approach.

A range of other concerns was raised by respondents in this group, relating generally to coastal development and erosion protection. One respondent was concerned about the current level of pressure being exerted on the coast by development, and considered there to be too many new subdivisions. This respondent does not consider that the right balance is being struck between development and environmental protection, with insufficient consideration given to the environment. However, it was unclear whether these comments were directed locally, or at the coast in general.

Another respondent considered that more engineering structures are needed to protect the coastline from erosion; this respondent expressed the view that we need to move away from the philosophy of 'letting nature take its course'. Not surprisingly, this respondent was in favour of seawalls and did not identify any drawbacks with their use, and also stated that people 'should be allowed to do whatever is necessary to protect their properties'.

One respondent took the opportunity to mention the importance of climate change for coastal management, and expressed the opinion that it must be taken seriously.

3.11 Key points for Waihi Beach

Results that particularly stood out are as follows:

- Around half of the 29 respondents had little idea of the underlying causes of coastal erosion.
- There appears to be scope for improving the public understanding of coastal erosion and its causes, particularly regarding long-term processes. People under-rated it as a problem for Waihi Beach.
- There is a level of support for dune management, though by no means unanimous.
- People may have unrealistic expectations of the level of protection offered by seawalls, and may be unaware of some of the tradeoffs involved also.

4.0 INTERVIEWS WITH BEACHGOERS AT TAIRUA

Interviews with beachgoers were conducted on 10 January 2007, at Tairua's Ocean Beach. The survey area covered the beach from the northern end near the patrolled area down to Two Mile Creek (south of the Shaw Rd rock wall). The sea was very rough the day we were there, and most beachgoers were based near the patrolled area in front of the Surf Club, so we worked in this area.



Figure 4.1 Tairua's Ocean Beach, looking north from southern end

4.1 Summary of responses

We interviewed 30 beachgoers. A summary of the numbers of residents and visitors, and of property owners and non-property owners, is given in Table 4.1.

Table 4.1 Summary details of Tairua beachgoers sample (n=30)

	Residents	Visitors	<i>Total</i>
Property owners	8	8	16
Non-property owners	1	13	14
<i>Total</i>	9	21	30

In comparison to the Waihi Beach sample (Table 3.1), it can be seen that there are higher proportions of both residents and property owners in the Tairua sample. Many people described themselves as regular visitors, and as having a strong sense of connection to the local area and, in general, a good knowledge of local environmental issues. As a result, we were able to have much more detailed discussions with interviewees at this beach.

4.2 Valued features of Tairua's Ocean Beach and surrounds

Respondents were asked to tell us what they valued most about the coast around Tairua. The following emerged as valued features of Tairua's Ocean Beach:

- its cleanliness, white sand and the lack of rubbish;
- the easy access;
- the big surf;
- the presence of the surf lifeguards;
- the sand dunes;
- the rugged, unspoilt, scenic surroundings and natural beauty of the area;
- views of the offshore islands;
- houses are set well back from the beach;
- that it is not too overdeveloped and crowded;
- the pleasant climate.

Two respondents also mentioned that they like the combination of an Ocean Beach and a more sheltered estuary in Tairua, as there is something for children of all ages.

4.3 Protection of valued features

Respondents were then asked if any of the features they had nominated in the above question were currently under threat or in need of greater protection. Two-thirds of the respondents had no comment to make, and were well satisfied with the status quo.

Thirteen respondents identified a range of threats to valued features. Compared to the general sample of beachgoers, both residents and property owners were over-represented in this group, which presumably reflects the greater level of awareness of local issues among these respondents. Six respondents commented that the sand dunes are under threat, and pointed out areas (eg Figure 4.2) where people trample over the dunes from the houses behind rather than using the accessways. This is a persistent problem at Tairua because there are only a limited number of public accessways because of the original pattern of development, and people are more inclined to take short cuts to avoid quite lengthy walks. This situation may change in response to the recent plantings (Section 1.4.1) at Tairua, particularly where beachfront owners have planted the dunes seaward of their own properties. According to Jim Dahm,

.. at Tairua we are always going to have some struggle given the widely spaced accessways and the far more tempting alternative for beachfront owners.



Figure 4.2 Trampling of sand dunes at Tairua's Ocean Beach

Five respondents in this group commented on a lack of amenities at the beach, particularly toilets and rubbish bins. One respondent thought there was insufficient car parking by the Surf Club.

Two respondents commented that 'development is a threat' and that they were strongly against any new subdivisions, and in favour of retaining the existing bush areas.

4.4 Natural hazards affecting Tairua

Respondents were asked to choose the two natural hazards, from a list of eight, most likely to affect Tairua. The most frequently-chosen hazards were flooding (chosen by 20 respondents) and coastal erosion (chosen by 18), followed by storms (chosen by 10). These were followed by tsunami (chosen by 4), forest fire and earthquakes (both chosen by 3), then landslides (chosen by one). No respondents thought volcanic ashfall was one of the two most likely hazards to affect Tairua.

The pattern of responses is quite different to Waihi Beach. Responses for all eight hazards are shown calculated as a percentage of the total responses for each location (Figure 4.3). Waihi Beach respondents clearly rate coastal erosion as the most probable hazard, followed by storms and tsunami. Tairua respondents rate flooding and coastal erosion as the most probable hazards, followed by storms. The largest differences were for flooding (Tairua

respondents were four times more likely that Waihi respondents to consider flooding the primary hazard) and tsunami (Waihi Beach respondents were twice as likely to consider tsunami a hazard). The shores of the Tairua estuary are prone to flooding as the estuary's catchment area is large (Section 1.2.1).

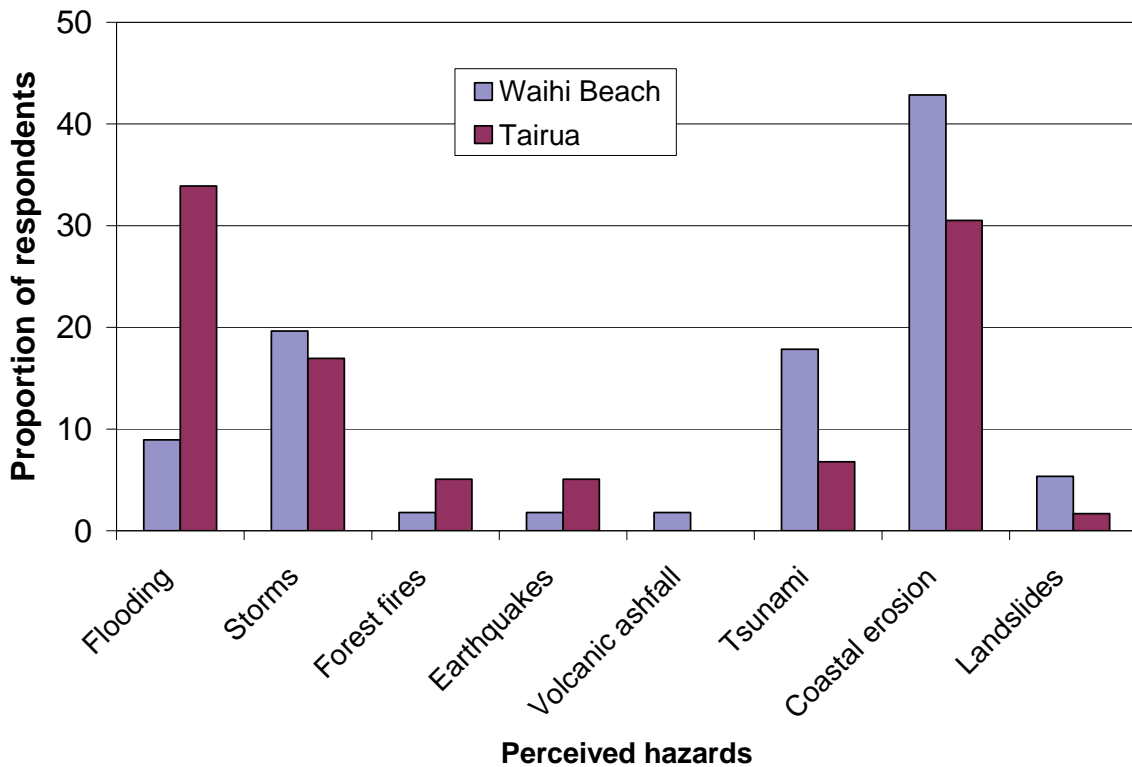


Figure 4.3 Proportion of samples of beachgoers nominating each hazard as one of two most likely to affect the local area

There was also a clear difference in how coastal erosion is rated as a hazard, with Tairua respondents less likely to consider it one of the two most probable hazards. This may be because Tairua has a wide beach, a substantial sand dune buffer, and houses are well above sea level also (Figure 4.4). At Waihi Beach, houses are visibly closer to the sea, and there are obvious erosion control measures such as the rock walls (Figure 4.5).



Figure 4.4 Views of Tairua's Ocean Beach



Figure 4.5 Views of Waihi Beach

4.5 Coastal erosion and its causes

4.5.1 Underlying causes

For Tairua beachgoers, a range of responses was put forward in response to this question. The main responses are summarised below, in order of decreasing prevalence.

4.5.1.1 Storms

Approximately half of the respondents indicated that they think that storms are the main cause of coastal erosion. Some people justified this view with comments such as 'erosion is cyclical' and 'beaches change and evolve, and sand gets redistributed'. These comments suggest a good grasp of the cyclical nature of erosion damage by storms with rebuilding episodes in between.

4.5.1.2 'Living too close'

Approximately a third of respondents gave responses along the lines that coastal erosion problems are primarily the result of people interacting too closely with the coast and its

natural processes. Specifically, respondents mentioned building too close to the coast and 'building in the wrong place', destroying protective coastal dune vegetation and 'interfering with natural coastal processes'.

Some responses were more vague, such as 'mankind impacting on nature'. In the context of the question as asked, however, these comments were thought to belong in this group of responses, as there was a general sentiment that problems arise from people having insufficient respect for natural processes and building structures too close to the coast.

4.5.1.3 *Sea level rise*

A small number of respondents (three out of 30) consider climate change, if accompanied by sea level rise, to be the most likely underlying cause of coastal erosion.

4.5.1.4 *Other explanations or unsure*

Several respondents were either unsure how to answer this question, or had other views on the underlying cause of coastal erosion. One respondent was very concerned about increasing power boat usage in the area and suggested that boat wakes were responsible for coastal erosion.

4.5.1.5 *Discussion*

As discussed in Section 3.5.1, Pilkey and Hume (2001) note that storms cause short-term 'jumps' in shoreline retreat, but that rebuilding episodes occur in between storms so that over longer time spans, storms *per se* are not the fundamental cause of overall shoreline erosion. Sea level rise is more likely to be an underlying cause because the rising sea brings each storm a little further inland. Other potential causes include changes to sand supply, and tectonic controls (whether the coast is in a zone of uplift or subsidence). As the question asked did not differentiate between short and long-term time scales, the range of responses given by respondents can generally be considered reasonable.

There is a clear difference between the responses for this question at Waihi Beach (where half the respondents had little or no idea of the underlying cause of coastal erosion) and Tairua (where the majority of respondents showed a greater understanding of coastal erosion and its causes). A possible explanation for this difference may be that the Tairua sample contained a higher proportion both of local residents and property owners. People who live at the coast, or visit frequently and are 'connected' to the area, are likely to have a better grasp of coastal processes than casual visitors or people who have little to do with the coast.

A similar finding was noted by Dahm (2003) in a review of a study (Ives and Furuseth 1988) of two communities on the North Carolina coast. People in these communities understood that erosion is a continuous natural process with which they must live and cope. They also understood the role of storms in erosional cycles, and that erosion is not simply due to natural coastal processes or human actions alone. The authors concluded that these findings were not surprising in view of the traditional maritime orientation of these communities and their long experience of their environment.

There may be lessons to be learned from this finding for situations such as new coastal subdivisions where new residents may have little experience of living at the coast and of coastal processes.

4.5.2 Current seriousness of coastal erosion threat to Ocean Beach

Respondents were asked how serious a problem they think coastal erosion is for Tairua's Ocean Beach, at present. A follow-up question asked whether they think it will become a problem in the future, and on what timescale.

Responses were divided into those who generally think there is a problem, and those who do not. Around one third of the respondents who answered this question currently consider erosion to be a problem at Tairua, with estimates of seriousness ranging from comments such as 'a big issue' and 'pretty bad', to 'moderate' and 'average'. Some people referred to their own observations on the beach to support their views, noting that sand had been lost from the beach and that the beach shape had changed over the past six years. However, such changes are expected in the short term, as storms cause cycles of erosion with rebuilding episodes in between. No respondents mentioned long-term observations or trends.

The other two-thirds of respondents considered erosion at Tairua to be either no problem at all, or a minor problem. One respondent stated that he was basing this assessment on 35 years of experience at Ocean Beach and noted that the beach has been 'stable' over this period although subject to episodes of erosion. Other respondents commented that they had noted cyclical or periodic changes, but no long-term trends.

A lower proportion of Tairua beachgoers (around 33%) consider erosion to be a current problem for the locality compared to the proportion for Waihi Beach (around 43% of the sample). The road behind Tairua's Ocean Beach runs at an angle to the beachfront so that there is a wide margin at the northern end of the beach that becomes progressively narrower towards the southern end. The houses towards the southern end lie within the hazard zone defined by the development setback lines established by Environment Waikato, and both primary and secondary setback lines run close to the landward boundaries of some of the properties. This is a consequence of these properties being created decades ago, whereas the hazard zones were only established recently (in 2002).

To date, construction of seawalls or other engineering works to protect these at-risk properties has been avoided at Tairua. Some of the measures taken to mitigate risks include ensuring that certain high-risk houses are fully relocatable houses, attaching stringent conditions to building consents issued for properties lying within coastal setbacks, and encouraging beach scraping (i.e. rebuilding dunes using sand from the beach after major storms) as an alternative form of protection (Jim Dahm, pers. comm., 2007).



Figure 4.6 South end of Tairua's Ocean Beach showing houses close to beach and within hazard zone



Figure 4.7 South end of Tairua's Ocean Beach showing rocks placed in an attempt to halt erosion

4.5.3 Future seriousness of coastal erosion threat to Ocean Beach

Responses were divided into those who generally think there is a problem, and those who do not. There were 23 responses to this question, with the remaining respondents feeling unable to address this question. Nine of the 23 respondents did not consider that erosion is likely to become a problem in the future for Tairua. Several of this group qualified their responses in various ways. One person noted that erosion shouldn't be a problem in the future if managed properly, and critical decisions made. Another noted that a tsunami could upset predictions, and a comment was also made that it would take a great deal of sea level rise to cause problems for Tairua. The respondents in this group all gave negative responses to the previous question about current seriousness as well, and the overall attitude of this group could be summarised as 'erosion isn't a problem for Tairua, either now or in the future'. One respondent mentioned that he had been observing the beach for 35 years, and had seen many short-term changes, but that he had not observed any long-term erosion.

Around 60% of the respondents think it likely that erosion will become a problem for Tairua in the future. A range of timescales was given for when this might occur. About half of this group thought it likely that erosion might become a problem within five to 20 years, and the other respondents thought longer timescales of 50 to 100 years were more likely to apply.

Foreshadowing the next question, several respondents commented that erosion will become a problem in the future if sea level rise occurs.

4.5.4 Effects of sea level rise on Tairua's Ocean Beach

Respondents were asked what they thought the effects of sea level rise on Tairua's Ocean Beach would be. A diverse set of responses was received. The largest group of 12 responses (out of a total of 22) stated that sea level rise will lead to increased coastal erosion, which in turn will lead to effects such as flooding of low-lying areas and coastal housing, and inundation of the coastline. One respondent suggested that climate change is likely to cause more extreme weather, which may cause more flooding and erosion in itself. Estimates of the magnitude of these effects varied quite widely. One person described the likely effects as 'horrendous', but most people appeared to think that the effects would be less dramatic. Of this group of 12, three people thought that the main effect would be loss of the beach.

Other responses received included a group of six who thought there would be effects but had little idea what they might be, two people who thought that sea level rise would occur, but would be minor and unlikely to cause many effects, and one person thought that sea level rise would necessitate the use of engineering solutions, such as seawalls. A further person challenged the assumption implicit in the question that sea level rise is going to occur, and said he was dubious about this.

4.6 Best approach to managing coastal erosion

Most respondents interviewed at Tairua had definite opinions on this topic, and sometimes contributed multiple suggestions, so that 36 separate suggestions were received. The option most favoured by respondents (18 out of the 36 suggestions, or 50%) was restoring and

maintaining a sand dune buffer. Within this group, practical suggestions included maintaining existing coastal vegetation including trees, planting dunes, protecting planted areas with fencing, installing good signage to inform people about dune care, and providing accessways to keep people off the dunes.

The next largest group of responses (9 out of 36) took a somewhat lateral approach to the question in that they did not specify management approaches such as dune care, seawalls, managed retreat and so on, but instead were concerned with more general matters such as getting the planning framework right for coastal management, and approaching the problem of coastal erosion via public education.

On the subject of planning, one respondent suggested that the regional plan was the most appropriate vehicle for managing coastal erosion; similar comments were received from two others. Another respondent commented that it is vital for any new coastal developments to be carefully planned, taking into account the best available knowledge on coastal processes.

The remaining responses were divided between those favouring seawalls as the best solution to coastal erosion (4 responses), those expressing the view that coastal erosion can't be managed as the 'sea will dictate' and 'nature will take its course' (3 responses), a suggestion that houses cannot be built on the beachfront, and another suggestion that beachfront houses could be raised up on poles to allow for shifting sands.

In comparison to Waihi Beach beachgoers, the same proportion of responses at Tairua (50%) was in favour of dune buffer restoration and maintenance as the best way to manage coastal erosion. The most obvious difference between these sites was that more people at Waihi Beach had strongly-held views about hard defences such as seawalls and rock walls.

4.7 Respondents' views on how coastal erosion is managed in Tairua

Over half of the sample of beachgoers (56%) were happy with the current approach to coastal erosion at Tairua's Ocean Beach, and had few negative comments to make. Two respondents had attitudes best described as neutral; they were neither for nor against the current management regime.

Five respondents had concerns about the Beachcare scheme. These people were very much in favour of the concept of dune care, but were concerned about the current implementation, with their comments covering areas such as the need to keep people off the dunes and the run-down state of the dunes. As described in Section 1.4.1, there was a very severe erosive episode in 2003 following a storm, and the dunes had not been replanted since because of a stand-off over the removal of exotic flowers on the dunes which was necessary before replanting with native sand-binding species. As a result, levels of disappointment and frustration were quite high among local people who had worked hard over the previous eight years to restore the dunes. Therefore it is likely that our visit in January 2007 caught some local residents, and the dunes, at a 'low ebb'. However, as described in Section 1.4.1, the situation has changed since January, with a major planting programme achieved with a high level of community support.

Some of the comments received from the people concerned about the management regime indicate that there may be a level of misunderstanding about the nature of Beachcare schemes; examples were that the scheme 'needs to be funded better', 'relies too heavily on volunteers', and that keeping people off the dunes 'is not being adequately enforced at present'. Several other comments were received about lack of enforcement. These views indicate that some people see these schemes as being imposed from external authorities such as councils, rather than being community-led initiatives. Jim Dahm's view (2007) is that

'The only enforcement in these programmes comes from the communities themselves – raised awareness of what is and is not appropriate behaviour and peer pressure. And in my opinion this is by far the best approach – once you win people over they don't go back. If you force acceptance they comply grudgingly at best.'

Jim Dahm also notes that if the Beachcare group had forced the issue of removal of exotics in 2003 the likely outcome would have been the alienation of sectors of the community, and that in general, forcing progress on controversial issues can include very unfavourable outcomes such as loss of community support, loss of key volunteers and negative publicity.

4.8 Respondents' views of the sand dune buffer maintenance programme at Ocean Beach

We asked respondents to rate the sand dune area at Ocean Beach in terms of three aspects: effectiveness at managing erosion, attractiveness and effects on beach usage and access.

4.8.1 Effectiveness at managing erosion

Twenty-one of the 30 respondents considered the Ocean Beach sand dune buffer zone to be effective at managing coastal erosion. Of the other nine, four were generally happy with its effectiveness but with some reservations about the operation of the current scheme (as discussed in Section 4.7). Five respondents of the 30 did not consider themselves well-enough informed to address this question.

4.8.2 Attractiveness

Around two-thirds of the respondents (18 out of 30) considered the sand dunes to be attractive, with several people commenting that they add to the natural character of the beach, and that they also help screen out the beachfront houses from beach users. A further six respondents commented that dunes are attractive in general, but that the dunes at Ocean Beach were currently not in very good condition and have 'lost attractiveness'. This was expressed in various ways by people describing the dunes as 'a bit sparse', 'looking a bit scruffy at present', and 'run down'. These views are in accordance with the situation described in Section 1.4.1 and discussed further in Section 4.7.

Of the remaining six respondents, two were not in favour of sand dunes in general, with one saying that he was 'not really into dunes'. The other four were indifferent towards the attractiveness of the dunes, rating them as 'six out of 10', 'five out of 10', 'average' and 'not that attractive, but OK'.

4.8.3 Effects on beach access and usage

Twenty-two out of 28 respondents who answered the question did not identify any problems for beach access and usage caused by the dune management scheme, which does restrict access to a limited number of access points along the beach (Figure 4.8). One respondent commented that these accessways actually improve access because they provide paths through the dunes, sometimes with sand ladders or steps, and are therefore easier to negotiate than walking on the sand. A further comment was that the access has been well-thought-out, with good provision for parking near the accessways. However, another respondent had an opposing view on ease of access, and was of the opinion that these accessways are too difficult for elderly or disabled people to negotiate.

Five people indicated that they thought sand dunes could cause problems for beach access or usage. In addition to the comment reported above, another view was that sand dunes can be damaged in storms, impairing access, and a further respondent thought that 'people should be able to play on the dunes'.

It is interesting that no respondents commented on the limited number and wide spacing of the accessways, which in turn is thought to lead to people living in or staying in beachfront properties taking short cuts across the dunes (Figure 4.2). This may be because our sample of beachgoers did not include anyone from this group.



Figure 4.8 Fenced accessway at the north end of Tairua beach

4.8.4 Drawbacks of sand dune buffer zone

Respondents were asked whether they consider there to be any drawbacks to the use of a sand dune buffer zone for the management of erosion at Tairua's Ocean Beach. All respondents answered this question, and their responses were remarkably uniform, with 29

stating that there are no drawbacks, and one stating that there may be drawbacks for beachfront property owners, as sand dunes can block their view and restrict their access. This respondent was a visitor who owns property very close to the beachfront at Ocean Beach. The respondent conceded that even though sand dunes may impinge on beachfront houses, they are still 'a good thing' as they give a protective buffer between the houses and the sea.

This was clearly a different pattern of responses in comparison to the Waihi Beach sample, in which half of the respondents identified drawbacks of seawalls and voiced some very strongly-felt opinions.

An overall conclusion is that the coastal management approach used at Tairua's Ocean Beach (maintenance and restoration of the sand dune buffer zone) is not contentious, as it was virtually unanimously supported by the sample of beachgoers interviewed for this study. The use of seawalls as part of the overall approach used at Waihi Beach is, however, contentious with strongly diverging opinions expressed by study participants.

4.9 Whether participants felt well-informed about the dune buffer care programme at Tairua's Ocean Beach before the project was implemented

It should be noted here that the question was somewhat different to the one asked at Waihi Beach (where respondents were asked whether they felt there had been enough opportunities for the public to get involved with the management of coastal erosion in general, not just in relation to the rock walls). Tairua respondents were asked specifically about whether they felt well-informed about the dune buffer maintenance programme at Ocean Beach before it was implemented.

There was a higher response rate to this question than was the case for Waihi Beach, because a higher proportion of the Tairua beachgoers' sample was comprised of residents or visitors owing property in the area (Tables 1 and 2). Of the 18 responses that were received for this question, 12 generally considered themselves to be well-informed about the project before its inception. One respondent (a property-owning local resident) stated that the project 'was in all the local newspapers' and that the level of information had been very good. Another respondent was well-informed about the project by virtue of having been involved with the Beachcare group over the period 1998-2001. Absentee ratepayers mentioned receiving mailouts, and another respondent mentioned that they got information through the Surf Club, and were involved with repairing the damage after the last big storm.

Six respondents did not consider that they had been well-informed about the project before it started. Mostly they did not elaborate, but one person said that they were 'not [consulted] at all and would have liked to have been'.

4.10 Respondents' awareness of development setback lines

Respondents were asked whether they were aware of the development setback lines for Tairua's Ocean Beach. These maps are available to the public on Environment Waikato's

website. Just four respondents out of the 25 who answered the question said they were aware of these lines, and there is some doubt about two of the positive responses as one person described themselves as 'not exactly aware' and another person gave the impression that they were unaware of the lines prior to hearing about them in this survey.

This issue is discussed further in Section 6.3.5.

4.11 Respondents' other comments about the way the coast is managed in general

The final question offered participants the chance to air any other comments or opinions about coastal management in general.

There were no particular themes emerging from people's comments so they are simply reported here:

'I am all for marine reserves being extended as they are a really good idea';

'I would like a small marina in Tairua';

'I would like to see more pines planted behind the dunes';

'Coastal management needs clear commitment and policy';

'Overdevelopment is a big issue that needs to be limited, and more thought needs to be put into it';

'More pathways and accessways are needed, and disability access [to Ocean Beach] needs to be improved';

*'A good level of attention is being paid to the protection and management of the beach and to addressing development pressures; people are getting involved and making their views known'
'trampling of the sand dunes is a pressing problem'.*

There appear to be some issues on which respondents hold opposing views. For instance, one respondent wanted to see more access to Ocean Beach, and another wanted access to be strictly limited. Similarly, the proposed marina development for Tairua is clearly a contentious issue, with some respondents in favour and some opposed to this project.

4.12 Key points for Tairua

Results that particularly stood out are as follows:

- In comparison to the Waihi Beach sample, there were higher proportions of residents and property owners in the sample of Tairua beachgoers, which in turn led to higher levels of knowledge, involvement and 'ownership' of local issues.
- There is clearly a high level of support for the approach to managing coastal erosion used at Ocean Beach; some concerns were raised about the state of the dunes and the lack of progress on dune restoration as of January 2007, but this situation has now changed as a major replanting programme was achieved with a high level of community support during 2007.

5.0 INTERVIEWS WITH BEACHGOERS: WHANGAPOUA

We visited Whangapoua on 11 and 12 January 2007. This part of the study was more preliminary and investigative in nature, and we used a twofold approach of semi-structured interviews and more loosely-structured interviews with key local people.

The semi-structured interviews with beachgoers were similar to those carried out at Tairua and Waihi Beach, with the questionnaire adapted for the local situation. The main public access point to Whangapoua Beach is at the general store, so we started there. The weather was not particularly good on the days we visited, and only a limited number of people were at the beach. Therefore, to increase our sample size, we also approached people along the roads close to the beachfront.



Figure 5.1 Whangapoua Beach looking south-east

Key local people, both residents and long-term visitors, were approached and asked if they would be willing to take part in loosely-structured interviews about their experiences in Whangapoua. People were identified from an initial contact with a well-informed local person, who provided a list of suggested contacts to follow up. These people were then approached directly and interviewed during our visit of 11-12 January 2007.

This chapter has a different structure to the previous two. A lot of useful general background information on Whangapoua was gleaned from speaking with local people in detail, and this is included in a separate section before the results for the semi-structured interviews with beachgoers are presented in the same way as for Tairua and Waihi Beach.



Figure 5.2 Whangapoua Beach looking north-west

5.1 Summary of responses

Five ‘key informant’ interviews were carried out. These were all people with a high level of local knowledge; three were local residents and two were visitors who were also long-term property owners.

Semi-structured interviews were carried out with 19 beachgoers at Whangapoua. Strictly speaking, this sample was not solely comprised of beachgoers as people were also approached on the street or in their gardens, but the same term will be used as for Tairua and Waihi Beach.

Table 5.1 Summary details of Whangapoua beachgoers sample (n=19)

	Residents	Visitors	Total
Property owners	6	7	13
Non-property owners	0	6	6
<i>Total</i>	6	13	19

The composition of this sample is similar to Tairua, but with a higher proportion (two-thirds) of property owners, compared to approximately half of the sample for Tairua. The property owners we spoke to were divided approximately evenly between permanent residents and bach owners living elsewhere (i.e. absentee ratepayers). Of this latter group, many people described themselves as long-term, regular visitors and in some cases, had bought their properties as long ago as the 1960s when the area was first subdivided. As a consequence, many people we spoke to described a very deep and long-term sense of attachment to this area.

5.2 Background on Whangapoua

From our interviews with key local people ('key informants') we gleaned much useful background information on the Whangapoua community.

Whangapoua is located approximately 30 minutes' drive northwest of Whitianga, and is on the eastern side of the Coromandel peninsula. It has a more remote feel than either Waihi Beach (which is much more accessible to both Hamilton and Tauranga), or Tairua, which is located on the main road (SH 25) up the eastern side of the Coromandel. It is quiet, low-key and relatively undeveloped: there is just one general store, located midway along the beachfront. There has apparently been at least one motor camp operating at Whangapoua in the past, but currently there are none. Many people spoke of the 'unspoilt' character of Whangapoua, and expressed the heartfelt hope that it stays that way.

The Whangapoua sandspit was reportedly in Maori ownership prior to its subdivision during the 1960s, or possibly as early as 1959. One person recalled the names of the two Maori families who sold the land as being 'the Mururoas and the Mangakahias'. We spoke to several people who had acquired their land during the initial subdivision; one person had paid '£600 each for two sections' in 1966. We were particularly fortunate that this person had maintained a good photographic record of the developments on their section from when they bought the section through to the present, and we have included copies of some of these photos in Appendix 2 of this report.

Before the sandspit was developed, it was reportedly comprised of sand dunes covered in marram grass, with sparse trees, mainly pines. The first phase of development was the creation of sections on both sides of the road running the length of the beach. More recently, the area on the inland side of Mangakahia Drive and Tangiora Ave has been zoned for development and is now partially filled in. This area is recognizably more modern in character with modern homes, street lights and pavements. According to the chair of the local Citizens and Ratepayers Association, who was one of our key informants, there is not a lot of investment buying in Whangapoua, with few existing properties being resold.

There are approximately 70 permanent residents in Whangapoua, with the population growing to several hundred during the summer. A dynamic of which we were previously unaware is that local residents tend to go away in January during the peak holiday time, and rent out their properties, which can fetch rentals of up to \$400-\$450 per night for beachfront properties. We were also told that Auckland Anniversary Weekend (late January) is usually a busy time at Whangapoua as many absentee property owners tend to visit during this period; this is useful knowledge for future work at Whangapoua.

5.2.1 Observations on long-term stability of coastline at Whangapoua

The key informant group offered their observations on the stability of the coastline around Whangapoua. An elderly Auckland couple who had bought their beachfront property at the northwestern end of the beach in 1959 reported that over this time they have not noticed any long-term changes to their beach frontage, which is a well-vegetated dune, and have not suffered any storm damage to their section. They consider that the presence of the small island (Figure 5.3) just off Whangapoua beach probably provides some protection from storms at the northwestern end of the beach, and that there is probably some additional protection from the headland also. When this couple bought their property, they were concerned about protection from storms, and bought at the northwestern end of the beach because they thought it was better protected than the southeast end. Another member of this group also shared the view that Whangapoua is reasonably well protected by the headlands on either side.

We also spoke to a long-term beachfront property owner from the other (southeast) end of the beach (see Appendix 2) who bought two beachfront sections in 1966, and has spent 'every summer since 1966' at Whangapoua. This person offered the observation that the beach profile changes in response to the overall weather patterns, with generally offshore winds from the southwest giving rise to calmer seas and a flatter, wider beach, while onshore winds, particularly from the north and east, produce more stormy seas and a more eroded and narrower beach.

Several major storms have caused erosional damage to this property (Appendix 2). The first major storm this family experienced was in November 1978; this storm eroded the sand dunes and left a scarp approximately 2.5 metres high. The damage undermined trees and fences, and encroached on some of the houses in the vicinity. After this storm, a group of beachfront residents clubbed together and had a seawall built, although our interviewee herself was not in favour of the scheme. She considered herself vindicated when another major storm in 1989 destroyed this seawall.



Figure 5.3 Northwest end of Whangapoua beach with island visible

5.2.2 Protection of sand dunes

The frontages of several beachfront properties at the southeastern end of Whangapoua beach are shown in Figure 5.4. It appears that property owners consider it important to stabilise their dunes, with plantings of trees, shrubs and grasses often quite dense. We spoke to the person who owns the property shown in the upper left hand of Figure 5.4, and he said that he considers it more important to have a protective, well-planted dune buffer than to have the sea view. However, we did not speak to enough beachfront residents to determine whether this view is widely shared.

Another feature of the beach frontages shown in Figure 5.4 is the presence of private accessways. In general, these structures appeared well-constructed and well-maintained, and probably make a positive contribution to dune stability by keeping people off the dune vegetation.

We also interviewed the local coordinator of the Dune Care scheme. The group was started up in 2002, and its main activity is an annual planting event, which attracts approximately 40-70 people. Most of the group's activities so far have been in the area around the general store (Figure 5.5). The coordinator also provides free plants, of appropriate species, for property owners who want to plant their dunes.



Figure 5.4 Beachfront at southeastern end of Whangapoua beach

5.2.3 Views on development setbacks

Within the key informant group there were diverse opinions on the use of development setbacks as a coastal management tool. Two of the group (who did not live or own property on the beachfront) were very much in favour of this approach, and were also opposed to any new development occurring in at-risk areas such as the coastal margin. The remaining three people in this group (which included two beachfront owners) were not very keen on the use of development setbacks. They were seen as heavy-handed and as a bureaucratic intrusion. One person thought they were generally unnecessary; he has seen few significant overall changes in the beachfront at Whangapoua over a period of almost half a century and remains to be convinced about the imminence of global warming and sea level rise. Another person suggested that if the ‘buyer beware’ principle is applied, and people buy properties fully informed about the risks, then there is no need for the council to be involved, as insurers can assess risks for themselves.

5.2.4 Other concerns raised by key informant group

Two of this group raised specific concerns about recent or impending developments in Whangapoua. One case was where a small beachfront property, on the seaward side of the

primary development setback line, was knocked down and replaced by a much larger and more valuable house occupying the same 'footprint'. This was seen by the interviewee as being a clear case study of the exploitation of a loophole, because the intention of development setback lines is to prevent this kind of situation developing where risks to property are increased in the high-risk coastal zone. The other case was quite similar: a high level of concern was expressed by one respondent and her family about a current proposal to move the shop back from its existing position adjacent to the beachfront, and to put in new buildings on the current site of the shop.

Findings from the semi-structured interviews will now be presented, as for the previous two chapters.



Figure 5.5 Planted area around general store, Whangapoua beach

5.3 Respondents' awareness of coastal hazard issues when they bought their property

As described in Table 3, 13 of the 19 beachgoers interviewed at Whangapoua were property owners, with six being permanent residents and seven having their primary residence somewhere else. Respondents were asked how long ago they bought their property, and whether they were fully informed about coastal hazard issues before they bought it.

The length of time ago that respondents had bought property at Whangapoua spanned a very wide range from just one month ago to 40 years ago. The median length of time was 17 years ago. As described previously, many people we spoke to in the beachgoers' sample described a long history of coming to Whangapoua, and a strong sense of attachment.

Just three of the 13 property owners said that they bought their property fully informed about coastal hazard issues. All three had bought property recently in comparison to the overall sample (at one month ago, one year ago and ten years ago). Of the people who said that they were not fully informed about hazard issues, most did not expand on their answers. However, two people in this group had antagonistic attitudes towards Environment Waikato. One person said that they were frustrated with the provision of hazard information, and the other, who was a beachfront property owner, said that there was no need to be informed about coastal hazards as they are 'not an issue' at Whangapoua, and that Environment Waikato should 'mind their own business' and 'stop trying to plan people's lives'.

5.4 Valued features of Whangapoua's coastline

Whangapoua beachgoers we spoke to valued a diverse range of features of the Whangapoua coast, including the following:

- Good beach access
- Good fishing
- Clean beaches and clean water
- A safe swimming beach
- Good fishing
- The natural beauty of the area and the views
- New Chums Beach
- The presence of a large estuary/harbour nearby
- The area is not overcrowded
- The area is less commercialised and more intimate (e.g. than Whitianga)
- A friendly local community
- Proximity to Auckland.

These values are in accordance with our impressions that people value Whangapoua for its low-key, quiet and relatively undeveloped, unspoilt character as well its great natural beauty.

5.5 Threats to valued features

Approximately half of the 19 respondents did not consider there to be any particular threats to the valued features of the coast at Whangapoua. Of the people that did nominate threats, the most common theme to emerge was that some people were concerned about development in this area and saw it as being a threat to the essential qualities of this beach. Specific comments were as follows:

'Over-residentialising is awful',

'The natural beauty of Whangapoua is being destroyed by too much development',

'Some of the proposals for development will erode the natural landscape'.

A development that people were particularly concerned about is a proposed residential development on the farmland north of Whangapoua; people were concerned that it would affect public access to New Chums Beach and have negative impacts on the remote and pristine character of this beach, which remains secluded and quiet despite being named, in 2006, by British magazine *The Observer* as one of the ‘twenty best deserted beaches’ in the world.



Figure 5.6 New Chums beach

Other than views on development issues, two respondents also mentioned that it is imperative to protect the beach and its dune buffer zone, by keeping people off the dunes and being proactive in planting and maintaining dune vegetation.

5.6 Natural hazards affecting Whangapoua

Respondents were asked to choose the two natural hazards, from a list of eight, most likely to affect Whangapoua. Of the 36 hazards (chosen by 18 of the 19 respondents), the most frequently-chosen were coastal erosion (chosen by 10 respondents) and flooding (chosen by eight respondents), followed by storms (six responses), tsunami (five responses), forest fires and landslides (both three responses) and then earthquakes (one response). No Whangapoua respondents thought volcanic ashfall was one of the two most likely hazards to affect them.

These responses have been expressed as a proportion of the total responses and are shown with results for Waihi Beach and Tairua included for comparison on Figure 5.7.

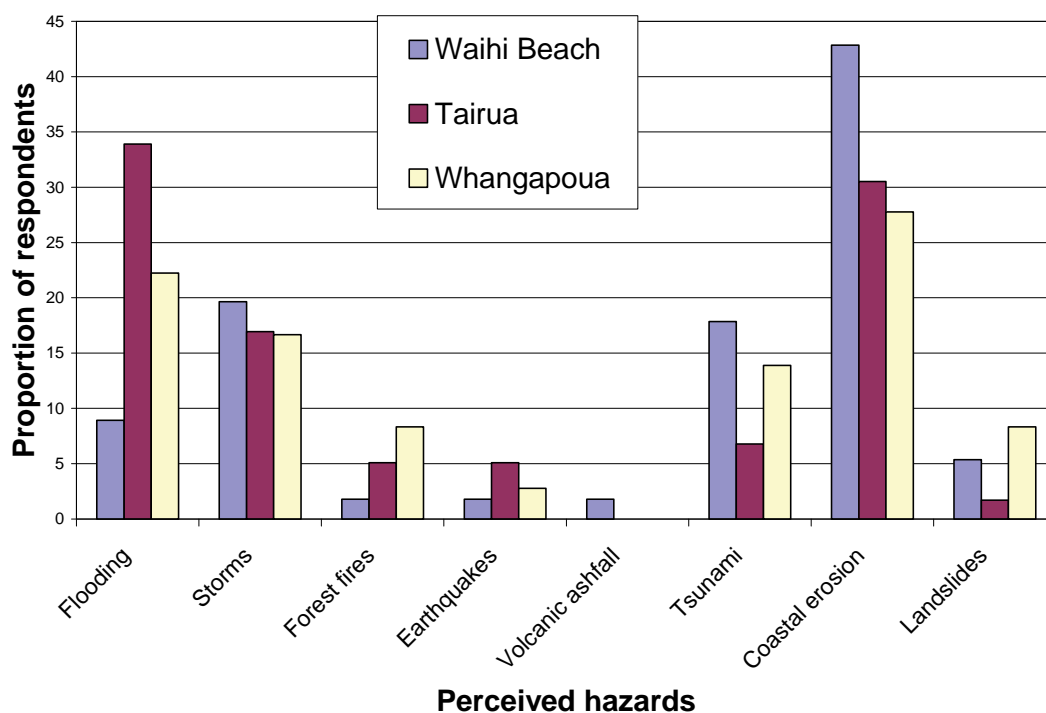


Figure 5.7 Respondents' perceptions of the natural hazards most likely to affect each location

Whangapoua beachgoers were the least likely of the three locations to rate coastal erosion as one of the two most probable hazards, although the proportion of respondents (28%) was only slightly less than for Tairua (31%). The next most frequent hazard for Whangapoua beachgoers was perceived to be flooding (22% of respondents); relative to the other locations this response was approximately midway between that of Tairua (34%) and Waihi Beach (9%). The proportion of respondents considering storms was quite similar between all locations (around 16-19%). Tsunami were also considered relatively likely at Whangapoua (by 14%).

Whangapoua beachgoers rated forest fires and landslides as more probable than did the respondents in the other locations. One person who nominated landslides noted that Whangapoua hill had been closed due to slips.

5.7 Coastal erosion and its causes

5.7.1 Underlying causes

When asked what they thought the fundamental cause of coastal erosion was, the Whangapoua beachgoers put forward a range of suggestions that were very similar to Tairua beachgoers, and will not be revisited in detail as the same comments and conclusions apply. Half of the Whangapoua beachgoers indicated that they think storms are the main cause of coastal erosion. Approximately a third of the sample held views along the lines that human

interactions with the coastline, such as building too close or stripping away dune vegetation, were to blame; one person expressed this point of view neatly by saying that:

'Erosion is a natural process, people make the problems'.

Three people thought that global warming is to blame, and two others had rather vague suggestions that 'natural processes' were to blame. As discussed previously (Section 4.5.1.5), there is some justification for most of these opinions.

5.7.2 Current seriousness of coastal erosion threat to Whangapoua

Respondents were asked how serious a problem they think coastal erosion is for Whangapoua at present. Follow-up questions asked whether they think it will become a problem in the future, and on what timescale.

Of the 16 people who answered this set of questions, only a minor proportion (three of the 16) consider coastal erosion to be a problem for Whangapoua at present. These people were also inclined to consider it to be 'an increasing issue'. This is a low proportion (~19%) compared to the samples of beachgoers we interviewed at Tairua and Waihi Beach, where approximately 33% and 43% of the samples respectively considered erosion to be a current problem for these beaches.

Most respondents (13 out of 16) did not consider coastal erosion to be a serious problem at present. Comments such as 'not an issue' and 'no problem' were typical of this group, and two people backed up their comments by referring to the length of time they had spent at Whangapoua observing the beach, which was 10 years in one case and 20 years in the other case.

5.7.3 Future seriousness of coastal erosion threat to Whangapoua

When asked to estimate when in the future coastal erosion might become a problem for this beach, around half of this group of 13 respondents thought it unlikely that coastal erosion would become a problem for Whangapoua in the foreseeable future. There were distinct differences in the underlying reasons for this opinion; some people considered that sea level rise poses a minor or negligible threat to Whangapoua and made it clear that they considered it an over-rated threat; others considered it more likely but because the level of awareness about it is high, considered that it will be 'manageable'. One respondent stated that:

'It's not a problem – [we] can use engineering solutions to solve the problem if there ever is one.'

The other half of this group of 13 respondents considered that erosion is likely to be a threat to Whangapoua in the future, with likely timeframes in the range of 20 to 50 years suggested. One respondent noted that erosion problems could be expected when the next big storm hits, which 'could be tomorrow'.

5.7.4 Respondents' awareness of development setback zones

Respondents were given a brief description of Environment Waikato's development setback lines and asked if they had seen a map of these zones for Whangapoua beach.

Of the 17 valid responses we received, the majority (13 out of 17) had not seen the map of the development setback zones. One person said that while they had not seen this map, they still agreed with the principle. Four of the 17 beachgoers we spoke to at Whangapoua had seen the development setback zone map. One person was a beachfront property owner, and had seen the map.

Two of the four Whangapoua beachgoers who had seen the development setback zones had further comments to make. One person, who owns property approximately 50 metres back from the beachfront and is a regular, long-term visitor to the area, was 'unimpressed' by this approach. Comments made in other parts of the interview indicated that this person considers that coastal erosion will be able to be mitigated by engineering solutions, and that Environment Waikato's approach is an unwarranted intrusion and amounts to 'stealing the land'. The other person was also a property-owning visitor, with property on the beachfront. This person was also hostile towards both Environment Waikato and the use of development setback zones, and commented 'on what basis do they have the right to do this'?

The issue of awareness and acceptance of setbacks is discussed further in Section 6.3.5.

5.8 Preferred management options for the Whangapoua coastline

Following on from the discussions of coastal erosion and the use of development setback lines, respondents were then asked to give their views on what they consider to be the range of available options for managing the coastline at Whangapoua in the event of it being threatened by coastal erosion. Follow-up questions were then asked on which were their most and least preferred options, and finally, which they would choose if their own property was to be threatened by erosion in the future.

Participants responded to this set of questions in different ways. Some people challenged the assumptions implicit in the question that sea level rise is inevitable and that some form of management will be necessary, and were inclined to recommend a reactive, 'wait and see' type of approach. Comments from this group were:

'Leave it as is – let the owners take the risk',

'Use engineering solutions to solve the problem if there ever is one',

'Fix things as they occur'.

Most people in this group were rather reluctant to offer views on their most and least preferred options, or which option they would choose if their own property was at risk, because of the general disbelief about sea level rise. When pressed, people's comments fell mostly into the category of the 'staying put but adapting' approach as their preferred option.

Other respondents were more receptive to the idea of proactive approaches towards future sea level rise. The range of options suggested included dune restoration and maintenance, the building of seawalls or rockwalls, raising houses higher, building an offshore wave barrier and retreating or relocating buildings further back.

There was a high level of approval towards the approach of restoring and maintaining the sand dune buffer. It was seen as being 'natural', and also as being a low-impact and unobtrusive approach. One person commented that they were attracted to Whangapoua because of the attractiveness of the beach, and that they would not like to see intrusive structures such as seawalls, which would alter the character of the beach and probably restrict access also, being built. Another person was strongly in favour of dune care, but commented that this approach would be unlikely to protect property from a major storm.

Respondents were divided about the approach of building seawalls and rock walls. They were the least preferred option for the majority, and their comments generally echoed those we received at Waihi Beach and Tairua (i.e. that rock walls are ugly and 'unnatural', can restrict access and can lead to scouring of the beach). However, a minority of respondents, particularly when asked what option they would choose to protect their own property if threatened by coastal erosion, stated that they would prefer the protection of a seawall or rock wall.

The option of managed retreat, or progressively moving houses back from the beachfront, was not viewed favourably by anyone we spoke to. In general, most people's attitudes could be summed up as 'holding the line', with any form of retreat being seen as a last resort.

Other approaches suggested by individual respondents included building an offshore wave barrier to modify the wave climate, and raising houses. One person commented that they had already done this to protect their house from flooding from the estuary and river.

5.9 Involvement of respondents with local groups

Participants were asked whether they were involved locally with a group interested in coastal management such as a Dune Care group. In the subset of 13 respondents who are property owners at Whangapoua (Table 3), four people indicated that they are members of a local group with an interest in coastal management. Two of this group said that their involvement is with the Citizens and Ratepayers Association.

5.10 Respondents' views on whether coastal protection should be tackled as a community

Respondents were asked whether it is a good idea to tackle coastal protection as a community. The majority of respondents (16 out of 19) answered 'yes' to this question, though most did not elaborate further on these views. The three people who answered 'no' offered the following comments:

'Let the owners take the risk.'

'Individuals should look after their own patch',

'[It's not a good idea] the way EW is approaching it .. by stealing the land.'

Two of these three people owned property close to the beachfront.

5.11 Respondents' views on coastal management in general

The final question put to respondents was whether they had any other comments about the way the coast is managed in general. Approximately half of the 19 respondents took this opportunity to add further comments. There were mixed comments about the role of Environment Waikato, with some respondents wanting more input from EW and some wanting less:

'I would like EW to provide more public information about the pros and cons of different approaches to coastal protection'

'EW needs to work with locals more'

'EW needs to come back with sensible options rather than what they are currently doing' [this was a reference to development setback zones]

'Let common sense prevail, keep the bureaucrats out, let the owners take the risks'.

Other comments were as follows:

'Councils need to be careful about future subdivisions and give priority to protecting natural values of the coast'

'It will be interesting to see the application of fallback positions' [this presumably refers to development setback zones]

'People are abusing sites that aren't designated [camping] sites, littering and destroying the place'

'It is inappropriate to have a big diesel tank up in the estuary'.

5.12 Key points for Whangapoua

Results that particularly stood out are as follows:

- Many people we interviewed described a long history of living in or visiting Whangapoua, and a deep sense of attachment to the area. People value this beach because it is low-key, quiet and relatively undeveloped and unspoilt. Many of the beachfront residents have taken steps to plant their frontages to stabilise the dunes.
- Because many people have owned property for a long time – several decades – at Whangapoua, they have seen the effects of large storms on the beachfront, and understand the cyclical nature of erosion processes well.
- There was a strong level of support for dune care as an option for coastal protection.
- Most people spoken to had not seen maps of development setbacks for Whangapoua. Of those that were familiar with them, opinions were sharply divided, with some people in favour and some vehemently opposed.

6.0 DISCUSSION AND INTEGRATION

In this final section, the findings from both survey methods (the face-to-face interviews, described in detail in this report, and the results of the postal survey, available as a data report (Becker et al. 2007)) will be integrated and discussed in relation to the objectives of this study (Section 1.1). These will be covered under four main headings corresponding to the individual objectives, with closely-related objectives grouped together.

6.1 Objective 1: to investigate the value of the coast to communities (including visitors as well as residents)

This objective was approached differently in the two branches of the study. In the face-to-face interviews, people were asked an open-ended question about what they value about the coast, whereas in the postal questionnaire, respondents were asked to consider a list of values and indicate the importance of each one. They were also given the opportunity to add further values in an open-ended format.

6.1.1 Interviews

Several 'valued features' were common to all the study locations. These were: easy access to the beach, clean beaches and good water quality, safe swimming (the presence of surf lifeguards was mentioned by many respondents as being an attraction) and the natural beauty of the surroundings. However, the open-ended approach to this question also enabled us to gain a sense of what makes each location unique, and also provided some insight into the social dynamics.

At Waihi Beach, our general impression was that beachgoers consider this beach to be a safe and family-oriented swimming beach; one respondent commented that they liked it because it was 'more laid-back and down-to-earth' than nearby Mt Maunganui. At Tairua's Ocean Beach, people's comments indicated that they value the wild, scenic and unspoilt nature of this beach. It appears less family-oriented than Waihi Beach; on the day we visited the surf conditions were heavy and we encountered fewer families with small children, and more young adults. Some respondents indicated that they enjoy Tairua's combination of a wild Ocean Beach and a sheltered and safe estuary. Whangapoua beachgoers we spoke to value this area for its low-key, quiet and relatively undeveloped character (there is just one general store) as well its great natural beauty and unspoilt nature. Interviews set up with key local people served to confirm this impression; many local residents and property owners show a very deep sense of attachment to this beach, having lived, bought property or visited regularly over a long period of time (since the 1960s in some cases).

6.1.2 Postal questionnaires

A different approach to investigating valued features of the coast was used in the postal questionnaires. Respondents were asked to consider a list of 'values' and rate the importance of each one using a five-point scale from 'very important' to 'not important'. Results are listed in full in Becker et al. (2007), and the data has also been used to calculate

means that differentiate between these values. The data can also be visualised as the proportion of respondents who rated each value as 'very important' to them (Figure 6.1).

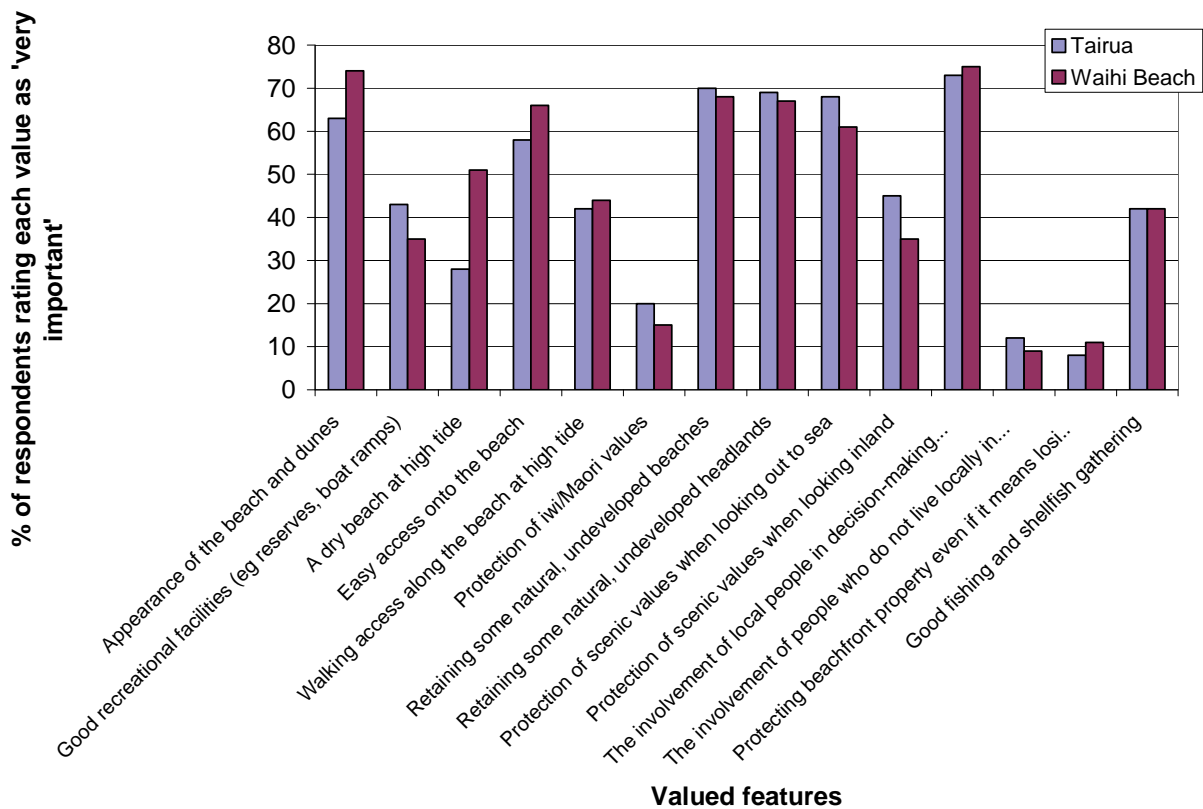


Figure 6.1 Valued features of Tairua and Waihi Beach for postal survey respondents (see questionnaires reproduced in Appendix 1 for full listing of valued features)

Six 'valued features' (rated as 'very important' to over 50% of survey respondents at both locations) stand out as the most important. These are listed here in decreasing order of importance (aggregating the responses from the two locations):

- The involvement of local people in decision-making about the coast
- Retaining some undeveloped, natural beaches around the coast
- Appearance of the beach and dunes (whether or not they are natural etc)
- Retaining some undeveloped, natural headlands around the coast
- Protection of scenic values when looking over the beach and towards the sea
- Easy access onto the beach

These 'valued features' are generally similar to those identified as common to all study locations in the interviews with beachgoers (Section 6.1.1), although there appears to be more emphasis on the importance of natural character among the postal survey respondents, and more emphasis on amenity values among the beachgoers interviewed. This may be due to differences in sample composition between the postal survey and interviews with beachgoers. The postal survey samples were predominantly comprised of property-owning residents, residents renting their properties and holiday-home owners, with almost no casual (non-property-owning) visitors (one in the Tairua sample, and none in the

Waihi Beach sample). In contrast, there were much higher proportions of non-property-owning visitors in the beachgoer interview samples (76% at Waihi Beach, 43% at Tairua, and 32% at Whangapoua). It is not too surprising that visitors and residents may value different features of a beach; in this case the beachgoers we interviewed, with samples dominated to varying extents by summer visitors, appear to rate amenity values very highly, such as the quality of the beach for swimming and the presence of a surf patrol. An interesting 'value' to investigate further might be the attitudes of visitors versus residents to development in coastal areas.

The quantitative method (using a scale for assessing the degree of importance) is useful for 'taking the temperature' on particular issues such as the importance of good public access, but is less useful for differentiating between sites and determining site-specific local issues. Generally the responses were similar for Tairua and Waihi Beach, although there was a discrepancy on the issue of having a dry beach at high tide, with 51% of Waihi Beach respondents rating it as very important to them compared to just 28% of Tairua respondents. Tairua respondents probably take this feature of Ocean Beach for granted whereas the loss of the high tide beach at Waihi Beach in the areas where rock walls have been placed is a contentious issue amongst local residents and was the subject of frequent comments at other points in the questionnaire.

Postal survey respondents were also invited to list their own suggestions about what they value about the coast. Responses were thoughtful and often quite detailed, and were generally in agreement with the themes we found in the face-to-face interviews.

At Tairua, respondents offered the following comments:

'The wild rugged coastline with clean ocean waters and dunes protected by native grasses'

'Our most exciting interface – sea and land dune areas – should be just that .. dunes.'

'The beach for me is a place of rest, relaxation and regeneration from a busy life – keeping it clean and simple is best.'

'I value the contrast to normal city and urban life. We all need a place to review our feeling for place in the natural world – we need to use the coast without spoiling its natural beauty.'

At Waihi Beach, many respondents took this opportunity to express their opposition to the rock walls:

'No manmade false protection of property that should never have been built so close to the shore on the dunes at the high tide mark'

'I value a safe, natural, untouched beach with dry sand at high tide along all the beach and freedom from rock groyne, seawalls, rock walls and other dangerous, ugly manmade structures.'

'Absolutely NO rock walls.'

'A beach that has sand at all tides and not a rock wall like Waihi Beach and many UK 'beaches''.

6.2 Objective 2: to investigate public perceptions of erosion

6.2.1 Causes of coastal erosion

6.2.1.1 Beachgoer interviews

Beachgoers were asked for their opinion on what the main underlying cause of coastal erosion might be. This was a difficult topic to investigate in this format; people were generally disinclined to expand on the reasons for their choices, and as interviewers we found it quite difficult to encourage discussion in a non-leading manner. Also, in retrospect, the question was probably too vague to determine people's understanding of coastal processes. As discussed in Section 4.5.1.5, responses generally fell into one of three categories: storms, 'living too close' and sea level rise. Given that the question asked did not differentiate between short and long-term time scales, the range of responses given by respondents can generally be considered reasonable.

Nonetheless we did find a clear difference in how interviewees perceive coastal erosion and its causes between Waihi Beach and Tairua/Whangapoua (Figure 6.2), with Waihi Beach respondents much more likely to have little or no idea of the causes of coastal erosion (Figure 6.2). A possible explanation for this difference may be that the Tairua and Whangapoua samples contained higher proportions both of local residents and property owners. People who live at the coast, or visit frequently and are 'connected' to the area, are likely to have a better grasp of coastal processes (such as the cyclical nature of erosion cycles, and shoreline fluctuations) than casual visitors or people who have little to do with the coast. While this explanation remains to be confirmed, there may be lessons to be learned for situations such as new coastal subdivisions where new residents may have little experience of living at the coast and of coastal processes.

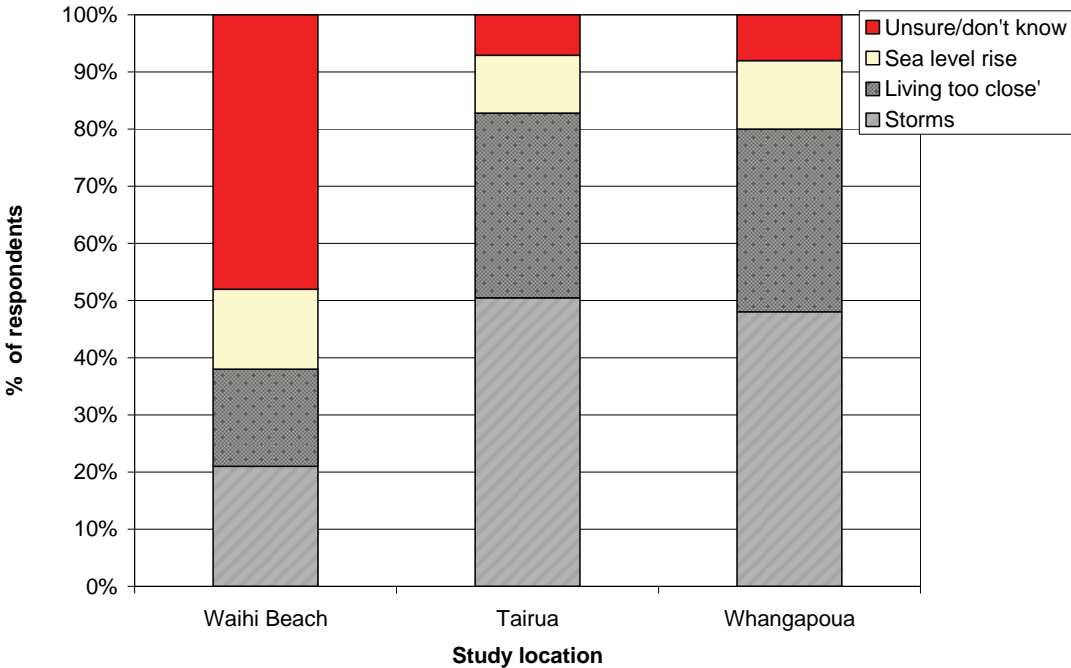


Figure 6.2 Beachgoers' perceived causes of coastal erosion

6.2.1.2 *Postal questionnaires*

Postal survey respondents were also asked for their opinion on the main underlying cause of coastal erosion. They were presented with a range of options (changes in sand supply, storms, sea level rise and 'other cause'). At Tairua, the most common response (by 60% of respondents) was that storms are primarily responsible for coastal erosion; this is quite a similar finding to the beachgoer interviews. Comments showed a high level of local knowledge in support of this view: one respondent noted that changes in the beach profile at Ocean Beach are linked to the prevailing weather conditions, with southwesterlies leading to the sand building up whereas onshore northeast winds lead to erosional conditions.

The next most common response was the 'other cause' category; most suggestions were along the lines that problems arise when people build too close to the shoreline.

'Building too close to the sea'

'Building in inappropriate locations (i.e. on sand dunes)'

At Waihi Beach, responses were spread more widely over the options offered, with fewer people inclined to think storms are responsible. There was a much more commonly-held view that erosion at Waihi Beach is largely the result of human modifications to the shoreline, particularly the modification to the creeks, building on the foredunes and the construction of the rock walls.

'Manmade problems – demolishing dunes, planting wrong dune cover, building too close to sea clearing native ground cover'

'Human intervention with the dune system, such as building homes where dunes should be protecting beaches'

There was quite a noticeable school of thought that the creeks at Waihi Beach are responsible for erosion and that if they were diverted to Tauranga Harbour this would largely solve the problems:

'I believe the creeks cause 90% of the erosion at Waihi Beach. Remove these and we will see immense improvement.'

'Closure of Two and Three Mile creeks will greatly assist in any erosion problems.'

'The single most desirable option that would have the largest positive effect would be the closure of the creeks.'

6.2.2 **Understanding of coastal processes**

Postal survey respondents were asked to consider a series of statements devised by Environment Waikato staff about coastal processes, and to indicate their level of agreement with each. Responses on a scale of 1 to 5 were used to calculate means (Figure 6.3).

There was a high level of agreement with the proposition that 'inappropriate development in coastal areas can put houses at risk from erosion'. The statement is hardly very contentious so the high levels of agreement at both study locations are unsurprising.

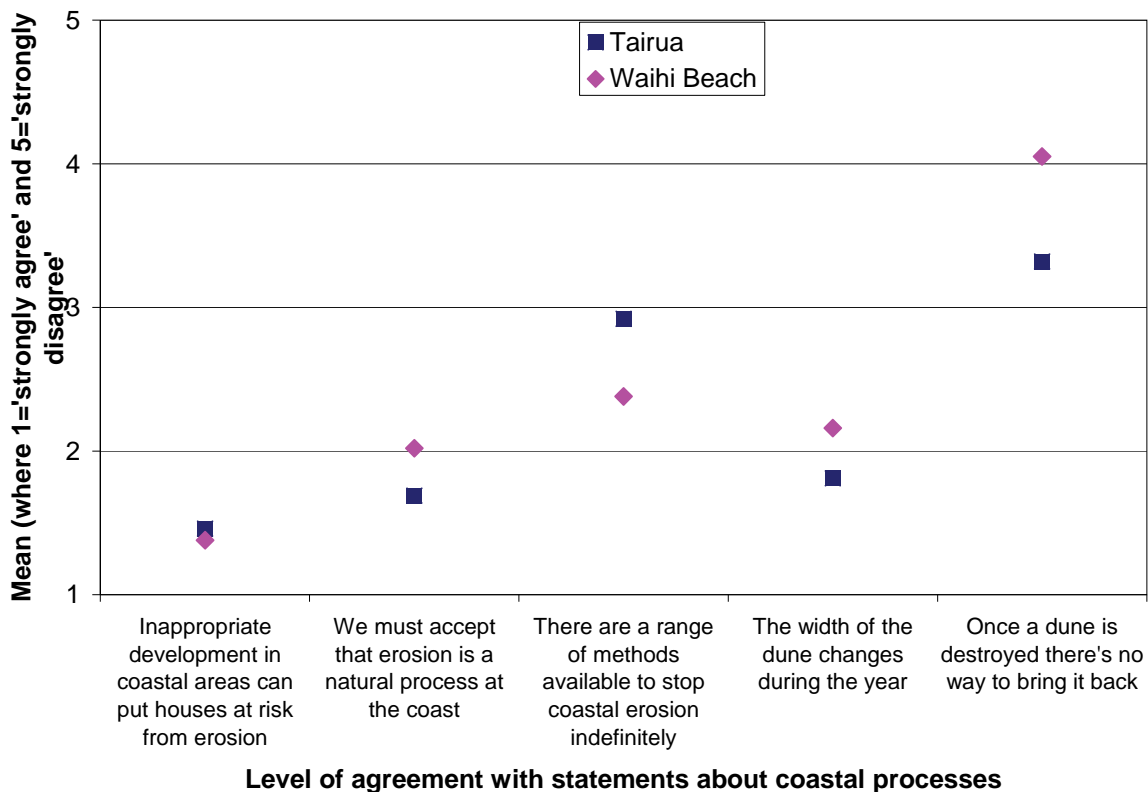


Figure 6.3 Postal survey respondents' attitudes towards statements about coastal processes

Respondents also agreed (though less strongly) with the two related statements that 'we must accept that erosion is a natural process at the coast' and 'the width of the dune changes during the year'. There was a distinct gap between levels of agreement at Tairua and Waihi Beach, with Waihi Beach respondents less likely to agree with these statements. Reasons for this difference are unclear, but may be related to the observation (Section 6.2.2) that Waihi Beach respondents were more inclined to hold human modifications to the shoreline rather than natural processes primarily responsible for coastal erosion.

There was also quite a marked difference in agreement with the statement that 'There are a range of methods available to stop coastal erosion indefinitely'. Tairua respondents were close to neutral overall, with the highest proportion (32%) neither agreeing nor disagreeing, and a further 10% opting for 'don't know'. That people do not hold strong opinions on this matter is perhaps due to a lack of knowledge or information. Waihi Beach respondents were more likely overall to agree with the statement. This is somewhat puzzling given the negative views on rock walls encountered in this group. A possible concern is that there may be unrealistic perceptions of the protection provided by sand dunes. The concept of 'stopping erosion' is probably not a useful one in coastal protection.

Finally, there was overall disagreement with the statement that 'once a dune is destroyed there is no way to bring it back'. The level of disagreement was noticeably stronger at Waihi Beach than at Tairua, with 49% of the Waihi Beach sample disagreeing strongly with the

statement. This may be due to the recent, visible successes at Waihi Beach in restoring dunes along stretches of the beach (Section 1.4.3). It would be interesting to determine whether the views of Tairua residents on this issue have changed following the successful plantings carried out during 2007.

In summary, it appears that for the majority of participants in this study, perceptions of erosion are reasonably realistic. People understand that it is a natural process and that there are cycles of erosion with rebuilding episodes in between, and that problems can arise when development occurs too close to the shoreline. However, there is some doubt about whether visitors to the coast share this level of understanding.

6.2.3 Perceptions of current erosion problems at Tairua and Waihi Beach

6.2.3.1 Interviews with beachgoers

Beachgoers were asked their opinion about the current seriousness of coastal erosion at each of the study locations. In analysing the interview data, we separated responses into two categories: people who generally think that erosion is currently a problem at each location, and those who do not. Perceptions varied between the study locations. A lower proportion (approximately 19%) of the Whangapoua beachgoers considers erosion to be a current problem for Whangapoua, compared to approximately 33% of Tairua and 43% of Waihi Beach interviewees. As discussed in the following paragraph, these perceptions are more or less consistent with the actual level of threat at each location, although it is perhaps surprising that the proportion of Tairua beachgoers considering erosion a current threat is so high given that problems are confined to a small area at one end of the beach.

At both Tairua's Ocean Beach and Whangapoua, the beaches are considered to be in a state of dynamic equilibrium with the shoreline advancing and retreating over approximately 10 to 15 metres as conditions change (Section 1.2). There are currently no obvious erosion problems at Whangapoua, although storms have caused considerable damage to the dunes in the past (see Appendix 2). However, at Tairua, erosion has threatened several properties at the southern end of the beach from time to time; several houses are close to the shoreline and rocks have been placed in front of one property (Figure 4.6 and 4.7). At Waihi Beach, although the beach is in a state of dynamic equilibrium overall, there has been a long history (decades) of erosion at Waihi Beach primarily due to properties being placed too close to the sea and there being an insufficient dune barrier to accommodate the erosion and accretion cycles. There is also local erosion where two streams discharge onto the beach and meander back and forth cutting into the dunes.

6.2.3.2 Postal questionnaires

Postal respondents were asked to rate the severity of the coastal erosion threat to the local beach, and also asked to nominate a timescale for when they consider that erosion might become a problem for the property that the questionnaire was delivered to (Figure 6.4).

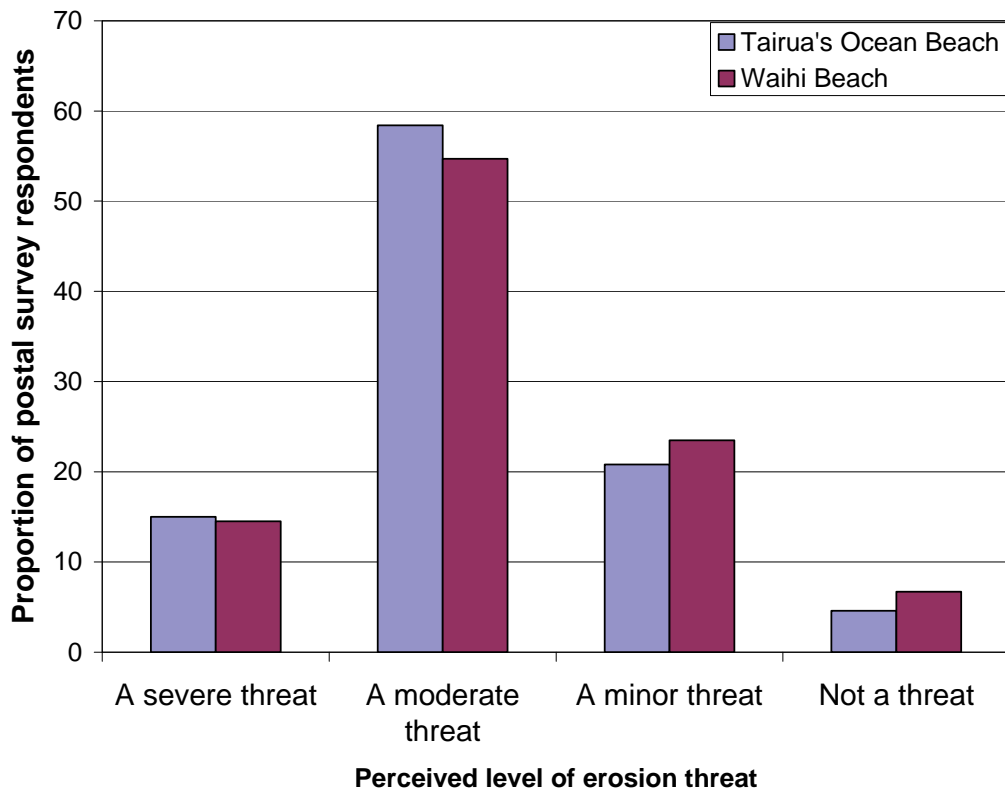


Figure 6.4 Views of postal survey respondents on the severity of the erosion threat at each study location

With respect to the severity of the threat of coastal erosion at Tairua and Waihi Beach, there was little difference between the two. In both cases, the most commonly-held view was that erosion is 'a moderate threat' (held by just over half of the respondents). Around 15% at both beaches consider it a 'severe threat', and slightly over 20% consider it 'a minor threat'. This result is somewhat unexpected as the comments from many Waihi Beach respondents left us in little doubt that they consider that the sand has been scoured out in front of the rock walls and that they find this unacceptable. Thus it might be expected that these respondents would rate erosion as a greater threat to the beach than respondents at Tairua beach, which is unmodified by rock walls other than a limited number of rocks placed at one end.

In retrospect, the way this question was worded may have been unclear, as it asked respondents to rate the erosion threat to 'Waihi Beach' and 'Tairua's Ocean Beach' rather than beachfront properties or amenities such as accessways or reserves. As explained earlier (Section 1.2), both beaches are actually in a state of dynamic equilibrium, and erosional threats to buildings are primarily a consequence of building occurring too close to the sea. Many respondents appear to understand this well:

'I think the original baches were there purely as holiday homes – simple, unassuming, possibly of a temporary nature. I think to build your house on the ever-moving sand and expect it to stand the test of time is foolish.'

Finally, the position of respondents' properties relative to the beachfront had an influence on their perceptions of the erosion threat. At Tairua, just three respondents were located within the hazard setback zone; all three (100%) considered erosion a severe threat and two of the three reported that their property is already affected by erosion. At Waihi Beach, the subsample of 19 beachfront property owners were almost twice as likely (26.3%) to consider erosion a severe threat compared to 14% of the whole sample. They were also more likely to consider erosion likely to affect their property within 10 years (21.1% compared to 6.7% of the whole sample) or within 50 years (42.1% compared to 26.3% of the whole sample).

6.3 Objectives 3 and 4: general views on coastal erosion management

In this section, Objectives 3 and 4, which are closely related, are discussed together. These were to investigate:

- Public perceptions of different erosion management strategies (including planning tools such as development setbacks); and
- Public preferences for different coastal protection schemes, and reasons for these preferences.

6.3.1 Approval of different coastal protection options

Postal survey respondents were asked firstly which forms of coastal erosion management they approve of in general, and secondly, which they consider to be the best long-term approach to managing coastal erosion (Figure 6.5 and 6.6). Beachgoers were only asked the second question and results are described in Section 6.3.2.

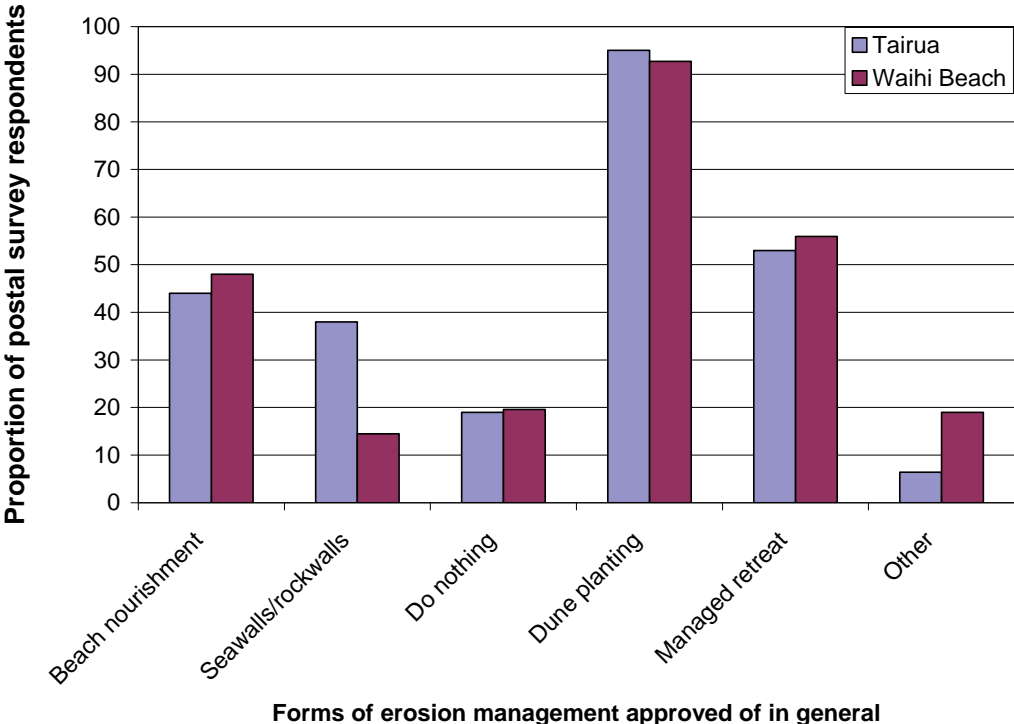


Figure 6.5 Forms of coastal erosion management approved of by survey respondents

There were similar responses in both study locations. Dune planting is almost universally approved of. Over half the respondents also approve of managed retreat. Approval for managed retreat was also noted in our previous study of coastal hazard perceptions in Coromandel coastal communities. In this report (Stewart et al. 2005) it was noted that the relative popularity of managed retreat is contrary to the finding of Dahm (2003) that managed retreat is largely seen as a last resort and that an emphasis on 'holding the line' is more usual among coastal property owners. It may be relevant to note here that Dahm reviewed the international literature on this topic, and her findings were based almost entirely on coastal communities overseas.

The location of survey respondents relative to the beachfront had an influence on their preferred options. The subsample of 19 beachfront property owners at Waihi Beach was less in favour of managed retreat (37% of the beachfront sample compared to 56% of the whole sample) and also less in favour of doing nothing (10% compared to 20% for the whole sample). However, the levels of approval for dune planting were as high in this group as for the entire sample, and levels of approval for rock wall construction were at a similar low level (approved of by 16% of beachfront owners and 15% of the entire sample).

Beach nourishment was also seen as a good option, by close to 50% of respondents at both locations. Of the 'other' options suggested, the construction of offshore/artificial reefs was the most popular.

'The consideration of an offshore reef was not looked into diligently enough.'

'Reefs offshore assist shore protection of dune; beach growth will result.'

'Sea floor structures to diminish wave power and allow sand to remain closer to the shore.'

The major difference between Tairua and Waihi Beach was in their approval of seawalls and rock walls; these are clearly less favoured at Waihi Beach.

6.3.2 Best long-term approach to managing coastal erosion

6.3.2.1 Beachgoer interviews

Approximately 50% of the sample of beachgoers interviewed at both Tairua and Waihi Beach were in favour of dune buffer restoration and maintenance as the best way to manage coastal erosion. They made a range of supporting suggestions, such as maintaining existing coastal vegetation including trees, planting dunes, protecting planted areas with fencing, installing good signage to inform people about dune care, and providing accessways to keep people off the dunes.

The most obvious difference between these sites was that people interviewed at Waihi Beach were more inclined to hold strong views about the use of hard defences such as seawalls and rock walls. Over a third (11 out of 29) believed that seawalls or rock walls will give the best protection from erosion. One respondent stated that 'beachfront owners should be able to do whatever is necessary to protect their properties'. However, other people were strongly critical of the rock walls, and told us that they are 'not the answer', are not compatible with being in harmony with nature, and can damage the beach.

People interviewed at Tairua also suggested a range of other options for managing coastal erosion, including the construction of seawalls or rock walls, 'doing nothing' and allowing nature to take its course, getting the planning framework right for coastal protection, and ensuring good public education. One respondent commented that it is vital for any new coastal developments to be carefully planned, taking into account the best available knowledge on coastal processes. These somewhat lateral responses arise from the question being asked in an open-ended way rather than presenting respondents with options.

6.3.2.2 Postal questionnaires

Following on from the previous question about approved options for coastal erosion management, respondents were then asked what they considered to be the best long term approach for managing erosion over a timescale of 50-100 years. The same options were offered, and respondents were asked to explain the reasons for their choices.

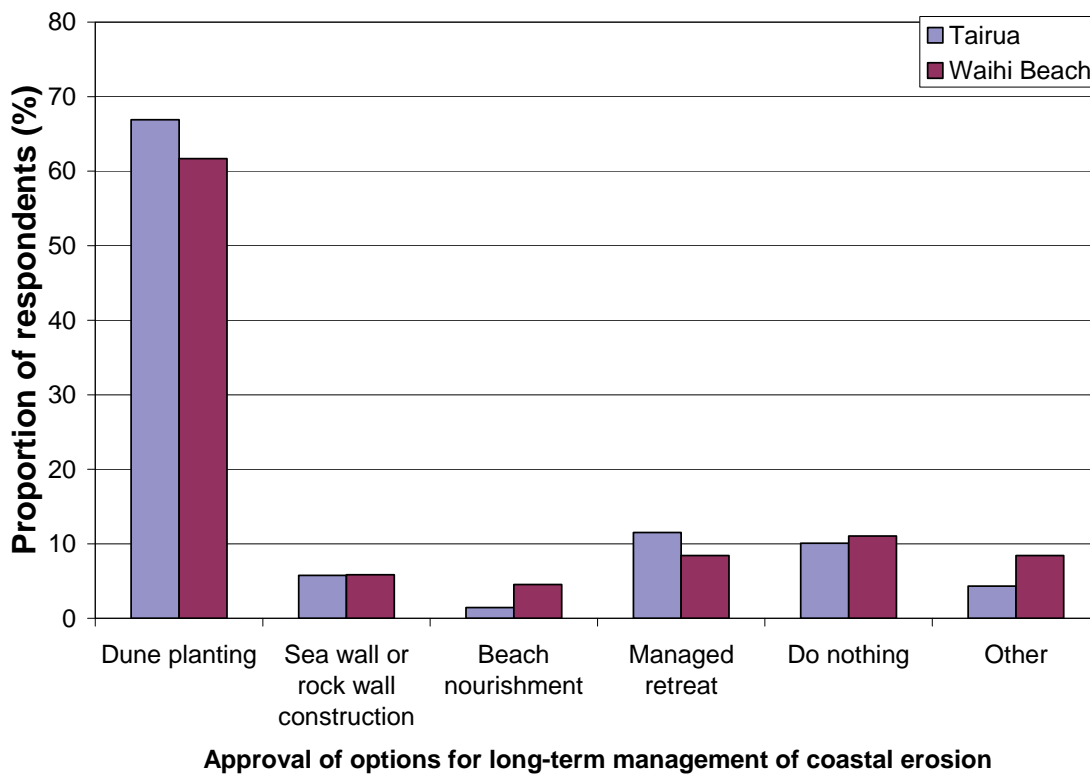


Figure 6.6 Survey respondents' views on the best long term approach to managing coastal erosion

These results give a clear mandate for dune planting as a long term management approach for coastal erosion. Several respondents indicate that they prefer a combination of approaches, with the options of managed retreat and beach nourishment the most popular in conjunction with dune planting.

'It's not possible to be categorical about solutions, it's just a sensible mix.'

Comparisons between beachgoers and postal survey respondents are complicated by the different approaches to this question in the two studies; beachgoers were asked an open-ended question whereas the questionnaire presented respondents with a 'closed' range of

options. Nonetheless there are some obvious differences, particularly at Waihi Beach where the beachgoers interviewed were much more likely to favour the construction of rock walls (about a third of people interviewed considered these the best long-term solution to erosion, compared to just 6% of postal survey respondents at Waihi Beach).

A possible explanation might be that (as already noted in Section 6.1.2) the sample compositions were quite different in the two studies. At Waihi Beach, the beachgoer sample was comprised mainly of non-property-owning visitors (76%), whereas the postal survey sample had no non-property-owning visitors and was comprised of 67% property-owning residents, 11% residents renting their homes and 22% absentee property owners (holiday home owners). Thus, the level of local knowledge is likely to be far greater among the postal survey respondents, and the frequent comments we received from this group about the negative effects of the rock walls on Waihi Beach would explain the lack of support for this option in this sample.

6.3.3 Understanding of the pros and cons of different erosion management strategies

A series of multi-choice questions were drawn up to test postal survey respondents' knowledge of various coastal erosion management options and their strengths and limitations. These took the form of asking respondents to complete a series of incomplete statements (Figures 6.7, 6.8 and 6.9).

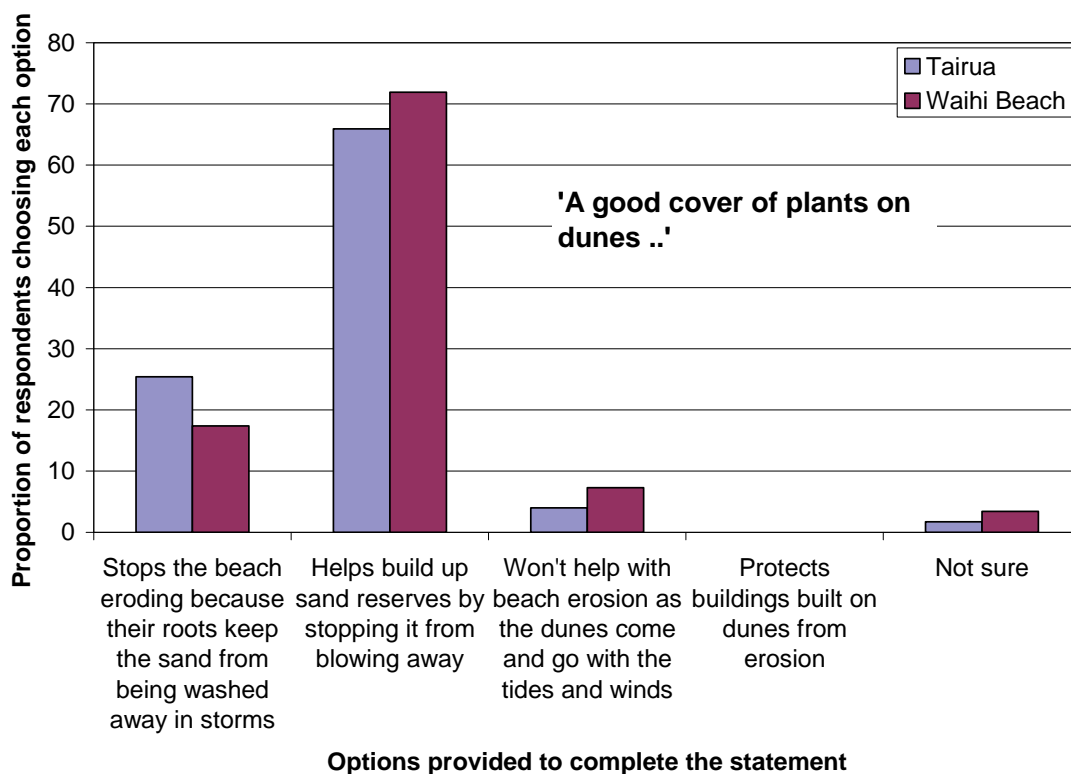


Figure 6.7 Responses to incomplete statement about dune function

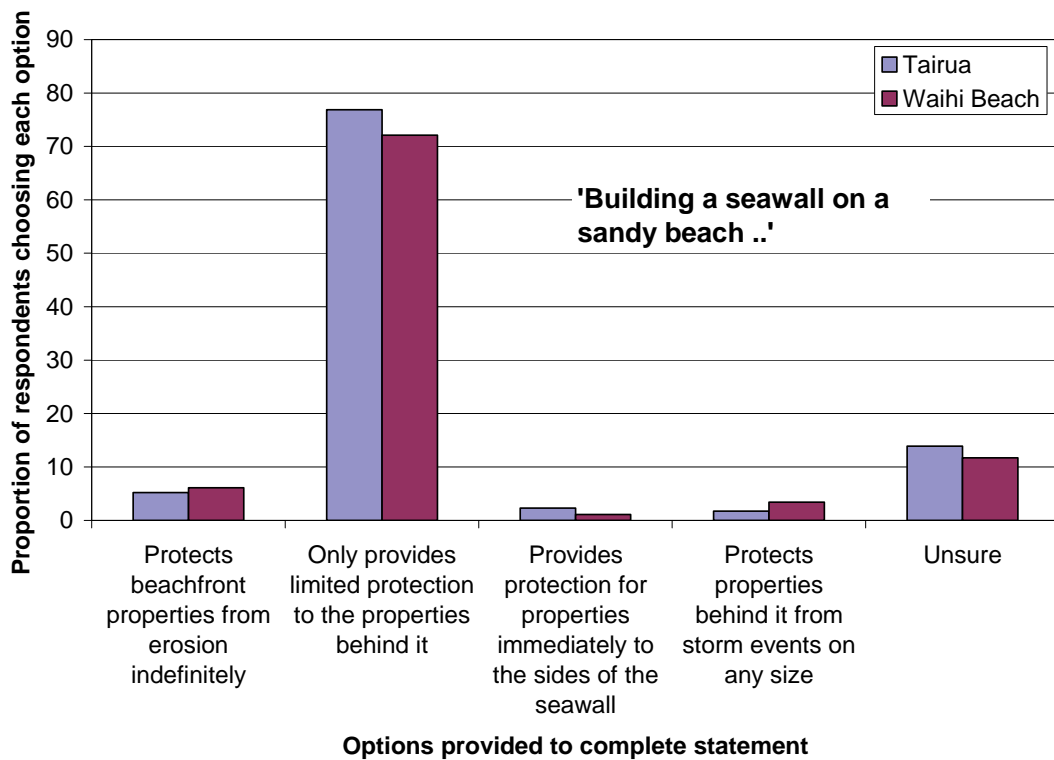


Figure 6.8 Responses to incomplete statement about the protection offered by seawalls

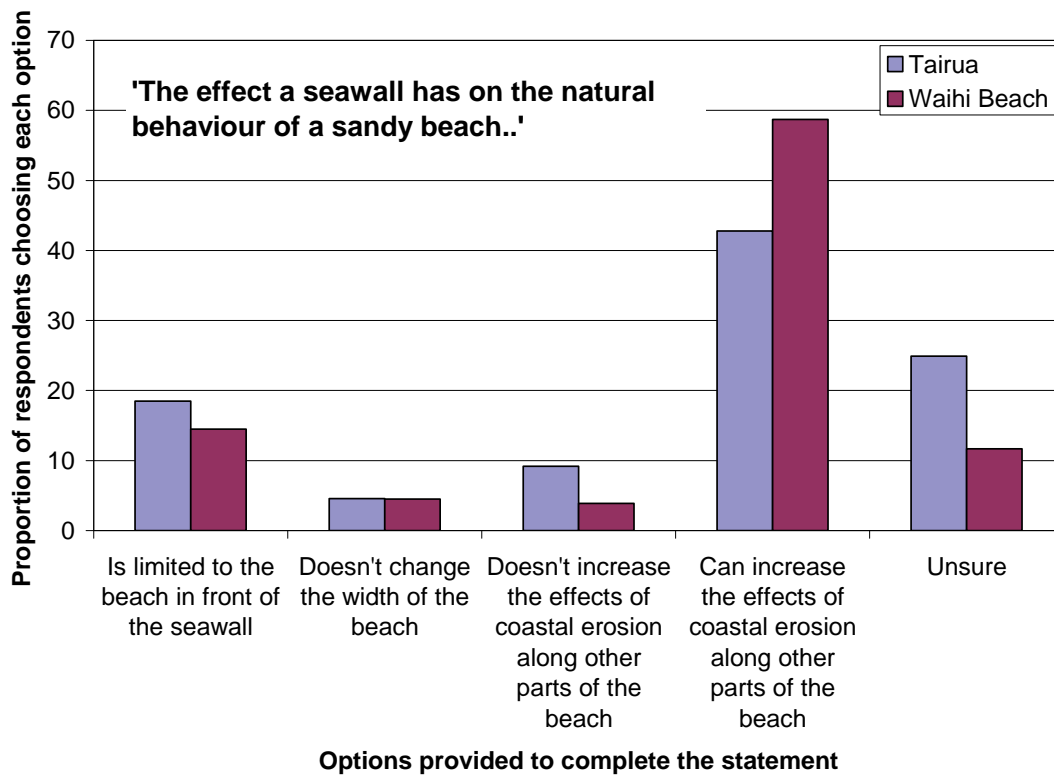


Figure 6.9 Responses to incomplete statement about the effects of seawalls on sandy beaches

Overall, most respondents completed these statements in accordance with the responses generally considered by coastal management experts to be most appropriate, suggesting a reasonably good overall level of understanding about the advantages and disadvantages of these approaches to coastal protection. People understand that sand-binding plants help trap sand by stopping it blowing away; however approximately 20% of respondents are under the impression that dune plants will also protect against storm damage, which may not be the case.

Most people have a realistic understanding of the level of protection offered by seawalls to the properties behind them, and also of the effects of seawalls on the beach, although there may be room to improve public understanding of ‘end effects’ associated with seawalls. Tairua respondents were less likely (43%) to choose the most appropriate option for this statement than Waihi Beach respondents (59%). A likely explanation for this difference is that Waihi Beach respondents are likely to have first-hand experience of the effects of seawall construction on a sandy beach.

6.3.4 Views on who should fund erosion control measures

Postal survey respondents were asked for their views on how coastal erosion management measures should be funded, both on private and public property. The difference was emphasised in the questionnaire by bolding and underlining the terms ‘public property’ and ‘private property’. Respondents were given a closed set of options to choose from, and also asked to expand on the reasons for their choices. Respondents were free to choose more than one option and therefore the responses sum to over 100%.

6.3.4.1 Private property

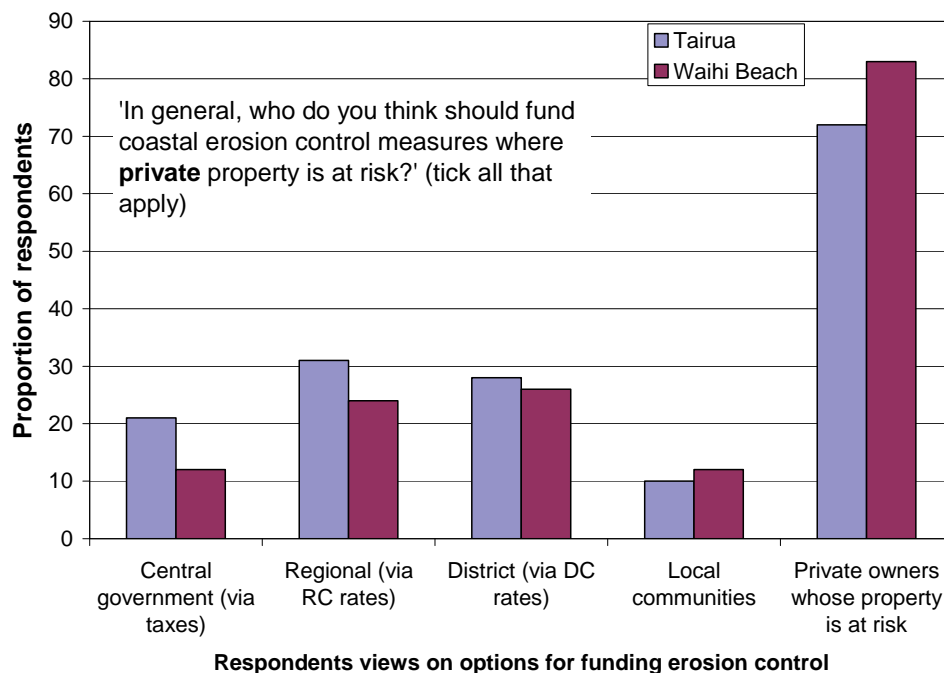


Figure 6.10 Respondents' views on funding coastal erosion control where private property is at risk

For private property, the majority of respondents clearly consider that erosion control should be funded by private property owners. Waihi Beach respondents were more likely to hold this view (83% favoured this option compared to 72% of Tairua respondents); this may be because the problem of erosion threatening private dwellings is more immediate and visible at Waihi Beach, and the issue is of real rather than theoretical concern.

Respondents' location relative to the beachfront influenced their views on this matter. Fifty-six percent of Waihi Beach beachfront property owners thought that erosion control where private property is at risk should be funded by private property owners (compared to 83% of the whole sample), Similarly at Tairua, property owners close to the beach at Tairua were less likely (56% compared to 72% for the overall sample) to think the same.

The comments we received were instructive. There was a strong sentiment that people have chosen to take the risk of living close to the beachfront and therefore should be financially responsible for any costs incurred, and a general lack of sympathy for beachfront property owners suffering from erosion problems:

'I believe in caveat emptor – let the buyer beware. Also if you build on or demolish dunes or plant the wrong things then you have created the erosion problem as should fund the solution.'

'If you build on sand you should accept the risks.'

'Private owners have had large capital gains in recent years and therefore should fund any protection.'

'If you buy property in a flood zone – expect flooding. If you buy property on a beach and then change the ecosystem, expect problems. Buyer beware.'

However, there were also views that councils should be partially responsible if they authorised the development in the first place:

'Council has an obligation to provide a level of protection as they approved the subdivision and the owner has an obligation as they purchased the property knowing the sea was there!!'

'Council should have barred building on beach frontage property years ago and private parties should have realised that there was always a likelihood of risk building on sand hills'

'Council has allowed development too close to the sea – should have left an undeveloped margin between sea and property'

'I believe the District Council [WBoPDC] has played a major part in the problem in allowing development (i.e. collecting high rates and building fees) from properties that have obviously been at risk for many years from erosion. Now we get the beach-destroying rock wall option to 'save' the beach.'

'If properties have been built exactly to council rules/bylaws then assistance should be available from council funds'

There was also a school of thought that erosion of beachfront property will also damage the beach which belongs to everyone, and therefore that everyone should help fund its control:

'In general we think the wider community uses the beach and facilities and therefore should contribute to repairs and refurbishment of the existing seawall'.

'Seawall redevelopment is to protect both the beach and private property. Therefore costs should be shared by all beach users'.

Some beachfront property owners defended themselves strongly:

'I'm a beachfront owner in a place which has been in the family for 27 years. Am all for passive solutions to the problem but am not impressed with radicals who advocate 'let them all fall into the sea'. We have been paying the lions share of rates for many years and have as much right to property rights as anyone else.'

6.3.4.2 Public property

The pattern of responses for situations where public property is at risk (Figure 6.11) is clearly different to the pattern described for private property at risk (Figure 6.10, preceding section).

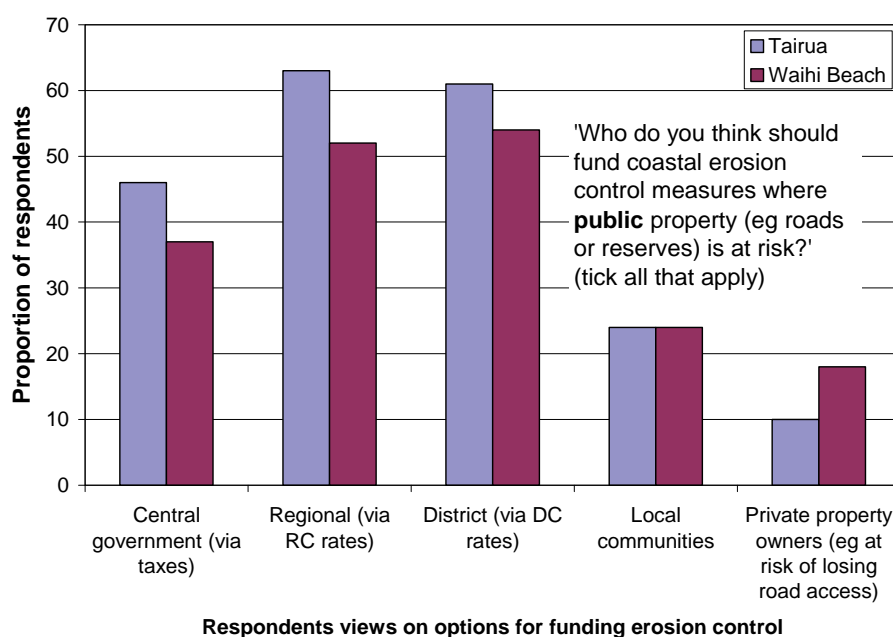


Figure 6.11 Respondents' views on funding coastal erosion control where public property is at risk

At both locations, the overall view was that in situations where public property is at risk, the costs should be shared among central, regional and district levels of government. Waihi Beach respondents were slightly less inclined to support these options and more inclined to think that private owners should also bear the costs of funding erosion control in situations such as where private owners are at risk of losing public road access.

An interesting feature of Figure 6.11 is that respondents are relatively unlikely to consider that local communities (i.e. themselves) should fund coastal erosion measures to protect public property. There is a feeling that as beaches and their associated infrastructure (access

roads, reserves) are public assets the costs should be shared quite widely. However, there were differing views about how widely the benefits of beaches are shared.

'All of the above [sources of funding] as we all lose out where public property is involved, residents and visitors alike'

'Beaches are enjoyed by all not just residents of a local community therefore central government should be responsible via taxes paid by everyone'

'Beaches are public places available to all, citizens, tourists etc, and maintenance shouldn't be a burden on ratepayers. A tourist tax would help maintain facilities and fight erosion'

'Beaches are a regional and district asset.'

'The coastline is a regional asset. The beneficiaries are primarily people who live in the region and visit/use the coast'

6.3.5 Views on development setbacks

Primary and secondary development setbacks are a forward-looking coastal planning tool used by Environment Waikato. A comprehensive account of their scientific basis and application can be found on Environment Waikato's website www.ew.govt.nz, together with a report on development setback recommendations for Coromandel beaches and downloadable maps.

Jim Dahm (2007) has noted that a more relevant approach to judging awareness and acceptance of setbacks is to focus on beachfront property owners, as setbacks only really affect these properties, rather than confusing the picture by including responses from the wider sample. Following the designation of the setback lines in 2002, Environment Waikato apparently went to considerable effort and expense to provide a readily-understandable report on the setbacks to every beachfront property on the Coromandel.

From the current study, the level of awareness of setbacks was high among the limited numbers of beachfront property owners surveyed. All three postal survey respondents at Tairua whose properties lie within the hazard zone were aware of the setbacks. Three beachfront owners were interviewed at Whangapoua; one was in the sample of beachgoers and the other two were in the 'key informant' group. Two of the three were aware of the setback lines. The person who was not aware was a holiday home owner, and it is possible that this communication may have gone astray.

In terms of acceptance of setbacks, this was not followed up further in the postal questionnaires, although it is interesting to note that some of the free-response comments received support the notion of ensuring that development is set well back from the coast:

'Dwellings or buildings should never be that close to the beach'

'Council .. should have left an undeveloped margin between sea and property'

'No-one should be allowed to own or build on the beachfront. A minimum of 0.5 km from sand dunes before buildings should begin to be erected'

'it's irresponsible to build houses that close to the shore .. keep them at least 150 metres away'.

'At every beach there should be a 200 metre reserve from high tide to any form of development'.

The beachfront owners interviewed at Whangapoua were also asked for their views on setbacks. One person was actively hostile (see Section 5.8.4). This person bought their property two years before the survey was conducted (presumably in 2005), and so would not have received the report from Environment Waikato, although they were still aware of the existence of setback lines. This person also thought that erosion was a non-existent hazard for Whangapoua both currently and within their lifetime, and when asked if they had bought the property fully informed about the coastal hazard issues, stated that they 'didn't need to know as it wasn't an issue here'.

The other person aware of the setbacks for Whangapoua was more moderate in their views, but generally considered setback lines unnecessary as during their long history of living at Whangapoua their property had never been threatened by erosion and the dunes in front of their property were well-vegetated and appeared stable.

6.4 Objectives 5 and 6: specific views on erosion management at each location

In this section, Objectives 5 and 6, which are closely related, are discussed together. These were to investigate:

- Respondents' experiences with local coastal protection schemes at the contrasting study locations; and
- Respondents' level of involvement with coastal protection schemes.

6.4.1 Tairua

6.4.1.1 Beachgoer interviews

Beachgoers interviewed at Tairua were asked what they thought about the way coastal erosion was currently being managed at Ocean Beach (Section 4.7). Over half of the sample of beachgoers (56%) were happy with the current approach to coastal erosion at Tairua's Ocean Beach, and had few negative comments to make. Two respondents had attitudes best described as neutral; they were neither for nor against the current management regime.

Five respondents had concerns about the Beachcare scheme. These people were very much in favour of the concept of dune care, but were concerned about the current implementation, with their comments covering areas such as the need to keep people off the dunes and the run-down state of the dunes. As described in Section 1.4.1, there was a very severe erosive episode in 2003 following a storm, and the dunes had not been replanted since because of a stand-off over the removal of exotic flowers on the dunes which was necessary before replanting with native sand-binding species. As a result, levels of disappointment and frustration were quite high among local people who had worked hard over the previous eight years to restore the dunes. Therefore it is likely that our visit in January 2007 caught some

local residents, and the dunes, at a 'low ebb'. However, as described in Section 1.4.1, the situation has changed since January, with a major planting programme achieved with a high level of community support.

Some of the comments received from the people concerned about the management regime indicate that there may be a level of misunderstanding about the nature of Beachcare schemes; examples were that the scheme 'needs to be funded better', 'relies too heavily on volunteers', and that keeping people off the dunes 'is not being adequately enforced at present'. Several other comments were received about lack of enforcement. These views indicate that some people see these schemes as being imposed from external authorities such as councils, rather than being community-led initiatives. Jim Dahm's (2007) view is that

'The only enforcement in these programmes comes from the communities themselves – raised awareness of what is and is not appropriate behaviour and peer pressure. And in my opinion this is by far the best approach – once you win people over they don't go back. If you force acceptance they comply grudgingly at best.'

Jim Dahm also notes that if the Beachcare group had forced the issue of removal of exotics in 2003 the likely outcome would have been the alienation of sectors of the community, and that in general, forcing progress on controversial issues can include very unfavourable outcomes such as loss of community support, loss of key volunteers and negative publicity.

6.4.1.2 Postal questionnaire

The postal questionnaires also asked a series of questions about respondents' knowledge and opinions of, and involvement with, the local coastal management schemes at each location. For the Tairua questionnaires, people were asked whether they were familiar with the dune buffer at Ocean Beach; the majority (93%) were aware of it. Respondents were also asked to rate the success of the approach in addressing the current erosion problems at Ocean Beach (Figure 6.13). The most common response was 'quite successful' (68% of subsample of people who were aware of the scheme). This degree of approval is not very high in comparison to the high level of enthusiasm of Tairua respondents for dune planting in general (Figure 6.6). It would be interesting to resurvey these respondents as a follow-up to the successful planting work carried out during 2007.

Respondents were asked to name advantages and disadvantages of the sand dune buffer. Advantages were identified as:

- Good access (via marked accessways);
- The attractive appearance;
- The community involvement;
- The cost-effectiveness;
- 'working with nature', not intrusive, preserves natural character;
- Successful in stabilising dunes, providing habitat for birds.

Disadvantages were as follows:

- Some people find the access (over the sand ladders) difficult, and others consider that their access is limited by the accessways;
- Some people think that the dunes have become less attractive as the plants are rather

- sparse at present;
- Require constant maintenance;
- High cost;
- Can restrict the sea views;
- Does not protect against all storm events: *'one cyclonic storm can undo all the good work', 'one tsunami would wipe them out'*;
- Labour intensive;
- Vulnerable to damage.

Respondents were asked whether their usage of the beach had been affected by the sand dune buffer. In general the scheme has had little impact on usage with 82% stating that their usage is much the same, 13% reporting positive effects on access and 5% reporting negative effects (Figure 6.15).

Respondents were asked about their level of involvement before the scheme began; only small proportions of people were involved in the decision-making. The most common responses were either that they were not aware the scheme was being proposed (45%), or they were aware of the scheme but weren't involved at all (36%). Fewer people were actively involved, with 10% attending public meetings, 8% participating in focus groups or interviews, 15% taking part in a survey and 3% making a submission.

A further question was concerned with people's expectations before the scheme began, and how the current version has compared with their expectations. Many respondents did not answer these questions; as the dune care group was started in 1994 at this beach (Section 1.2) it is possible that people don't remember their expectations at the time. Of those who did answer, the scheme appears to be reasonably well in line with their expectations. People disagreed with statements that they 'expected the scheme to look different to how it looks now', 'expected the scheme to have less impact on how the beach looks now', and 'expected the scheme to have less impact on their use of the beach. Only 7.5% indicated that they would have liked more opportunities to become involved with the decision-making beforehand; people generally agree that there was an adequate amount of information available.

In summary, a similar picture about attitudes towards the sand dune buffer scheme at Tairua's Ocean Beach emerges from both the beachgoer interviews and the postal questionnaires. People are very much in favour of dune planting schemes in general, but views on the effectiveness and attractiveness of the dunes at Ocean Beach were probably at somewhat of a low point among local residents because of the lack of maintenance and replanting following major storm damage to the dunes in 2003. This situation has now changed and it would be interesting to see if attitudes have also changed.

6.4.2 Waihi Beach

6.4.2.1 Beachgoer interviews

Beachgoers interviewed at Waihi Beach were asked what they thought about the way coastal erosion was currently being managed at this beach (Section 3.7). Due to the high proportion of people with no particular connection to the area in this sample (76% non-property-owning

visitors) many people felt they had insufficient knowledge of the approach to coastal erosion to comment. Others were generally happy with the current management regime. Several respondents mentioned that they particularly like the dune planting and fencing initiatives, and others said that they like the overall approach but dislike the rock walls. One respondent commented that 'time would tell' if the current management approach was on the right track.

We then asked beachgoers to rate the seawalls at Waihi Beach in terms of three aspects: effectiveness at managing erosion, attractiveness and effects on beach usage and access. We took care to specifically describe the two stretches of rock wall (along Shaw Rd and The Loop) so that respondents were commenting on these structures in particular rather than giving generic opinions. Some respondents were not familiar with the rock walls and did not answer this question.

Respondents were divided about the effectiveness of the Waihi Beach rock walls in managing erosion. Around two-thirds thought they were 'generally effective' but the other third had the opposite view. This latter group were more willing to expand on their views and offer specific comments on the rock walls, such as that they are making erosion worse and are leading to scouring of sand from the beach in front. Another view was that the rock walls are a waste of time and merely delay the inevitable.

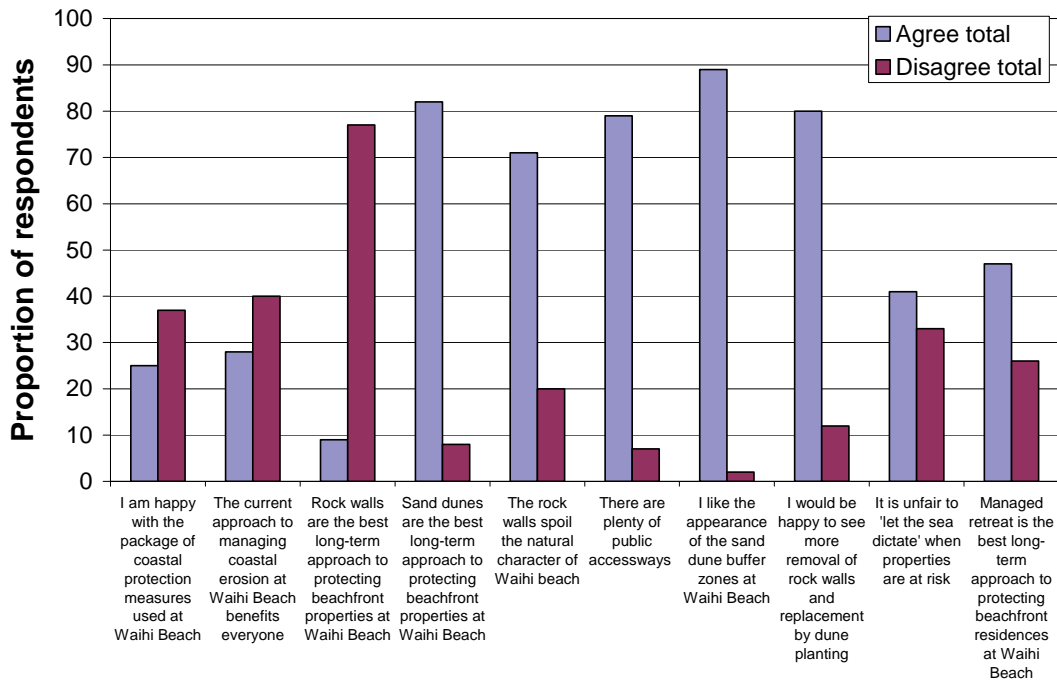
Respondents were also divided about the attractiveness of the rock walls. The majority of people thought them unattractive and some very strong opinions were expressed to us, such as 'ghastly', 'terrible', 'unsightly', 'unacceptable', and 'visually jarring'. The other respondents were generally happy to accept the visual impact of the rock walls because of their practical purpose. Typical comments were that rock walls are 'effective but ugly', and 'not as attractive as the natural environs, but better than the beach eroding'.

There were also divided opinions about the effects of the rock walls on beach access. Most people did not consider that their access was negatively affected, but around a quarter of the sample did consider that the rock walls negatively affect beach usage. Specific comments from this group were that the rocks are unsafe for children to play on, and that the rock walls trap rubbish and debris.

6.4.2.2 *Postal questionnaires*

The postal questionnaires also asked a series of questions about respondents' knowledge and opinions of, and involvement with, the local coastal management schemes at each location. In the Waihi Beach questionnaires, the combination approach was described, together with photos of the Shaw Road rock wall and the Coronation Park dune restoration scheme.

The first set of questions was intended to determine respondents' satisfaction with the overall approach and also of its components. Responses give a clear picture (Figure 6.12) that people are not very happy with the overall approach, and in particular are not happy with the rock walls. There is strong support for the dune planting scheme, and 80% of respondents would be happy to see more rock walls removed and the dunes restored. These findings were reinforced by subsequent responses.



Statements about management of coastal erosion at Waihi Beach

Figure 6.12 Respondents' attitudes towards statements about coastal management at Waihi Beach (nb this graph sums the attitudes at each end of the scale where 'agree total' equals the proportion who chose 'agree strongly' plus those who chose 'agree'. Responses in the middle of the scale have been omitted).

Respondents were then asked to rate the success of the dune planting scheme at Waihi Beach (Figure 6.13, with results for Tairua shown for comparison).

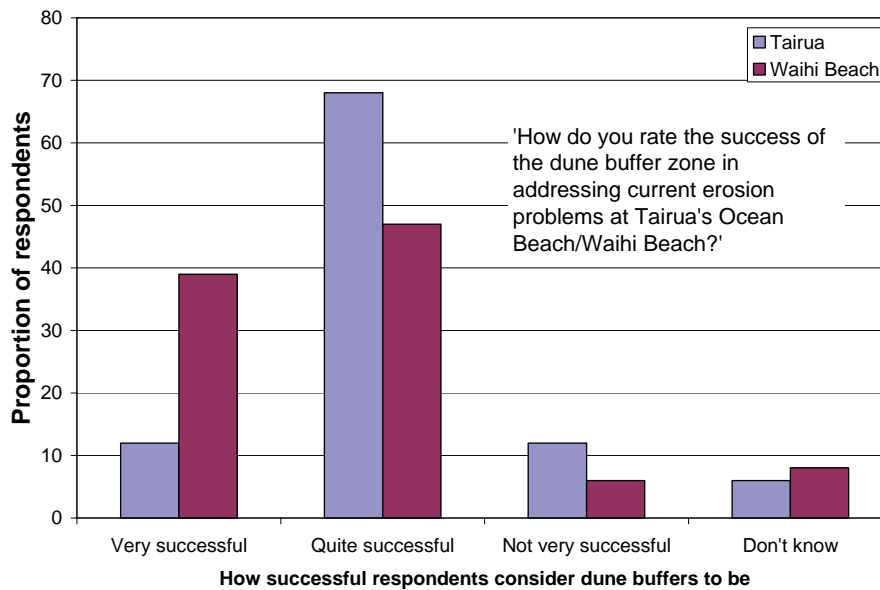


Figure 6.13 Respondents' views on the success of the dune buffer zones in addressing current erosion problems at the study locations

Waihi Beach respondents were three times more likely to rate the local dune restoration schemes as 'very successful' than were Tairua respondents. As discussed previously, this is likely to be due to the fact that when this survey was carried out in January 2007, levels of frustration and disappointment among local residents were likely to have been high as a major storm in 2003 had caused major erosion of the dunes and effectively destroyed their previous eight year's work in restoring the dunes. Another factor may be that at Waihi, the new dunes along stretches of the beach have replaced the widely unpopular seawalls that were there previously.

However, caution must be expressed at this point. It is unlikely to be realistic to replace all the rock walls at Waihi Beach with dune management schemes, as the fundamental problem is that the dwellings are too close to the shoreline and there is insufficient space for a dune buffer zone (Jim Dahm, pers. comm.).

Respondents were then asked to rate the success of the rock walls in addressing current erosion problems at Waihi Beach (Figure 6.14). Unsurprisingly, in view of the responses shown in Figure 6.12, most people (71%) regard the rock walls as having been unsuccessful in combating erosion. Interestingly, the proportion of beachfront respondents (74%) holding this view is much the same as for the entire sample (71%).

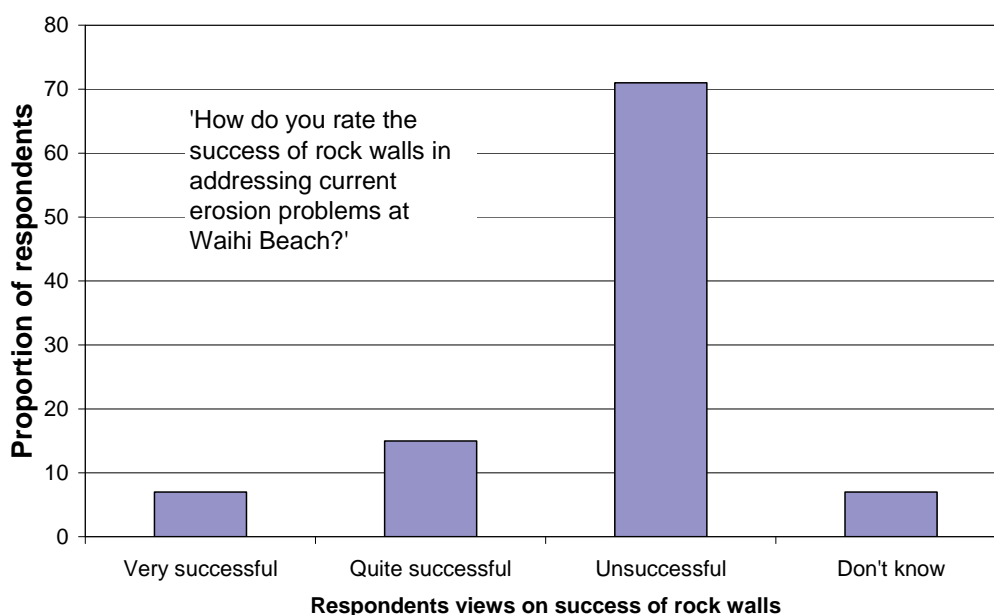


Figure 6.14 Waihi Beach respondents' views on success of rock walls in addressing current erosion problems

Respondents were then asked about the effects, both positive and negative, of the rock walls and the sand dune buffer on their usage of the beach. For the sand dune buffer, beach usage was affected positively overall (34% positive, 60% about the same, 6% negative). Reasons given for positive effects were: more sand covering rocks; a more attractive and natural-looking beach, the removal of hazards such as steel spikes; and access to more of the beach at high tide. Specific comments were as follows:

'can walk at high tide on more of the beach'

'beach develops at a natural angle; created a bigger beach with more exposed at high tide'

'more attractive, safer beach created'

'looks natural and lovely'

'lots more sand, safer, healthier'

There was a contrast with Tairua with respect to effects on beach usage, with more Waihi beach respondents reporting positive effects (Figure 6.15). From people's comments, it is clear that people remember what the beach was like before the dune restoration schemes were started, and are drawing favourable comparisons. This does not appear to have been the case at Tairua, perhaps because the scheme was implemented over a decade ago (in 1994), and also, unlike Waihi Beach, the Tairua scheme did not replace widely unpopular seawalls.

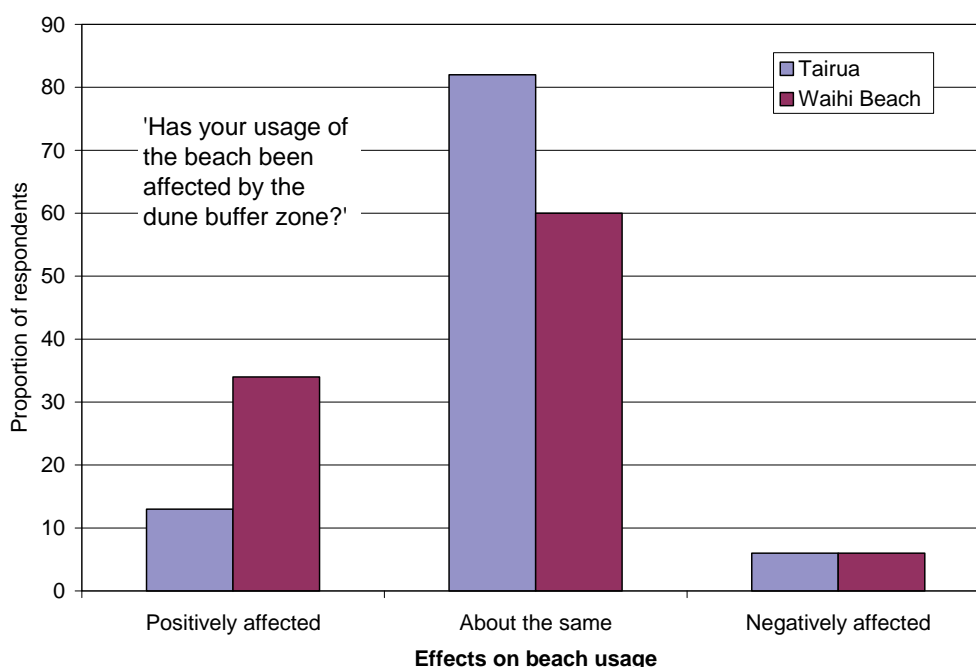


Figure 6.15 Effects of the dune buffer zone on beach usage at Tairua and Waihi Beach

Respondents were then asked about the effects of rock walls on their beach usage. Over half of respondents report that the rock walls negatively affect their beach usage (Figure 6.16). Reasons given were consistent and repeated many times:

'Access- can't walk beach at high tide'

'Access is dangerous as rocks are not stable. Small children are incapable of negotiating rocks.'

'No access at high tide, dangerous rusty poles – I have witnessed two accidents on the rocks at high tide.'

'Ugly and dangerous'

'Ugly, makes access and walking along the beach difficult and in some cases dangerous'.

'I consider that the rock wall area is the most dangerous part of the beach and building a new rock wall will only increase the hazard to young children. A rock wall will effectively be the 'privatisation' of this area of beach'.

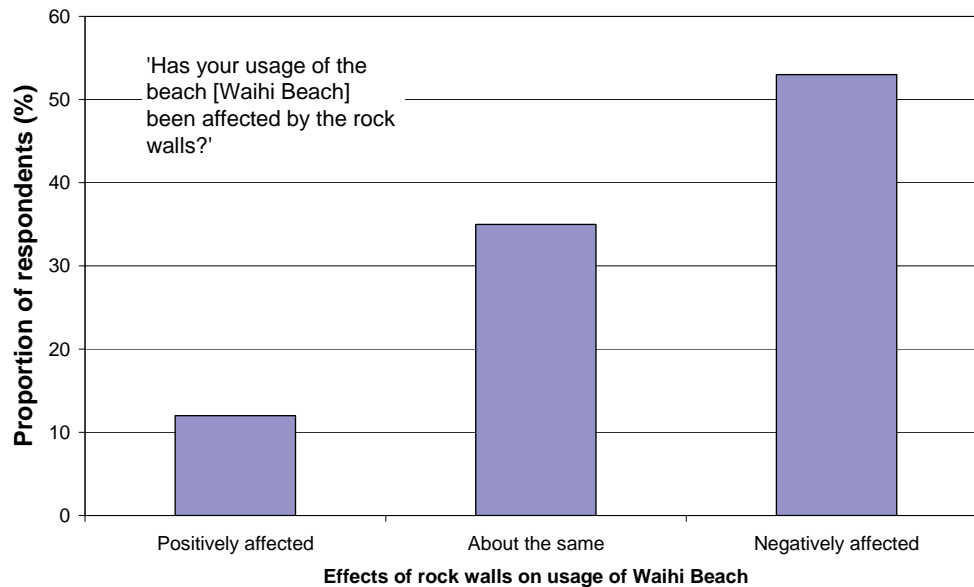


Figure 6.16 Effects of rock walls on usage of Waihi Beach

Respondents' attention was then drawn to a particular rock wall (the Shaw Rd wall, built in 1968 and rebuilt during 1970s, but with more large boulders added now). People were asked whether they could remember what the beach looked like before this wall was built, and the subsample of people who said they could remember (31% of the total sample) were then asked a series of questions intended to investigate their prior expectations of the scheme, any involvement they had in the decision-making process, and how the scheme had met their expectations over time (Figure 6.17).

It is clear that people have been disappointed with how the rock wall has turned out relative to their expectations, and that, in retrospect, it was a poor decision to build the wall in the first place. The quality of the decision-making is regarded as poor, with people considering that the level of information about the project was inadequate and that they would have liked to have more opportunity to be involved with the process.

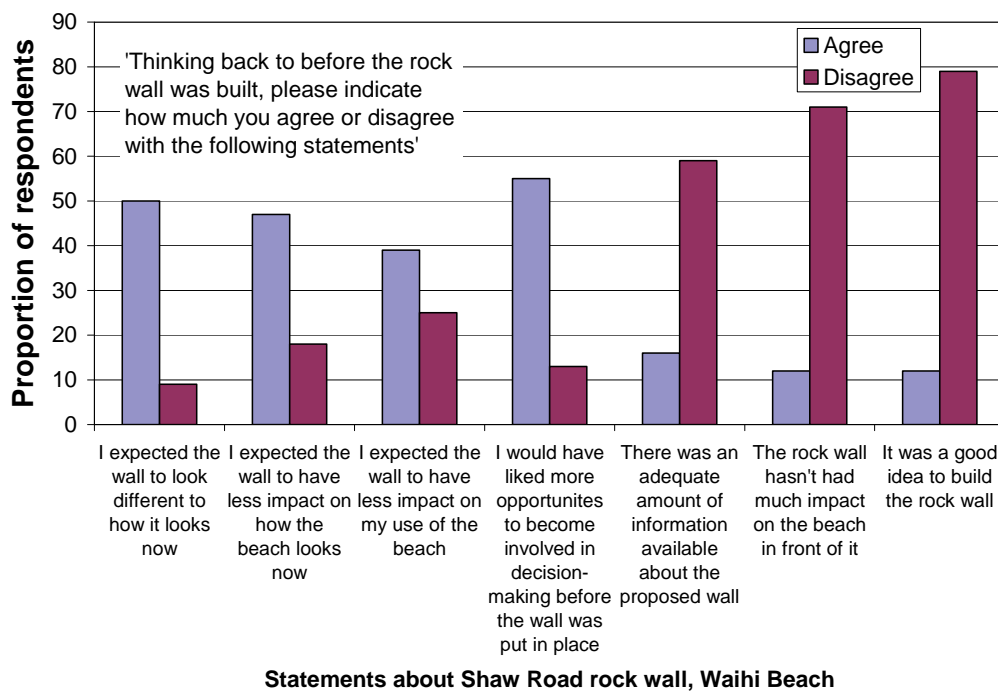


Figure 6.17 Attitudes of Waihi Beach respondents to statements about the Shaw Rd rock wall (see Figure 6.12 for explanation of categories).

All respondents were then asked whether they had participated in any decision-making processes related to options for coastal protection at Waihi Beach (in a general sense, not just in relation to the Shaw Road rock wall). Over half of all Waihi Beach respondents say they have participated; this probably not surprising if they are interested enough in this issue to also participate in this survey.

About two-thirds of respondents consider that there have not been enough opportunities for the public to be involved with options coastal protection at Waihi beach. Comments reveal a level of disenchantment with the consultation process run by public authorities, and a level of anger over the process that led to the rock walls being built.

'General public only became involved due to RMA and Local Government Act. The rock wall was decided with affected property owners and WBOPDC. Despite the majority at Waihi Beach being opposed to the wall it is still going ahead.'

'Opportunities for input are OK, however majority input/opinion has been largely ignored in favour of property owners under threat or erosion.'

'The process allows for public input but Council seems to have already made up its mind e.g. to build a rock revetment before the public was consulted. They tried to make it a non-notified consent.'

'The WBOPDC listens to the wealthy beachfront owners and themselves chose the 'independent' commissioner. Also the engineers [Tonkin and Taylor] were allowed to review their own scheme. WBOPDC is determined to have a rock wall.'

'Council have already made up their mind and will do what they want but make it look as though they are giving the public the chance to object.'

'Despite efforts at consultation by council and 'experts', local people consider the process to have been far from democratic with decisions made contrary to public opinion.'

'WBOPDC and EBOP have not listened honestly to public concerns about the rock walls. They have decided to build a wall and then set out to find 'experts' to back the proposal.'

Several comments were received to the effect that they appreciate being consulted via this survey.

'More opportunities - considered written submissions preferred. This questionnaire is a good start.'

'This questionnaire is the first time my opinion has been sought.'

'Thank you for sending this questionnaire and I hope some good will come out of it. I first came to Waihi Beach as a boy in 1928.'

6.5 Conclusion

6.5.1 Summary of findings

Valued features

Investigating what people value about the coast was approached differently in the interviews with beachgoers (where an open-ended question was asked) than in the postal surveys (where respondents were asked to rate the importance of a list of valued features). Features valued by beachgoers at all the study sites were: easy access, clean beaches and good water quality, a safe swimming beach and the natural beauty of the surroundings. The open-ended nature of the question also provided insights into the unique characteristics of each location. Postal survey respondents were less concerned with amenity values and more concerned with natural character and preserving the wild, natural, undeveloped areas on the coast.

Perceptions of the causes of coastal erosion

The range of suggested causes of coastal erosion put forward by the beachgoers (storms, 'living too close' to the sea, and sea level rise) were all considered to be reasonable responses as the question asked did not distinguish between long and short-term timescales. Postal survey respondents at Tairua were more inclined to consider storms responsible for coastal erosion; this may be a response to severe erosion that occurred after a major storm in 2003. A more commonly-held view among Waihi Beach respondents was that erosion problems are largely the result of building too close to the sea.

Understanding of coastal processes and options for coastal protection

The postal survey was a good medium for investigating these complex topics, with respondents asked for their views on a series of statements about coastal processes and the advantages and disadvantages of different coastal protection methods. Generally, respondents' perceptions were quite realistic and people understand that erosion is a natural process, that there are cycles of erosion with rebuilding episodes in between, and that

problems arise when development occurs too close to the shoreline. Similarly, there was a high level of understanding about the function of sand-binding plants on dunes in trapping wind-blown sand, and that sea walls offer only limited protection to the properties behind them.

Areas in which there may be scope to improve public understanding are:

- To emphasise that sand dunes can successfully be restored even after being removed;
- To correct an impression that dune plants will protect against sand being washed away in storms; and
- To describe 'end effects' associated with sea walls.

Approval of different forms of coastal protection

Among both the postal survey respondents and the beachgoers interviewed, the most highly-approved form of coastal protection was dune planting. Over 90% of the postal survey respondents were in favour of dune planting. Many respondents also indicated a willingness to consider a combination of approaches, with the options of managed retreat and beach nourishment the most popular in conjunction with dune planting. Respondents were strongly divided on the option of sea walls and rock walls. Some felt that they offered the best protection against erosion, but others were vehemently opposed to them on a range of grounds. There was a marked difference between Tairua and Waihi Beach postal survey respondents with regard to approval of seawalls and rock walls, with Waihi Beach respondents much less in favour of them. When asked to choose the *best* long-term approach for managing coastal erosion, postal survey respondents were clearly in favour of dune planting. This was also the case among the beachgoers interviewed.

Views on who should fund erosion control measures

Postal survey respondents were asked for their views on how coastal erosion management should be funded, for situations where public property is at risk, and private property is at risk. There was a clear difference between views for these two scenarios. For private property at risk, the majority consider that the private owners themselves should fund erosion control, with many of the comments received generally unsympathetic and suggesting that *caveat emptor* applies. In contrast, where public property is at risk, the overall view was that the costs of erosion control should be shared among central, regional and district levels of government. There was a general feeling that as beaches and beachfront reserves are a public asset the costs should be shared widely.

Views on development setbacks

Development setbacks were established for Coromandel beaches by Environment Waikato in 2002. The council also provided all beachfront properties with a copy of a report on the setback approach. A limited number of beachfront property owners were interviewed or surveyed in this study. Among this group of six beachfront owners, five were aware of the setbacks. Two of this group also gave their views on setbacks; both were opposed, one strongly and one more moderately. However this sample size is much too small to determine acceptance of the setback approach.

Views on the erosion management approaches used at each location

At Tairua's Ocean Beach, a Beachcare group has been in existence since 1994, and was

very active between 1995 and 2002 in establishing a good cover of native sand grasses along the entire beach. However, storms in 2003 caused very severe erosion at the south end of Ocean Beach, and removed most of the grasses that had been planted. As of January 2007, when this survey took place, replanting had not occurred because of a stand-off over the removal of exotic flowers from the dunes.

A similar picture of attitudes towards the dune planting scheme at Ocean Beach emerged from both the beachgoer interviews and the postal surveys. People were very much in favour of dune planting in general, but their views on the effectiveness and attractiveness of the dunes at Ocean Beach were probably at somewhat of a low point because at that stage the dunes had not been replanted or maintained. The situation has now changed; during 2007 a major replanting programme was carried out with a high level of community support.

At Waihi Beach, a combination of coastal protection measures are used, with two major stretches of rock wall protecting houses close to the shoreline, and dune restoration schemes operating along stretches of the beach. It was abundantly clear that Waihi Beach residents were not happy with the overall approach used at this beach and in particular, had strong objections to the rock walls. The majority of respondents did not consider rock walls to be the best approach to protecting the beachfront properties, considered that they spoiled the natural character of the beach and negatively affected beach access and usage. Particular reference was made to the loss of the beach at high tide in front of the rock walls. In contrast, people strongly supported the stretches of dunes that have replaced old sea walls and indicated that they wish to see more removal of rock walls to be replaced by dunes. However, this option may be unrealistic to protect houses which are too close to the shoreline.

Finally, when respondents were asked to recall the beach before the rock walls were constructed, it was clear that the outcome has been significantly worse in comparison with their expectations, with almost 80% disagreeing that 'it was a good idea to build the rock wall'. There was also quite a high level of disenchantment with the consultation processes leading to decisions about options for coastal protection.

6.5.2 A comparison of methods used in this study

The different methods used in this survey complemented each other well. The main advantages and disadvantages of postal survey methods versus face-to-face interviews were described in Section 2.1. In retrospect, the key advantages of the face-to-face interview method were that the perceptions and opinions of visitors to the beaches could be investigated (these can be difficult to capture by other survey methods), and that issues could be explored in depth. This was particularly true at Whangapoua, where in-depth interviews with knowledgeable local people were set up, and more generally where we encountered people who were interested in or knowledgeable about coastal erosion and its management.

There were several advantages of the postal survey method used at Tairua and Waihi Beach. This approach was successful in investigating complex issues, such as people's

understanding of the causes of coastal erosion and their understanding of the pros and cons of different management approaches. The surveys were able to yield both quantitative data (useful for drawing comparisons between the study locations, and also for establishing baseline data for long-term studies), and qualitative data, when respondents were asked to expand on their answers in an open-ended format. These free-response answers yielded considerable insight into the reasons for people's opinions and perceptions. The fact that so many respondents provided thoughtful and detailed comments on coastal management suggests that this survey fulfilled a useful purpose in providing an avenue for consultation with the public.

The other advantage of the postal survey method were that it solicited input from a substantial number of local residents and property owners (173 at Tairua and 179 at Waihi Beach), and enabled them to voice their opinions on topics important to them. People clearly appreciated this opportunity to have their say, as noted above. In the words of one respondent at Waihi Beach, *'this questionnaire is the first time my opinion has been sought'*.

7.0 ACKNOWLEDGEMENTS

The authors thank Environment Waikato and the Foundation for Research, Science and Technology for funding this work. We also thank staff of GNS Science, NIWA, Environment Waikato and Environment Bay of Plenty for their input during the development of the questionnaires used in this study. We thank David Johnston and Joshua Stewart for assistance with field work; Jill Thomson of Environment Waikato, Jim Dahm of Eco Nomos Ltd, James Goff of NIWA and Kim Wright of GNS Science for their excellent review comments and Daryl Barton of GNS Science for assistance with the postal survey.

8.0 REFERENCES

- Becker, J.S., Stewart, C., Coomer, M., Hume, T., Blackett, P. and Davies, A. (2007) Managing our coast: the tabulated results of two community surveys undertaken at Tairua and Waihi Beach. GNS Science Report 2007/28.
- Bell, R.G., Hume, T.M. and Todd, D. (2002) Planning on sea level rise? Planning Quarterly, Journal of the New Zealand Planning Institute 145, 13-15.
- Berryman, K. and Hull, A. (2003) Tectonic controls on late Quaternary shorelines: a review and prospects for further research. In *The New Zealand coast: Te Tai Aotearoa*, edited by Goff, J.R., Nichol, S.L. and Rouse, H.L. Dunmore Press, Palmerston North, New Zealand.
- Blackett, P.E. and Hume, T.M. (2006) Community involvement in coastal hazard mitigation: an initial scoping of process and pitfalls. NIWA Client Report HAM2006-083.
- Brander, R.W., Osborne, P.D. and Parnell, K. (2003) High energy beach and nearshore processes. In *The New Zealand coast: Te Tai Aotearoa*, edited by Goff, J.R., Nichol, S.L. and Rouse, H.L. Dunmore Press, Palmerston North, New Zealand.
- Coastline Consultants Ltd and Economos (2006) Waikato Region Beachcare Report: July 2005 to June 2006. Report prepared for Environment Waikato Environmental Education

Programme. Available online at:

<http://www.ew.govt.nz/enviroinfo/coasts/beachcare/documents/report0506.pdf>

- Dahm, C. (2003) Beach user values and perceptions of coastal erosion. Environment Waikato Technical Report 2003/03.
- Goff, J.R., Nichol, S.L. and Rouse, H.L. (editors) (2003) The New Zealand coast: Te Tai Aotearoa, Dunmore Press, Palmerston North, New Zealand.
- Gorman, R.M., Bryan, K.R. and Laing, A.K. (2003) Wave hindcast for the New Zealand region: nearshore validation and coastal wave climate, New Zealand Journal of Marine and Freshwater Research, 37 (3), 567-588.
- Horvath-Hallett, E. (2005) Beachcare members survey report. Environment Waikato Internal Series ISO05/04.
- Hume, T., Bell, R.G., de Lange, W.P., Healy, T.R., Hicks, D.M. and Kirk, R.M. (1992) Coastal oceanography and sedimentology in New Zealand 1967-1991. New Zealand Journal of Marine and Freshwater Research 26, 1-36.
- Jenks, G. (2007) A journey of dune discoveries in the Bay of Plenty: presentation made to the Dune Restoration Trust of New Zealand Inaugural Conference, Tauranga, February 2007.
- Stewart, C., Leonard, G.S., Johnston, D.M. and Hume, T.M. (2005) The 2003 National Coastal Community Survey: results for Waikato beach communities. GNS Science Report 2005/28.

APPENDICES

Managing our coast



Questionnaire January 2007



Coastal management questionnaire

We are interested in your views on how we manage our coasts. This information is part of a national project conducted by GNS Science and NIWA to help agencies with responsibilities for coastal management better understand the views and values of communities.

The first set of questions concerns the property that this questionnaire was delivered to.

1. Choose the option that best describes your situation: (tick one option only)

- ₁ Permanent resident, own this property
- ₂ Permanent resident, renting this property
- ₃ Visitor, own this property (e.g. if it is your bach or holiday home)
- ₄ Visitor, don't own this property
- ₅ Other (please describe) _____

2. If you **own** this property, how long ago did you buy it? (tick one option only)

- ₁ Less than 1 year
- ₂ Between 1 year and 5 years
- ₃ Between 5 years and 10 years
- ₄ More than 10 years

3. If you are a **visitor**, where do you normally live? _____

4. Thinking of the past couple of years, which option best describes how often you visit **Tairua's Ocean Beach**? (tick one option only)

- ₁ Once a day or more, year-round
- ₂ Once a day or more, but more in summer than in winter
- ₃ Once a week or so, year-round
- ₄ Once a week or so, but more in summer than in winter
- ₅ Once a month or so
- ₆ Two or three times a year
- ₇ Once a year or less

What do you value about the coast? (Please tick the option in each row that best matches your view)

	Very important (1)				Not Important (5)
		←	→		
Appearance of the beach and dunes (whether or not they are natural, etc)	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Good recreational facilities in general (e.g. boat ramps, reserves, etc)	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
A dry beach at high tide levels for recreational activities, such as sun bathing and sports	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Easy access onto the beach	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Walking access along the full length of the beach at high tide	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Protection of iwi / Māori values	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Retaining some undeveloped, natural beaches around the coast	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Retaining some undeveloped, natural headlands around the coast	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Protection of scenic values when looking out over the beach and toward the sea	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Protection of scenic values when looking inland (e.g. towards houses or the surrounding landscape)	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
The involvement of local people in decision-making about the coast	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
The involvement of people who do not live locally in decision-making about the coast	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Protecting beachfront property, even if it means losing the sandy beach	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Good fishing and shellfish gathering	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Your suggestions on what you value about the coast...please describe.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5

The next set of questions asks about your awareness and experience of natural hazards in general.

6. Which are the **two** natural hazards you consider most likely to affect Tairua?

- 1 Flooding (river or sea)
- 2 Storm or cyclone with high winds
- 3 Forest or bush fire
- 4 Earthquake
- 5 Ash fall from a volcanic eruption
- 6 Tsunami
- 7 Coastal erosion
- 8 Landslide

Tick two only.

7. Have you ever (a) personally experienced any of the following hazards in the past, and (b) suffered loss or damage as a result? (tick all that apply)

	I've had personal experience of:	I've experienced loss/damage due to:
Flooding (river or sea)	<input type="checkbox"/> 1	<input type="checkbox"/> 1
Storm or cyclone with high winds	<input type="checkbox"/> 2	<input type="checkbox"/> 2
Forest or bush fire	<input type="checkbox"/> 3	<input type="checkbox"/> 3
Earthquake	<input type="checkbox"/> 4	<input type="checkbox"/> 4
Ash fall from a volcanic eruption	<input type="checkbox"/> 5	<input type="checkbox"/> 5
Tsunami	<input type="checkbox"/> 6	<input type="checkbox"/> 6
Coastal erosion	<input type="checkbox"/> 7	<input type="checkbox"/> 7
Landslide	<input type="checkbox"/> 8	<input type="checkbox"/> 8

Please give details here: _____

The questionnaire now moves on to coastal erosion and its management. Coastal erosion is common around New Zealand's coastline, but is most noticeable and causes problems when property is threatened. This can include public assets such as roads and parks, and also private property.

8. What do you think is the main cause of coastal erosion? (tick one option only)

- 1 Changes in the sand supply to the beach
- 2 Storms
- 3 Sea level rise
- 4 Other cause (please describe) _____
- 5 Don't know

9. For each of the following statements do you agree or disagree? (please tick one option in each row)

	Strongly Agree (1) ←————→ Strongly Disagree (5)					Don't Know
Inappropriate development in coastal areas can put houses at risk from erosion	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6
We must accept that erosion is a natural process at the coast	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6
There are a range of methods available to stop coastal erosion indefinitely	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6
The width of the dune changes during the year	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6
Once a dune is destroyed there's no way to bring it back	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6

The next few questions are about managing erosion.

10. **In general**, which forms of coastal erosion management do you approve of? (tick all that apply)

- 1 Dune planting (to restore or maintain an adequate buffer zone)
- 2 Construction of seawalls and rock walls
- 3 Beach nourishment (adding extra sand)
- 4 Moving of buildings back from the beachfront (managed retreat)
- 5 Doing nothing (i.e. letting the sea dictate)
- 6 Other options (please describe) _____

11. In general, which of the above options do you consider to be the best **long term** approach for managing erosion (i.e. over the next 50 -100 years)? Please write the option number from above and briefly state the reasons why you chose this option.

With respect to managing erosion, please tick the statement you think best follows on from the starting sentence.

12. A good cover of plants on dunes... (tick one option only)

- 1 Stops the beach eroding because their roots keep the sand from being washed away in storms
- 2 Helps build up sand reserves by stopping it from blowing away, making a store of sand
- 3 Won't help with beach erosion as the dunes come and go with the tides and winds
- 4 Protects buildings built on dunes from erosion
- 5 Unsure

13. Building a seawall on a sandy beach... (tick one option only)

- 1 Protects beach-front properties from erosion indefinitely
- 2 Only provides limited protection to the properties behind it
- 3 Provides protection for properties immediately to the sides of the seawall
- 4 Protects properties behind it from storm events of any size
- 5 Unsure

14. The effect a seawall has on the natural behaviour of a sandy beach... (tick one option)

- 1 Is limited to the beach in front of the seawall
- 2 Doesn't change the width of the beach
- 3 Doesn't increase the effects of coastal erosion along other parts of the beach
- 4 Can increase the effects of coastal erosion along other parts of the beach
- 5 Unsure

15. **In general**, who do you think should fund coastal erosion control measures where **private property** is at risk? (tick all that apply)

- 1 Private owners whose property is at risk
- 2 Local communities or towns
- 3 District community (e.g. via District Council rates)
- 4 Regional community (e.g. via Regional Council rates)
- 5 Central government (via taxes)
- 6 Other (please describe) _____

16. **In general**, who do you think should fund coastal erosion control measures where **public property** (e.g. reserves and roads) is at risk? (tick all that apply)

- ₁ Private property owners living nearby (e.g. at risk of losing road access)
- ₂ Local communities or towns
- ₃ District community (e.g. via District Council rates)
- ₄ Regional community (e.g. via Regional Council rates)
- ₅ Central government (via taxes)
- ₆ Other (please describe) _____

17. Please tell us any thoughts you have on your choices for questions 15 and 16:

18. Currently, how much of a threat is coastal erosion to **Tairua's Ocean Beach**? (tick one option only)

- ₁ A severe threat
- ₂ A moderate threat
- ₃ A minor threat
- ₄ Not a threat

19. Thinking about the property that this survey was delivered to, on what timescale is coastal erosion likely to affect this property directly? (tick one option only)

- ₁ Already affects this property
- ₂ Likely to affect this property within 10 years
- ₃ Likely to affect this property within 50 years
- ₄ Unlikely to affect this property within 50 years

Only respondents who own the property where the questionnaire was delivered should answer questions 20 and 21. All others please skip to question 22.

20. What consideration did you give to coastal erosion issues when you bought this property? (please describe)

21. Have you seen a map of development setback lines for Tairua's Ocean Beach?

- ₁ Yes
- ₂ No

The next set of questions (22 to 31) are concerned with the management of coastal erosion at Tairua's Ocean Beach.



At Tairua's Ocean Beach, local people together with assistance from the district and regional councils have worked to maintain a sand dune buffer by planting sand-binding grasses and creating well-defined access-ways (see the photograph above).

22. Are you familiar with the dune buffer at Tairua's Ocean Beach?

- ₁ Yes
- ₂ No

If you answered 'no' to question 22, please skip ahead to question 32 (demographic information). Otherwise please continue.

23. How do you rate the success of this approach in addressing the current erosion problems at Tairua's Ocean Beach? (tick one option only)

- ₁ Very successful
- ₂ Quite successful
- ₃ Not very successful
- ₄ Don't know

24. Do you think that the dune buffer approach is a good long-term solution for coastal erosion at Tairua's Ocean Beach? (tick one option only)

- ₁ Yes
- ₂ Unsure/too soon to tell
- ₃ No

25. Do you think a different management approach would have worked better?

- ₁ Yes
- ₂ No (go to question 27)

26. If you answered 'yes' to question 25, what do you think would have been a better approach?

27. What do you think are the main advantages and disadvantages of Tairua's erosion management approach (dune buffer)? (list up to three of each)

Advantages:

Disadvantages:

- 1. _____
- 2. _____
- 3. _____

- 1. _____
- 2. _____
- 3. _____

28. With respect to the dune buffer approach to erosion control at Tairua's Ocean Beach, please consider the following statements and tick the box on each line that best describes your attitude:

(1) Agree strongly ← → Disagree strongly (5)

This approach is visually attractive	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
The beach's natural character has been adversely affected by this approach	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
The approach is a good solution to Tairua's erosion problems	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
I feel positive towards the approach taken toward erosion management at Tairua's Ocean Beach.	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
The approach will help protect my property	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
It is unfair to 'let the sea dictate' (ie do nothing) when people's properties are at risk	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅

29. Has your usage of the beach been affected by the dune buffer zone?

- ₁ Positively affected (how?) _____
- ₂ Much the same as before
- ₃ Negatively affected (how?) _____

The following questions concern the extent to which local people were involved with the decision-making process for the current erosion control approach.

30. Thinking back to **before** the current planting and dune buffer maintenance programme began, did you personally... (tick all that apply)

- ₁ Attend any public meetings about the proposed approach
- ₂ Participate in any focus groups or interviews
- ₃ Complete a survey (e.g. a questionnaire or phone survey)
- ₄ Make submissions about the proposed approach (e.g. to council)
- ₅ Receive any information about the approach (e.g. flyers, newspapers, articles etc.). If yes, please describe _____
- ₆ Actively seek information about the approach. If yes, please describe _____
- ₇ Other (please describe) _____
- ₈ I was aware the approach was being proposed, but wasn't involved in any way
- ₉ I was not aware the approach was being proposed (if so, skip to question 32)

31. Once again, think back to **before** the current planting and dune buffer maintenance programme began. Please indicate how much you agree or disagree with the following statements (tick one for each line).

(1) Agree strongly ← → Disagree strongly (5)

I expected the scheme to look different to how it looks now	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
I expected the scheme to have less impact on how the beach looks now	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
I expected the scheme to have less impact on my use of the beach	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
I was well aware of the impacts of the scheme	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
I would have liked more opportunities to become involved in decision making before the scheme was put in place	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
There was an adequate amount of information available about the proposed scheme	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
I was not interested in the scheme before it was implemented	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅

The final set of questions concerns information about yourself. This information will be treated with complete confidence, and we will only report on general trends. We need this information to determine how representative our sample is of the general population in Tairua.

32. Are you?

- ₁ Male
 ₂ Female

33. Which best describes the situation you are living in now? (tick one option only)

- ₁ Family with children
 ₂ Family without children
 ₃ Alone
 ₄ With non-family
 ₅ Other (please specify) _____

34. Which ethnic group do you belong to? (tick one option only)

- | | |
|--|--|
| <input type="checkbox"/> ₁ New Zealand European | <input type="checkbox"/> ₄ Chinese |
| <input type="checkbox"/> ₂ Māori | <input type="checkbox"/> ₅ Indian |
| <input type="checkbox"/> ₃ Pacific Island | <input type="checkbox"/> ₆ Other (please state) |

35. In what year were you born? _____

36. What is your current employment status? (tick one option only)

- ₁ Employed full-time
 ₂ Employed part-time
 ₃ Not in paid employment (e.g. if you are retired or an at-home parent)
 ₄ Self-employed

37. What was your gross household income for 2006 before tax is removed?

- ₁ Under \$5,000
 ₂ \$5,000 to \$15,000
 ₃ \$15,001 to \$20,000
 ₄ \$20,001 to \$30,000
 ₅ \$30,001 to \$40,000
 ₆ \$40,001 to \$50,000
 ₇ \$50,001 to \$60,000
 ₈ \$60,001 to \$90,000
 ₉ \$90,001 to \$150,000
 ₁₀ \$150,001 to \$200,000
 ₁₁ Over \$200,001

38. What is your highest educational qualification?

- ₁ No school qualifications
- ₂ Secondary school qualifications
- ₃ Trade certificate or professional certificate or diploma
- ₄ University undergraduate degree (such as a diploma or bachelors degree)
- ₅ University postgraduate degree (such as a masters degree or doctorate)

39. Have you had any experience with environmental matters (e.g. have you been involved in activities, groups or employment related to the environment)?

- ₁ Yes (please describe) _____
- ₂ No

40. Please use this space to write any other comments regarding erosion management for Tairua's Ocean Beach, coastal management in general, or this survey. All remarks will be useful.

Thank you for taking the time to complete this questionnaire.

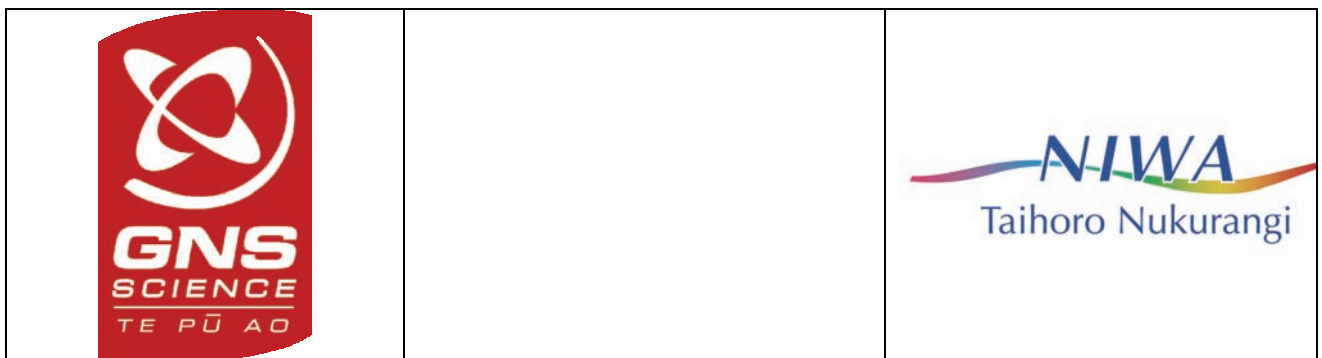
Please post the questionnaire in the envelope provided.

Managing our coast



Questionnaire

January 2007



Coastal management questionnaire

We are interested in your views on how the coast is managed, as part of a national project conducted by GNS Science and NIWA. Information from this project will be used by agencies with responsibilities for coastal management.

The first set of questions concerns the property that this questionnaire was delivered to.

1. Choose the option that best describes your situation: (tick one option only)

- ₁ Permanent resident, own this property
- ₂ Permanent resident, renting this property
- ₃ Visitor, own this property (e.g. if it is your bach or holiday home)
- ₄ Visitor, don't own this property
- ₅ Other (please describe) _____

2. If you **own** this property, how long ago did you buy it? (tick one option only)

- ₁ Less than 1 year
- ₂ Between 1 year and 5 years
- ₃ Between 5 years and 10 years
- ₄ More than 10 years

3. If you are a **visitor**, where do you normally live? _____

4. Thinking of the past couple of years, which option best describes how often you visit **the beach** at Waihi Beach? (tick one option only)

- ₁ Once a day or more, year-round
- ₂ Once a day or more, but more in summer than in winter
- ₃ Once a week or so, year-round
- ₄ Once a week or so, but more in summer than in winter
- ₅ Once a month or so
- ₆ Two or three times a year
- ₇ Once a year or less

5. What do you value about the coast? (Please tick the option in each row that best matches your view)

	Very important (1)		←————→		Not Important (5)
Appearance of the beach and dunes (whether or not they are natural, etc)	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Good recreational facilities in general (boat ramps, reserves, etc)	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
A dry beach at high tide levels for recreational activities, such as sun bathing and sports	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Easy access onto the beach	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Walking access along the full length of the beach at high tide	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Protection of iwi / Māori values	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Retaining some undeveloped, natural beaches around the coast	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Retaining some undeveloped, natural headlands around the coast	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Protection of scenic values when looking out over the beach and toward the sea	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Protection of scenic values when looking inland (e.g. towards houses or the surrounding landscape)	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
The involvement of local people in decision-making about the coast	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
The involvement of people who do not live locally in decision-making about the coast	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Protecting beachfront property, even if it means losing the sandy beach	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Good fishing and shellfish gathering	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Your suggestions on what you value about the coast...please describe.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5

The next set of questions asks about your awareness and experience of natural hazards in general.

6. Which are the **two** natural hazards you consider most likely to affect Waihi Beach?

- 1 Flooding (river or sea)
- 2 Storm or cyclone with high winds
- 3 Forest or bush fire
- 4 Earthquake
- 5 Ash fall from a volcanic eruption
- 6 Tsunami
- 7 Coastal erosion
- 8 Landslide

Tick two only.

7. Have you ever (a) personally experienced any of the following hazards in the past, and (b) suffered loss or damage as a result? (tick all that apply)

	I've had personal experience of:	I've experienced loss/damage due to:
Flooding (river or sea)	<input type="checkbox"/> 1	<input type="checkbox"/> 1
Storm or cyclone with high winds	<input type="checkbox"/> 2	<input type="checkbox"/> 2
Forest or bush fire	<input type="checkbox"/> 3	<input type="checkbox"/> 3
Earthquake	<input type="checkbox"/> 4	<input type="checkbox"/> 4
Ash fall from a volcanic eruption	<input type="checkbox"/> 5	<input type="checkbox"/> 5
Tsunami	<input type="checkbox"/> 6	<input type="checkbox"/> 6
Coastal erosion	<input type="checkbox"/> 7	<input type="checkbox"/> 7
Landslide	<input type="checkbox"/> 8	<input type="checkbox"/> 8

Please give details here: _____

The questionnaire now moves on to coastal erosion and its management. Coastal erosion is common around New Zealand's coastline, but is most noticeable and causes problems when property is threatened. This can include public assets such as roads and parks, and also private property.

8. What do you think is the main cause of coastal erosion? (tick one option only)

- 1 Changes in the sand supply to the beach
- 2 Storms
- 3 Sea level rise
- 4 Other cause (please describe) _____
- 5 Don't know

9. For each of the following statements do you agree or disagree? (Please tick the option in each row that best matches your view)

	Strongly Agree (1) ←————→ Strongly Disagree (5)					Don't Know
Inappropriate development in coastal areas can put houses at risk from erosion	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6
We must accept that erosion is a natural process at the coast	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6
There are a range of methods available to stop coastal erosion indefinitely	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6
The width of the dune changes during the year	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6
Once a dune is destroyed there's no way to bring it back	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6

The next few questions are about managing erosion.

10. **In general**, which forms of coastal erosion management do you approve of? (tick all that apply)

- 1 Dune planting (to restore or maintain a sand dune buffer)
- 2 Construction of seawalls and rock walls
- 3 Beach nourishment (adding extra sand)
- 4 Moving of buildings back from the beachfront (managed retreat)
- 5 Doing nothing (i.e. letting the sea dictate)
- 6 Other options (please describe) _____

11. **In general**, which of the above options do you consider to be the best **long term** approach for managing erosion (i.e. over the next 50 -100 years)? Please write the option number from above and briefly state the reasons why you chose this option.

With respect to managing erosion, please tick the statement you think best follows on from the starting sentence.

12. A good cover of plants on dunes... (tick one option only)

- 1 Stops the beach eroding because their roots keep the sand from being washed away in storms
- 2 Helps build up sand reserves by stopping it from blowing away, making a store of sand
- 3 Won't help with beach erosion as the dunes come and go with the tides and winds
- 4 Protects buildings built on dunes from erosion
- 5 Unsure

13. Building a seawall on a sandy beach... (tick one option only)

- 1 Protects beach-front properties from erosion indefinitely
- 2 Only provides limited protection to the properties behind it
- 3 Provides protection for properties immediately to the sides of the seawall
- 4 Protects properties behind it from storm events of any size
- 5 Unsure

14. The effect a seawall has on the natural behaviour of a sandy beach... (tick one option only)

- 1 Is limited to the beach in front of the seawall
- 2 Doesn't change the width of the beach
- 3 Doesn't increase the effects of coastal erosion along other parts of the beach
- 4 Can increase the effects of coastal erosion along other parts of the beach
- 5 Unsure

15. **In general**, who do you think should fund coastal erosion control measures where **private property** is at risk? (tick all that apply)

- 1 Private owners whose property is at risk
- 2 Local communities or towns
- 3 District community (e.g. via District Council rates)
- 4 Regional community (e.g. via Regional Council rates)
- 5 Central government (via taxes)
- 6 Other (please describe) _____

16. **In general**, who do you think should fund coastal erosion control measures where **public property** (e.g. reserves and roads) is at risk? (tick all that apply)

- ₁ Private property owners living nearby (e.g. at risk of losing road access)
- ₂ Local communities or towns
- ₃ District community (e.g. via District Council rates)
- ₄ Regional community (e.g. via Regional Council rates)
- ₅ Central government (via taxes)
- ₆ Other (please describe) _____

17. Please tell us any thoughts you have on your choices for questions 15 and 16:

18. Currently, how much of a threat is coastal erosion to **Waihi Beach**? (tick one option only)

- ₁ A severe threat
- ₂ A moderate threat
- ₃ A minor threat
- ₄ Not a threat

19. Thinking about the property that this survey was delivered to, on what timescale is coastal erosion likely to affect this property directly? (tick one option only)

- ₁ Already affects this property
- ₂ Likely to affect this property within 10 years
- ₃ Likely to affect this property within 50 years
- ₄ Unlikely to affect this property within 50 years

Only respondents who own the property where the questionnaire was delivered should answer questions 20 and 21. All others please skip to question 22.

20. What consideration did you give to coastal erosion issues when you bought this property? (please describe)

21. Have you seen any hazard maps for coastal erosion at Waihi Beach?

₁ Yes

₂ No

The next set of questions (22 to 31) are concerned with the management of coastal erosion at Waihi Beach.



Rock wall, Waihi Beach

Currently, a combination of different approaches is used for coastal protection at Waihi Beach. Rock walls (such as the one shown in the photo above) have been placed in front of beachfront properties along Shaw Rd and the Loop.

In other areas, seawalls have been removed and replanted with native dune plants to help build up sand dunes.

An example of this programme in Coronation Park is shown on the next page.

Coronation Park, Waihi Beach (Photographs: Coastcare, Environment Bay of Plenty)



July 2000

Sea wall removed, and planting undertaken in winter 2003.

Rocks were left on the beach.



October 2006

Rocks are now buried by the accreted white sand, raising the beach profile and improving dune resilience.

22. Please consider each of the following statements and tick the box on each line that best describes your attitude:

(1) Agree strongly ← → Disagree strongly (5)

I am happy with the 'package' of coastal protection measures used at Waihi Beach	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
The current approach to managing coastal erosion at Waihi Beach benefits everyone	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Rock walls are the best long-term approach to protecting beachfront properties at Waihi Beach	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Sand dunes are the best long-term approach to protecting beachfront properties at Waihi Beach	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
The rock walls spoil the natural character of Waihi Beach	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
There are plenty of public accessways to the beach	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
I like the appearance of the sand dune buffer zones at Waihi Beach	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5

	(1) Agree strongly ← → Disagree strongly (5)				
I would be happy to see more removal of rock walls and replacement by dune planting programmes at Waihi Beach	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
It is unfair to 'let the sea dictate' (i.e. do nothing) when people's properties are at risk	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
Managed retreat - moving of buildings back from the beachfront is the best long-term approach to protecting beachfront residences at Waihi Beach	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅

23. How do you rate the success of dune buffer zones in addressing any current erosion problems at Waihi Beach? (tick one option only)

- ₁ Very successful
₂ Quite successful
₃ Unsuccessful
₄ Don't know

24. How do you rate the success of rock walls in addressing any current erosion problems at Waihi Beach? (tick one option only)

- ₁ Very successful
₂ Quite successful
₃ Unsuccessful
₄ Don't know

25. Has your usage of the beach been affected by the dune buffer zones?

- ₁ Positively affected (how?) _____
₂ Much the same as before
₃ Negatively affected (how?) _____

26. Has your usage of the beach been affected by the rock walls?

- ₁ Positively affected (how?) _____
₂ Much the same as before
₃ Negatively affected (how?) _____

27. If you have any other comments about coastal protection at Waihi Beach, please write them here:

28. This question refers specifically to the rock wall along the Shaw Rd beachfront. This wall was originally built in 1968, and rebuilt during the 1970s. Since then, more large boulders have been added to the wall.
 Can you remember back to how the beach looked **before** the wall was built?

- 1 Yes (please answer question 29)
- 2 No (please skip to question 30)

29. Thinking back to **before** the rock wall was put in place, please indicate how much you agree or disagree with the following statements (Please tick the option in each row that best matches your view).

(1) Agree strongly ← → Disagree strongly (5)

I expected the wall to look different to how it looks now	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
I expected the wall to have less impact on how the beach looks now	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
I expected the wall to have less impact on my use of the beach	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
I would have liked more opportunities to become involved in decision-making before the wall was put in place	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
There was an adequate amount of information available about the proposed wall	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
The rock wall hasn't had much effect on the beach in front of it	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
It was a good idea to build the rock wall	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5

30. Have you participated in any decision-making processes (e.g. public meetings, making a submission) with respect to coastal protection at Waihi Beach?

- 1 Yes (please describe) _____
- 2 No

31. Do you think there have been enough opportunities for the public to be involved with options for coastal protection at Waihi Beach?

- 1 Yes
 - 2 No (please add here any suggestions you have for increasing public input)
- _____
- _____

The final set of questions concerns information about yourself. This information will be treated with complete confidence, and we will only report on general trends. We need this information to determine how representative our sample is of the general population in Waihi Beach.

32. Are you?

- ₁ Male
 ₂ Female

33. Which best describes the situation you are living in now? (tick one option only)

- ₁ Family with children
 ₂ Family without children
 ₃ Alone
 ₄ With non-family
 ₅ Other (please specify) _____

34. Which ethnic group do you belong to? (tick one option only)

- | | |
|--|--|
| <input type="checkbox"/> ₁ New Zealand European | <input type="checkbox"/> ₄ Chinese |
| <input type="checkbox"/> ₂ Māori | <input type="checkbox"/> ₅ Indian |
| <input type="checkbox"/> ₃ Pacific Island | <input type="checkbox"/> ₆ Other (please state) |
- _____

35. In what year were you born? _____

36. What is your current employment status? (tick one option only)

- ₁ Employed full-time
 ₂ Employed part-time
 ₃ Not in paid employment (e.g. if you are retired or an at-home parent)
 ₄ Self-employed

37. What was your gross household income for 2006 before tax is removed?

- ₁ Under \$5,000
 ₂ \$5,000 to \$15,000
 ₃ \$15,001 to \$20,000
 ₄ \$20,001 to \$30,000
 ₅ \$30,001 to \$40,000
 ₆ \$40,001 to \$50,000
 ₇ \$50,001 to \$60,000
 ₈ \$60,001 to \$90,000
 ₉ \$90,001 to \$150,000
 ₁₀ \$150,001 to \$200,000
 ₁₁ Over \$200,001

38. What is your highest educational qualification?

- ₁ No school qualifications
- ₂ **SECONDARY SCHOOL QUALIFICATIONS**
- ₃ Trade certificate or professional certificate or diploma
- ₄ University undergraduate degree (such as a diploma or bachelors degree)
- ₅ University postgraduate degree (such as a masters degree or doctorate)

39. Have you had any experience with environmental matters (e.g. have you been involved in activities, groups or employment related to the environment)?

- ₁ Yes (please describe) _____
- ₂ No

40. Please use this space to write any other comments regarding erosion management for Waihi Beach, coastal management in general, or this survey. All remarks will be useful.

Thank you for taking the time to complete this questionnaire.

Please post the questionnaire in the envelope provided.



Date:

Interviewer:

Coastal management survey January 2007 - Tairua

Hello, would you be happy to participate in a short survey on coastal management and erosion control in Tairua? The survey is part of a research project being run by GNS Science and NIWA, and we'll use the findings to feed back to the agencies responsible for managing the coast.

Do you live in Tairua, or are you visiting? Resident/visitor

Are you a property owner here? Yes/no

[If a property owner] How close to the beachfront is your property?

Can you tell us what you value most about the coast around Tairua?
[give options if necessary such as good fishing, beach access, clean water etc]

And thinking of those things you value most, do you feel that any of them are currently under threat or don't get as much protection as they need?

Thinking of natural hazards [give examples if necessary], which *two* do you think are most likely to affect Tairua?

Flooding Storms Forest fire Earthquake Volcanic ashfall Tsunami
Coastal erosion Landslide

Have you ever experienced or suffered any loss or damage as a result of a natural disaster?
Yes/no

And if you have, can you tell us about it?

Moving on now to coastal erosion, what do you think is the main underlying cause of coastal erosion?

How serious a problem do you think it is for Tairua at the moment?

[if not serious at the moment] Do you think it will become a problem in the future, and over what time frame?

What do you think the effect of sea level rise will be?

In general, what do you think is the best way to manage coastal erosion?
[give options if necessary]

What do you think of the way coastal erosion is currently being addressed in Tairua?
[if not happy, then probe for views on how to manage it differently]

How do you rate the sand dune buffer maintenance program at the Ocean Beach in Tairua in terms of:

- a) effectiveness at managing erosion
- b) attractiveness
- c) effects on beach usage?

Do you think there are any drawbacks of having a dune buffer at Tairua's Ocean Beach?

Thinking back to before the dune buffer maintenance program at Tairua's Ocean Beach was started, did you feel well informed about the project?

Are you aware of the development setback lines for Tairua's Ocean Beach?

Do you have any other comments about the way the coast is managed in general?

Thank you very much for taking part in this survey. Your views are very useful to us.



Date:

Interviewer:

Coastal management survey January 2007 – Waihi Beach

Hello, would you be happy to participate in a short survey on coastal management and erosion control in Waihi Beach? The survey is part of a research project being run by GNS Science and NIWA, and we'll use the findings to feed back to the agencies responsible for managing the coast.

Do you live in Waihi Beach, or are you visiting? Resident/visitor

Are you a property owner? Yes/no

[If a property owner] How close to the beachfront is your property?

Can you tell us what you value most about the coast around Waihi Beach?
[give options if necessary such as good fishing, beach access, clean water etc]

And thinking of those things you value most, do you feel that any of them are currently under threat or don't get as much protection as they need?

Thinking of natural hazards [give examples if necessary], which *two* do you think are most likely to affect Waihi Beach?

Flooding Storms Forest fire Earthquake Volcanic ashfall Tsunami
Coastal erosion Landslide

Have you ever experienced or suffered any loss or damage as a result of a natural disaster?
Yes/no

And if you have, can you tell us about it?

Moving on now to coastal erosion, what do you think is the main underlying cause of coastal erosion?

How serious a problem do you think it is for Waihi Beach at the moment?

If not serious at the moment] Do you think it will become a problem in the future, and over what time frame?

What do you think the effect of sea level rise will be on the beach here?

In general, what do you think is the best way to manage coastal erosion?
[give options if necessary]

What do you think of the way coastal erosion is currently being addressed in Waihi Beach?
[if not happy, then probe for views on how to manage it differently]

How do you rate the *use of seawalls* at Waihi Beach in terms of:

- c) effectiveness at managing erosion
- d) attractiveness
- c) effects on beach usage?

Do you think there are any drawbacks to having seawalls as part of the approach to controlling coastal erosion in Waihi Beach, and if so what are they?

Do you feel that there have been enough opportunities for the public to get involved with the management of coastal erosion in Waihi Beach?

Do you have any other comments about the way the coast is managed in general?

Thank you very much for taking part in this survey. Your views are very useful to us.



Date:

Interviewer:

Coastal management survey January 2007 - Whangapoua

Hello, would you be happy to participate in a short survey on coastal management in Whangapoua? The survey is part of a research project being run by GNS Science and NIWA, and we'll use the findings to feed back to the agencies responsible for managing the coast.

Do you live in Whangapoua, or are you visiting? Resident/visitor

Are you a property owner here? Yes/no

[If a property owner] How close to the beachfront is your property?

How long ago did you buy this property?

Did you buy the property fully informed about the coastal hazard issues?

Can you tell us what you value most about the coast around Whangapoua?
[give options if necessary such as good fishing, beach access, clean water etc]

And thinking of those things you value most, do you feel that any of them are currently under threat or don't get as much protection as they need?

Thinking of natural hazards [give examples if necessary], which *two* do you think are most likely to affect Whangapoua?

Flooding Storms Forest fire Earthquake Volcanic ashfall Tsunami
Coastal erosion Landslide

Have you ever experienced or suffered any loss or damage as a result of a natural disaster?
Yes/no

And if you have, can you tell us about it?

Moving on now to coastal erosion, what do you think is the main underlying cause of coastal erosion?

How serious a problem do you think it is for Whangapoua at the moment?

When in the future do you think coastal erosion might start to become a problem in Whangapoua?

Development setback lines are lines drawn up by Environment Waikato to provide a safe distance between any new buildings and the shoreline, both in the short term and the long-term (over the next 100 years).

Have you seen a map of development setback zones for Whangapoua?

[If yes] does your property lie on the seaward side of either the primary or secondary development setback zones?

Can you tell us what you think the main management options are for Whangapoua?
[give examples if necessary: retreat, staying put but adapting, building seawalls or rockwalls]
[probe for awareness of pros and cons of each approach]

Can you tell us which of these options you *most* prefer and why, and which you *least* prefer and why?

If your property did become threatened by erosion in the future, which of the options above do you think you would prefer?

Are you involved locally with a group interested in coastal management such as a Dune Care group?

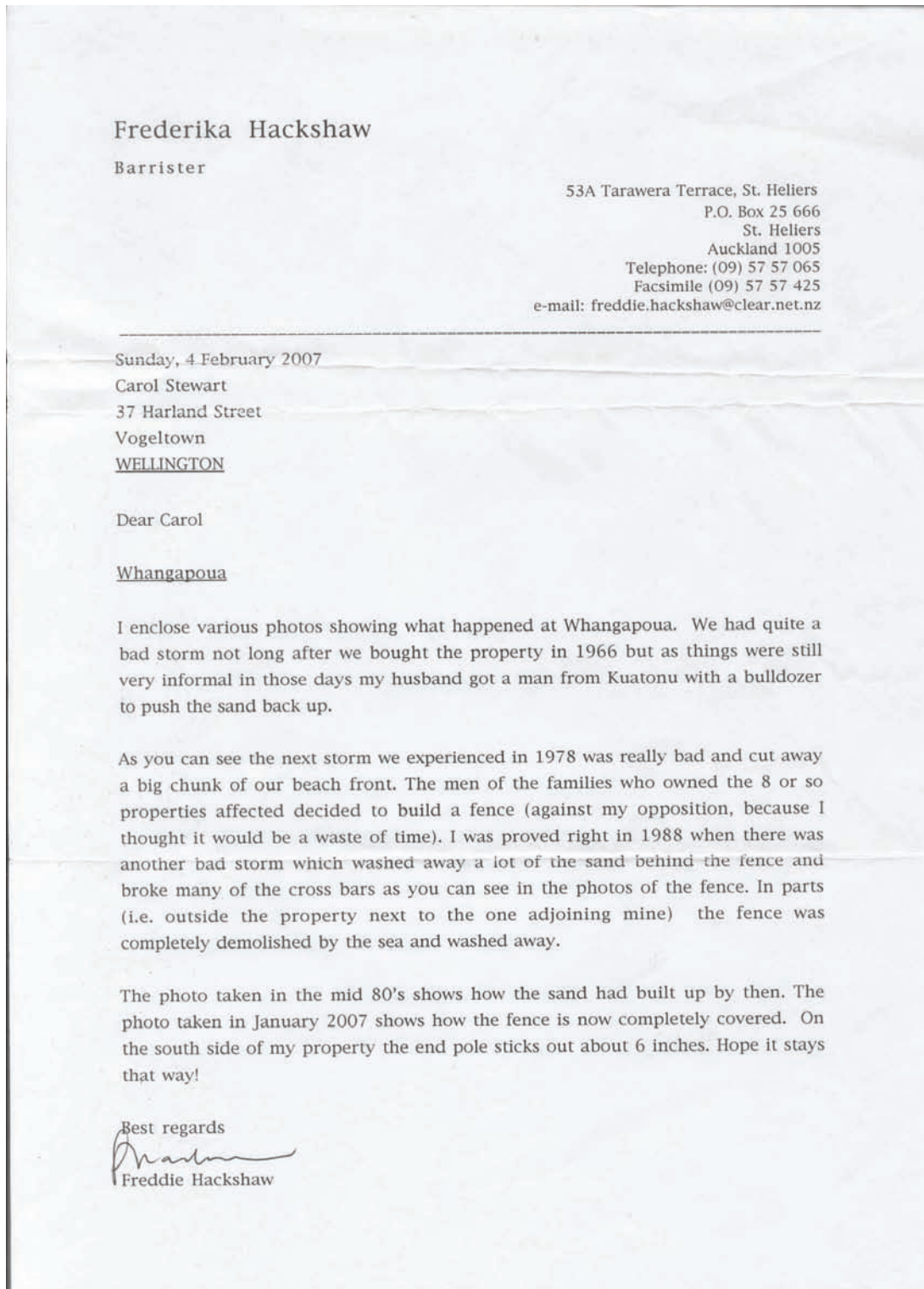
Do you think it is a good idea to tackle coastal protection as a community?

Do you have any other comments about the way the coast is managed in general?

Thank you very much for taking part in this survey. Your views are very useful to us.

APPENDIX 2 ADDITIONAL PHOTOGRAPHS AND RECOLLECTIONS

We were very fortunate to have access to the photo collection, and personal recollections, of long-term Whangapoua property owner Frederika Hackshaw.



THE NOVEMBER 1978 STORM

The following photos show the extent of damage to the sand dunes and beach frontages of several properties at the southeastern end of Whangapoua beach after a major storm in November 1978.





o/s Russell's place



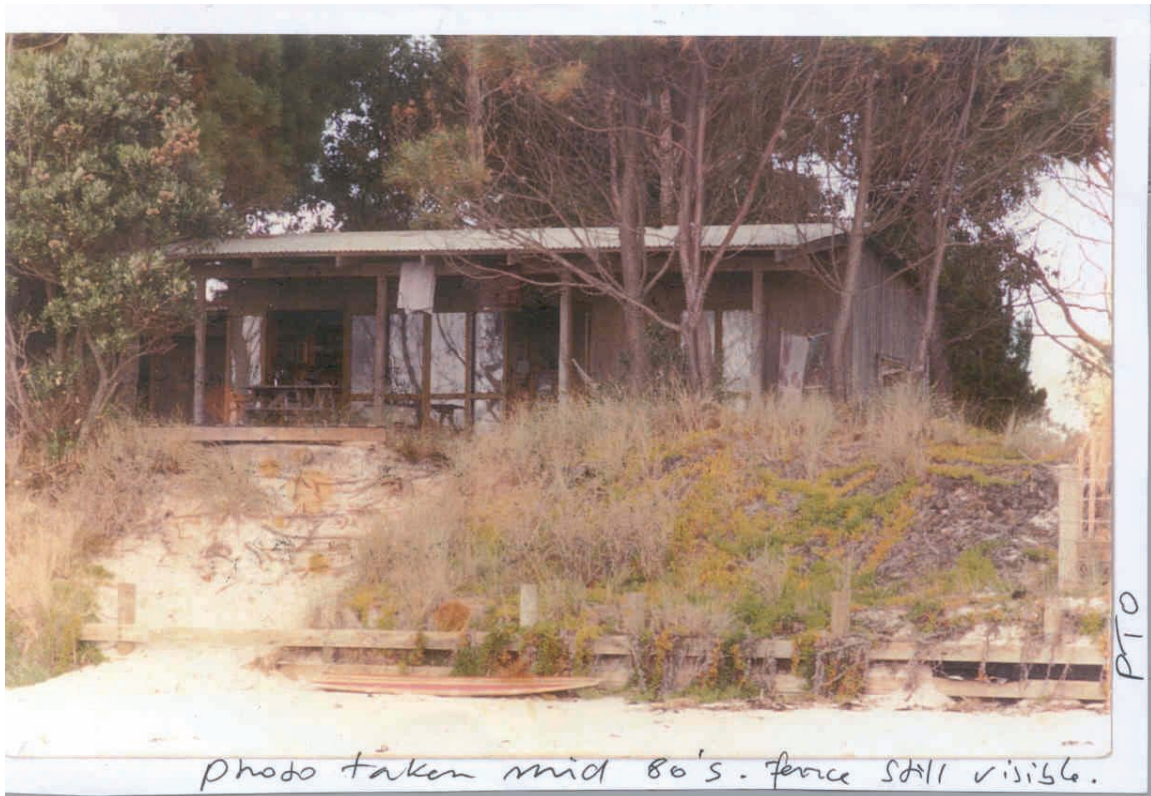
o/s Marau's place



THE FENCE BUILT AFTER THE 1978 STORM

Freddie Hackshaw describes in her letter how, after the 1978 storm, people from several beachfront properties clubbed together to have a fence built to protect against erosion. This photo, taken in the mid-1980s, shows the section of fence in front of the Hackshaw's bach, partially buried by sand.

Freddie also notes that the pine trees on the right hand side of the photo have now been cut out, with one falling down after the 1988 storm. The pohutukawa on the left hand side of the photo was planted around 1970.



THE 1988 STORM

The next major storm to hit Whangapoua was in 1988. As the following photos show, the fence shown in the previous photo was undermined and much of the sand behind it washed away. Freddie notes that for some neighboring properties, the fence was completely demolished.





Fence was erected
after 1978 storm.
Next storm in 1988
wrecked it.

2007 BEACHFRONT

This photo of the Hackshaw's bach was taken in January 2007. The remaining upright posts of the 1978 fence have now been covered by accreted sand. The pohutukawa at the right hand side of the house was planted in the mid-to-late 1980s, and replaced the pine trees that were visible in the mid-1980s photo of the house.





www.gns.cri.nz

Principal Location

1 Fairway Drive
Avalon
PO Box 30368
Lower Hutt
New Zealand
T +64-4-570 1444
F +64-4-570 4600

Other Locations

Dunedin Research Centre
764 Cumberland Street
Private Bag 1930
Dunedin
New Zealand
T +64-3-477 4050
F +64-3-477 5232

Wairakei Research Centre
114 Karetoto Road
Wairakei
Private Bag 2000, Taupo
New Zealand
T +64-7-374 8211
F +64-7-374 8199

National Isotope Centre
30 Gracefield Road
PO Box 31312
Lower Hutt
New Zealand
T +64-4-570 1444
F +64-4-570 4657