

**ASA
2018**

**Engaging Architectural Science:
Meeting the Challenges of Higher Density**

PROCEEDINGS



52nd International Conference of the
Architectural Science Association (ANZAScA)
28 Nov - 1 Dec 2018, Melbourne, Australia

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Edited by:

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Published by:

The Architectural Science Association (ANZAScA)

Hosted by:

School of Property, Construction and Project Management, RMIT University, Melbourne, Australia

Printed in Melbourne, Victoria, Australia

Designer: Viet Hoang

Please cite papers from these proceedings as follows:

Lastname, A. (2018) Example Title of ASA 2018, in P. Rajagopalan and M.M. Andamon (eds), *Engaging Architectural Science: Meeting the Challenges of Higher Density*, 52nd International Conference of the Architectural Science Association 2018, pp. 1-10, 28 November-1 December 2018, RMIT University, Melbourne, Australia.

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ISBN 978-0-9923835-5-8

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**ARCHITECTURAL SCIENCE:
BUILDING SCIENCE AND BUILT
ENVIRONMENT QUALITY**

Stepping back: a look at managed retreat in NZ

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Abstract: In 1990 the Intergovernmental Panel on Climate Change proposed the adaptation strategies of Protect, Accommodate and Retreat, and these were adopted and incorporated into New Zealand's national policy. This paper investigates the practice of managed retreat in New Zealand, with the aim to understand how the strategy has been implemented in the coastal environment. Some local councils have faced vociferous opposition from those who are affected by the implementation of 'managed retreat' as a preferred coastal hazard management strategy. Coastal property is highly valued, and this financial and social investment in the coastal edge is increasingly being threatened by climate related change. Managed retreat both threatens and aspires to protect the significant role the coast plays in New Zealand's social identity. The challenges of implementing, even openly discussing these 'retreat' strategies in an urban residential context in NZ are yet to be fully realised. The resistance to managed retreat appears to be economic, barely veiled as socio-cultural concerns. Should not socio-ecological resilience take precedence?

Keywords: Managed retreat; climate change; coastal policy; local government.

1. INTRODUCTION

The Intergovernmental Panel on Climate Change (IPCC), with the mandate to provide clarity and guidance on issues of climate change, developed three basic adaptation strategies: Protect: to reduce the risk of an event by decreasing the probability of its occurrence; Accommodate: to increase society's ability to cope with the effect of the event; Retreat: to reduce the risk of the event by limiting its potential effects (IPCC CZMS, 1990). These strategies were adopted by the New Zealand government as the guiding principles for coastal hazard management. They were integrated into the New Zealand Coastal Policy Statement 2010 as protection of coastal lines; accommodation of coastline hazards; or avoidance of coastal impacts; and retreat of coastal settlement (NZCPS, 2010). *Protection* is the most visible response and therefore the most popular with those coastal residents in the front line. *Retreat* is a clear directive that triggers social and cultural issues. Issues of loss of property, of economic value, loss of place, and loss of customary cultural use. The NZCPS 2010 doesn't integrate the IPCC's definition of *Accommodate* as a socially focused strategy.

The strategy of 'managed retreat' has been implemented by some local councils in New Zealand with vociferous opposition from those who were affected. While other strategies are available within the policy framework managed retreat is seen as the preferred option by councils, in most cases, as it reduces both liability (theirs) and risk (theirs and resident's). It is widely considered the most resilient adaptive strategy in response to existing and potential future coastal hazards. The environmental and climatic indications are obvious, the world's climate is changing and society needs to adapt. The focus is often on sea level rise yet it is the increasing frequency and intensity of severe weather events that is causing the most direct impacts. In New Zealand particularly, access to our coastlines is considered a birth right (Peart, 2009). Coastal property is highly valued, and this financial and social investment in the coastal edge is increasingly being threatened by climate related change. Managed retreat both threatens and aspires to protect the significant role the coast plays in New Zealand's social identity. Human needs are often acknowledged in the short term and this is reflected in coastal policy and management strategies. However, understanding coastal processes and habitat migration as well as the importance of valuing ecosystem services in the face of climate related threats is key to the success of managed retreat strategies. Policy and decisions are typically defined by what society wants and expects from the environment, and this consciousness highlights the importance of education and knowledge sharing (Scott *et al*, 2006).

Managed retreat has been successfully implemented in New Zealand in inland Auckland, as part of the Twin Streams project (Bell *et al*, 2017b). While this is an important example, the inland suburban context is substantially different to the coastal edges and this likely contributed to the less volatile nature of the project implementation process. The residents whose properties were affected by the retreat process would have been able to, in most cases, relocate to a similar suburban neighbourhood. The sense of displacement when retreating from the coastal edge is further increased by the likelihood that the new location will not have similar coastal characteristics, for obvious reasons.

The implementation of managed retreat as an adaptive strategy in less densely populated coastal communities provides some understanding of the issues likely to be faced as these strategies become necessary in more densely populated urban coastal areas. The challenges of implementing, even openly discussing these 'retreat' strategies in an urban residential context in NZ are yet to be fully realised. The more recent publication of 'guidelines' for local government now prioritises community consultation and cultural engagement – although the road map is by no means clear or without challenges.

2. METHOD

This paper focuses on the adaptive strategy of 'managed retreat', specifically how it is implemented in the coastal environment. The coastal environment is unique in that the impacts of natural hazards are not primarily a result of significant natural events, but rather are ongoing and further exacerbated by human intervention/s as well as significant natural events. An overview of relevant policy at national, regional and local levels provides an understanding of the policy framework that governs and facilitates the implementation of adaptive strategies, specifically managed retreat. Three case studies of communities that have been impacted by climate related coastal hazards, resulting in the provision of a 'managed retreat' response, then provide an understanding of the complexities inherent in this *preferred* adaptive strategy. This paper is intended as a starting point for further research into the issue of increasing urban coastal resilience to climate related change and starting to more openly discuss the concept of managed retreat in an urban context.

3. RELEVANT POLICY

Regional and Local authorities must meet the natural hazard management responsibilities under the Resource Management Act 1991 (RMA) and the New Zealand Coastal Policy Statement 2010 (NZCPS 2010). Under these acts the mandate for managed retreat comes from the New Zealand Coastal Policy Statement 2010 which guides policy for the coastal environment under the Resource Management Act 1991, the Civil Defence emergency Act 2002 also has influence. At local government level councils are also guided by the Local Government Act 2002.

3.1 New Zealand Coastal Policy Statement 2010

The New Zealand Coastal Policy Statement is a national policy statement under the Resource Management Act 1991. Its purpose is to state policies in order to achieve the purpose of the Act 'to promote the sustainable management of natural and physical resources' in relation to the coastal environment of New Zealand... regional policy statements, regional plans and district plans must give effect to this NZCPS. (NZCPS, 2010)

Objective 5 of the NZCPS 2010 relates directly to managed retreat:

To ensure that coastal hazard risks taking account of climate change, are managed by... locating new development away from areas prone to such risks; considering responses, including managed retreat, for existing development in this situation; and protecting or restoring natural defences to coastal hazards. (NZCPS, 2010)

This is the first time in NZ policy that the term 'managed retreat' is used although a similar strategy was alluded to in the superseded Coastal Policy Statement (1994). This objective is to be achieved most directly through the identification of coastal hazards (policy 24), providing for the protection, restoration and enhancement of natural defences (policy 26), and developing strategies for protecting existing development from coastal hazard risk (policy 27). (NZCPS, 2010) Section 1 of Policy 27, in particular, describes the encouragement to local authorities to favour 'managed retreat' in the coastal environment, the only exception is the protection of regionally or nationally significant infrastructure:

(1) In areas of significant existing development likely to be affected by coastal hazards, the range of options for reducing coastal hazard risk that should be assessed includes: (a) promoting and identifying long-term sustainable risk reduction approaches including the relocation or removal of existing development or structures at risk; (b) identifying the consequences of potential strategic options relative to the option of 'do-nothing'; (c) recognizing that hard protection structures may be the only practical means to protect existing infrastructure of national or regional importance, to sustain the potential of built physical resources to meet the reasonably foreseeable needs of future generations; (d) recognizing and considering the environmental and social costs of permitting hard protection structures to protect private property; and (e) identifying and planning for transition mechanisms and timeframes for moving to more sustainable approaches. (NZCPS, 2010)

This differs from the wording of the superseded NZCPS 1994 in which *abandonment* or *relocation* (Policy 3.4.6) is suggested as an option when considering responding to known coastal hazards threatening existing development (NZCPS, 1994).

3.2 Regional and local policy

Many local authorities have already started to plan for sea-level rise, and the potential escalating impacts of climate change on the coast. Some councils have completed coastal hazard assessments and have developed maps showing areas which are expected to be affected over the next 50-100 years. The areas considered to be at risk of coastal hazards are zoned as

the Coastal Hazard Management Area (CHMA), or similar, and typically have zones within that relate to the 50-year and 100-year hazard risk projections. Once this information has been adopted into the district plan it forms the basis for establishing trigger thresholds for implementing managed retreat. The triggers typically reflect the highest predicted SLR (Sea Level Rise) and 'worst case scenario' impacts. The Ministry for the Environment (MFE) provides specific scenarios for future sea level rise that apply to four categories of development in the Coastal Hazard Management Area. Category C relates to existing coastal development and assumes a minimal SLR of 1m relative to the 1983-2005 baseline, and planning and decision timeframes out to 2120 (MFE, 2017).

District plans outline the defined management areas or zones within a council's jurisdiction. Under the district plan councils have provisions that direct how they will manage the use, development and protection of the land within defined management areas, for example the coastal hazard management area. Provisions are made up of objectives, policies and rules. The objectives and policies set out the council's goals for managing the hazard zone. The rules state how these goals will be achieved. The rules define what you can and cannot do on your property and are broken down into six categories: permitted, controlled, restricted discretionary, discretionary, non-complying and prohibited.

Local authorities are also undertaking other activities in response to coastal hazards, including restricting development and rejecting consents for any renovation or extension of existing buildings or built structures in the coastal hazard management area, this includes sea walls and other built coastal defences (MFE, 2017). These activities restricting building work within the coastal hazard management area are implemented primarily through the Building Act 2004.

The Building Act 2004 has a series of sections that apply to the implementation of 'managed retreat'. Sections 71-74 relate to the limitations applicable to building on land subject to natural hazards. Where building activities within the Coastal Hazard Management Area require consent the building Act must give regard to the NZCPS 2010.

Where a building consent has been issued on hazard prone land under section 72, section 74 requires that the appropriate notification channels are followed to result in a covenant being placed on the title to land showing that consent has been granted in respect to the known hazards. A section 74 covenant placed on a property's certificate of title may affect insurance cover and mortgage eligibility, for example, and in some cases the market value of the affected property. Property owners can refuse such a notation being placed on the property title but it may result in future building consent being refused.

3.3 Land Information Memorandums

Hazard information known to councils is recorded in a number of ways relevant to the coastal hazard management area and the affected properties. As well as in the district plan, hazard information for each property title is recorded in LIMs (Land Information Memorandums). Councils are legally required to provide all hazard information for properties within their territory. This includes coastal properties threatened by coastal hazards associated with climate change.

LIMs must identify information that is 'known' to the territorial authority regarding any special feature or characteristic of the land concerned that is not included in the district plan. A special feature or characteristic of the land may include, amongst other things, potential erosion, avulsion, falling debris, subsidence, alluvion, or inundation. (LGNZ, 2018)

Information doesn't need to be included on a LIM to affect a property if it is clearly apparent in the operative district plan. The hazard information may be referring to potential hazards, including projected impacts associated with climate change. It is also worth noting that the council is required to provide information on natural hazards that is known to it even if it is not in the council's possession, for example held instead by the regional council or civil defence emergency management group. Once a district plan becomes operative the hazard information becomes part of the hazard management provisions and the council is able to enforce the rules in regard to the NZCPS 2010.

4. CASE STUDIES

The implementation of managed retreat in the coastal zone, in the New Zealand context, has been mostly in open coastal environments to date. Proactive councils in coastal areas that have been prone to coastal hazard impacts have led the way with the implementation of coastal hazard management strategies like managed retreat. These pioneers have helped others refine their approaches. These case study examples provide some insight into the potential issues in applying 'retreat' strategies in more urban coastal context in the near future, and poses questions about the ethical barriers to planning for the future.

4.1 Haumoana, Hawkes Bay, NZ

The coastal settlement of Haumoana, in the Hawkes Bay region on the central eastern coast of New Zealand's North Island has been subjected to significant erosion since the 1931 Hawkes Bay Earthquake caused tectonic uplift and changed

the coastal system along the 'cape coast'. In 1936 the first severe inundation incident after the earthquake triggered the construction of the first concrete sea walls to protect properties in Haumoana. The erosion of the coast continued and residents continued to construct protection structures up until the 1990s. The erosion at Clifton Beach, Haumoana through the 1980-1990s was considered to be an average of 0.75m per year (WOW, 2009). In April 2002 20 Haumoana residents are evacuated from their homes due to high seas threatening their properties along Clifton Beach. Hawkes Bay Regional Council opposes "residents attempting protection measures on their properties" (WOW, 2009). Another storm in 2003 completely destroys a house and renders a further 4 uninhabitable, others are severely damaged. A Regional Coastal Hazard Assessment and Hazard Zone Definition report by Tonkin Taylor (reference? 2004) identifies risk areas, current and projected to 2060 and 2100. In 2005 6m swells hit the coast causing the evacuation of 6 homes, destruction of several homemade seawalls, and a bach was washed into the sea. Hawkes Bay Regional Council (HBRC) coastal hazard assessment report is released in the same year showing 750 properties listed as being within the hazard area, predominantly the Haumoana and Clifton Beach area. In response to the hazard report a joint working group of residents and regional and district council discuss a range of options for responding to the current and projected hazards. The options tabled include: the status quo (do nothing), managed retreat, soft engineering/beach nourishment and hard engineering (groyne fields). The regional and district councils (Hasting District Council) prefer a 'managed retreat' approach, the local residents prefer the hard engineering option, although cost is a factor (WOW, 2009).

In February 2008 high seas severely damage the timber seawall protecting 9 Clifton Rd, Haumoana. The property owners are advised that under the district plan any building work on the property is a 'Non-complying activity' and they are not allowed to repair or replace it. Another severe storm surge destroys remaining wall at 9 Clifton Rd, and the family has to be evacuated by Civil Defence. The foundations are undermined and septic tank swept away by sea. The house is abandoned and later demolished at the owner's expense following request by council to 'fix or remove unsafe structure'. The land was declared unsafe for a new structure. This is an early example of managed retreat being implemented on the coast, in this instance in reaction to damage caused by storm related erosion within the hazard zone (WOW, 2009 and NZ Herald, 2015).

In May 2009 residents of the homes affected by the hazard zoning met and WOW (Walking on Water) was formed to advocate on their behalf. WOW proposes a groyne field strategy to protect the cape coast properties from the coastal hazards and were challenged to prove their proposal is the better option for the community than managed retreat (WOW, 2009). After the formation of WOW another storm brings high seas to the coast severely eroding the Clifton Motor Camp access road causing the camp to be closed. Alternative access was negotiated through private landowner's property to reconnect Clifton Motor Camp and Clifton Marine Club to the rest of the community. This 'replacement' road was funded by the Clifton Domain Board and was seen as 'managed retreat'. All hard engineering proposals were rejected. A private property owner received a notice from the HBRC to remove their concrete block sea wall protecting their property. This followed a similar notice from HDC (WOW, 2009).

As a result of the advocacy from WOW the HBRC has since adopted a much more consultative approach to responding to issues in the coastal hazard management area. The Clifton to Tangoio Coastal Hazards Strategy 2120 was released in February 2018, and "represents a co-ordinated approach to identifying and responding to coastal hazards and the influence of sea level rise over the next 100 years." (Bendall, 2018).

4.2 Kapiti Coast, Wellington, NZ

In 2006, on the Kapiti Coast north of Wellington on the lower western coast of the North island of New Zealand, the Kapiti Coast District Council (KCDC) was actively developing a coastal management strategy and in 2005 had commissioned a coastal hazard assessment for its 40 km coastline to determine likely hazard risk. The strategy aimed to "treat the coast as an ecosystem to be managed as a whole, while retaining the coastal lifestyle values of the residents." (Parsons *et al*, 2006). The coastline had long been impacted by erosion, and coastal properties and infrastructure were being threatened most predominantly in the coastal settlements of Paekakariki and Raumati South at the southern end of the coastline. The KCDC actively engaged the community in the development of the coastal strategy. In 2006 the Kapiti Coast: Choosing Futures, Coastal Strategy was adopted by the Council (KCDC, 2006)

The council recognised that the existing hazard lines in their operative district plan (1999) were inadequate and commissioned Coastal Systems Ltd (CSL) to carry out coastal erosion hazard assessments between 2006-2014. These assessments were intended to inform new setback lines as part of the proposed district plan (2012). Following best practice methodologies, the assessments were thoroughly peer reviewed (Shand, 2018). The resulting report and hazard maps were incorporated into the proposed district plan, and managed retreat was identified as the preferred strategy for the affected area impacting 1800 properties. Under section 74 of the Building Act 2004 information was added to LIMs.

The Coastal Hazard Management Area (CHMA) is set out in district plans. In the 'proposed' District Plan (2012) for Kapiti Coast had a provision (policy 4.7 Natural dunes) that reads

"Natural dune systems will be protected and enhanced, as a buffer for coastal hazard effects and enabled to migrate inland in response to shoreline retreat." (KCDC, 2012)

This seems like an environmentally resilient policy, although it has a veiled provision for managed retreat hidden within its wording. For the shoreline to be retreating and the dunes to be able to migrate inland it assumes that the properties and built infrastructure that might inhibit this migration would also be retreating. The response from the 1800 affected property owners was led by the newly formed Coastal Ratepayers United (CRU). In the submissions on the proposed district plan CRU actively opposed the wording in the second half of this policy and sought to have "...and enabled to migrate inland in response to shoreline retreat." removed from the policy in their submission on the proposed plan. They actively coached affected residents to submit similar opposition to the 'managed retreat' enabling elements of the proposed plan. (CRU, 2012)

The CRU led a nationally unprecedented media campaign of criticism using the impending 2013 election to their advantage. In response to the residents' significant dissatisfaction with the initial report the Kapiti Coast District Council appointed an 'expert panel' to consider public submissions and provide another review of the CSL assessments. The panel found that the initial assessments followed a sound methodology and were based on the appropriate data and hazard occurrence levels (Shand, 2018).

The CRU was formed to represent the 1800 properties directly affected by the new hazard modelling. Even after the expert panel found that the CSL assessments were sound CRU was not satisfied and in an effort to subdue them KCDC appointed an independent panel to again review them. The panel recommended that the assessment material be 'modified and applied' into the district plan, the modifications being only minor (Shand, 2018). The residents, represented by CRU, sought a High Court Judicial Review to have the hazard information excluded from the LIMs, but this was unsuccessful. Councils must include known hazard information on LIMs in a clear manner.

Two High Court Decisions (Weir v Kapiti Coast District Council 2013 and 2015) ruled that a Council has no discretion over including information on potential hazards it holds, on LIMs, only discretion in the wording it uses. The Weir case also stated that natural hazard information must be accurate, state the position fairly, and not mislead. (CCC, 2016)

Despite this ruling, due to significant pressure from CRU, the information on erosion prediction was removed from affected LIMs by the council and the maps were removed from the report itself leaving only a disclaimer. The Kapiti Coast District Council has backed down on the managed retreat strategy implementation and, for now, there is an uneasy stalemate awaiting further hazard and risk assessments to determine, to a greater degree of certainty, the coastal hazard risks to the coast. In the meantime, the eroding Kapiti coastline continues to threaten private properties and public infrastructure and open spaces.

4.3 Pegasus Bay, Christchurch, NZ

Christchurch City Council (CCC) commissioned a coastal hazard assessment in 2015. The resulting report by Tonkin and Taylor was challenged by the residents of Pegasus Bay and in response the CCC appointed an expert panel to review. Kapiti CRU appeared in Christchurch to support the Pegasus residents in their challenge to hazard information appearing on LIMs and in the CCC district plan. The panel found that the assessment was sound, and interestingly it followed the same approach as the Coastal Systems Ltd assessment for the Kapiti Coast. The Christchurch City Council responded by requesting Tonkin and Taylor to address the issues raised by the panel review, which they did, rejecting some as non-substantive (Shand, 2018). The LIMs for the affected properties now include the following reference to the potential coastal hazard impacts identified in the hazard assessment report:

The Council has a report, Coastal Hazard Assessment for Christchurch and Banks Peninsula (2017) that indicates this property or part of this property may be susceptible to coastal inundation (flooding by the sea) and/or coastal erosion over the period to 2120. The 2017 report considers four sea level rise scenarios. A copy of the 2017 report and other coastal hazard information can be found at www.ccc.govt.nz/coastalhazards. (CCC, 2017)

The Christchurch Mayor Lianne Dalziel acknowledged the issues that arise from Council's following the Central Government mandate to provide up-to-date hazard information. She has written to the minister for Local Government and the Minister for the Environment to highlight the difficulties in meeting statutory obligations to provide hazard information on LIMs and in consulting with communities about hazard risks. Christchurch City Council's website reported the mayor's comments in their Newsline:

"Notifying hazards on LIMs needs to happen, but we lose the goodwill of people to engage in the wider discussion about hazards and how we respond to them when we get caught up in the conflict over LIM notations," Mayor Dalziel said. (CCC, 2016)

The CCC responded to resident concerns instead by implementing a robust peer review process for the development of their final hazard report, having it independently reviewed four times as part of the consultative and development process. They did not succumb to resident pressure to remove hazard information from affected property LIMs. The council is actively engaging their hazard vulnerable communities in on-going discussions around coastal hazard management, and welcomes the oversight and guidance now being provided by the Ministry for the Environment.

5. DISCUSSION

The tension between residents and councils around managed retreat appears most volatile in the coastal environment. While other strategies are available within the policy framework managed retreat is seen as the preferred option by councils, in most cases, as it reduces both liability (theirs) and risk (theirs and resident's). In New Zealand particularly, access to our coastlines is considered a birth right (Peart, 2009). In many cases inhabitation of the coastal edge is deeply ingrained in the history of the area, and ownership and development patterns are the result of long held relationships with a place. Councils have inherited the responsibility for these communities and as a result are required to assess and address hazard risks. Coastal property is highly valued, and this financial and social investment in the coastal edge is increasing despite the obvious threats exacerbated by climate related change. The residents of coastal communities threatened by coastal hazards seem most concerned with councils making the hazard information available to potential purchasers, insurers and mortgage lenders and as a result de-valuing their properties. After the release of HBRC's regional coastal hazard report residents of the cape coast noticed an adverse effect on coastal property values in the area (WOW, 2009). The CRU directly discussed the value of property as a driver in opposing the hazard information on LIMs. Property values are responsive to insurance costs and mortgage eligibility is being impacted by perceived hazard risks (Moody, 2012). On the cape coast the majority of the threatened properties are long established modest family homes, unlike the predominantly more affluent Kapiti Coast residents for example. The economic, social and cultural investment in the coast still dictates our responses to being asked to step back. Ownership, control, financial and social security take precedence. Consultation, information and hard evidence in a complex environment are difficult to provide, and directly affected property owners any are motivated to be litigious and to protect what is 'theirs'. The resistance to managed retreat appears to be economic barely veiled as socio-cultural concerns. Should not socio-ecological resilience take precedence?

Councils and consultants with best available science and the best intentions to provide risk responsible advice for their stakeholders are being held to ransom by those who don't want to let go of the edge. While managed retreat may well be the most resilient approach to coastal hazard management in our changing climate, ownership is a complicated issue in the coastal environment. This will only be adjusted when the absolute-control element of the definition of *ownership* starts to shift. It is likely insurance companies, and mortgage lenders will play a critical and significant role in the future in shifting the vice-grip of high value coastal properties. With lenders and insurance companies responding the to the predicted coastal hazard risks by raising premiums and in some cases refusing to lend or insure affected property.

6. CONCLUSIONS

The way managed retreat is currently implemented in coastal New Zealand seems less about retreat and rather more about displacement. Home owners are not retreating before the potential hazards are realized, rather they are being forced to abandon damaged property due to the policy that restricts them repairing and protecting it. Physically uplifting your home to move inland to an as yet unspecified new location to make room for the sea is a difficult concept for most people to accept. Understandably this concept is un-nerving and viewed with distaste by the majority of affected residents. The realities of climate change and its impacts on coastal New Zealand are starting to become more and more apparent and this will likely assist in a change in the coastal resident's relationship with the coast. In some ways the social cost far outweighs the economic, although the financial impact of managed retreat has its social implications also. It is far more complicated than simply uplifting buildings and re-siting them outside of the hazard zone. Hard protection is not the most resilient long-term option, but the economic and social equations associated with managed retreat are so complex it can seem 'cost' prohibitive.

Managed retreat both threatens and aspires to protect the significant role the coast plays in New Zealand's social identity. 'Retreat' from the first line of defence is only the beginning, the sea won't stop eroding the coastline unless there is a significant change in the coastal system. Further properties and infrastructure will be threatened and impacted. Regional and territorial authorities in New Zealand are now taking a much more risk-averse consultation-led process in developing hazard management strategies for the coastal environment. Local government guidance is being updated to reflect the lessons learned by the pioneer councils who have been navigating the significant social implications of implementing best practice managed retreat strategies (Bell *et al*, 2017a). The question now is how do we implement managed retreat in our urban coastal environments in the face of already increasing urban density?

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