

How can we engage with coastal communities over adaptation to climate change?: A case study in Whitianga on the Coromandel Peninsula

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Abstract

For coastal communities, adapting to the impacts of climate change in a way which maintains the things they value about their community is likely to be a considerable challenge. Consideration of future adaptation strategies tend to be very low priority for the general public due to the complexity of the issues, perceived lack of scientific consensus about the likely impacts, and the inter-generational nature of the impacts. How to overcome the low levels of public motivation around climate change initiatives and engage with local communities to enable and empower them to have debates around adaptation options will be a key problem for local authorities and other key stakeholders. This paper discusses the key learnings from a recent open day and follow-up workshop held in Whitianga which aimed to 1) provide local community participants with visual and scientifically grounded perspectives of the likely future impacts of climate change on the Whitianga community; 2) allow people to link future potential impacts with what they currently value about their community and wish to retain; and 3) facilitate debate around future options, and to begin consideration of what actions could be taken to protect the things which are of value in the community against the impacts of climate change.

Introduction

Realisation that some degree of climate change is inevitable, and that mitigation¹ policies alone will not suffice (Burton, *et.al.*, 2002), has generated an increased focus on adaptation to the effects of climate change. Ford (2008) discussed three reasons for the increased focus on adaptive strategies: 1) the erosion of confidence in the ability of mitigation to stabilise or mitigate climate change; 2) the impacts of climate change are already affecting vulnerable communities; and 3) developing countries with low populations, limited industry, and low levels of consumption contribute little to greenhouse gas emissions - thus adaption is the only option.

Adaptation has been defined by Smit and Wandel (2006) as “a process, action or outcome in a system (household, community, group sector, region, country) in order for the system to better cope with, manage or adjust to come changing condition, stress, hazard, risk or opportunity” (p. 282). In essence, adaptation is a social process because it concerns the ways in which human activity will respond to change (Duerden, 2004).

In New Zealand, both the *Resource Management Act* (1991) and the *Local Government Act* (2002) devolve climate change adaptation responsibilities to local authorities (Greenaway & Carswell, 2009) These authorities are required to engage with communities throughout decision making processes concerning future development. This inclusion of local people “*in addressing climate change effects and developing adequate responses*” (UNFCCC 1992, p17 cited in Few *et al.* 2007) is promoted by both the

¹ Mitigation is “an anthropogenic intervention to reduce the sources or enhance the sinks of greenhouse gases” (IPCC, 2001).

UN Framework convention on climate change and the Intergovernmental Panel on Climate Change. However, results from previous studies report low levels of public engagement with climate change for reasons including: 1) the complexity of the issues 2) perceived lack of scientific consensus about the likely impacts of climate change (Few *et al.*, 2007) and 3) the inter-generational nature of the impacts (Lorenzoni, *et al.*, 2007).

The present study sought to use the contributions of coastal scientists, council staff, social scientists and education researchers to develop a method of engagement that might enable local authorities to better involve community stakeholders in decision making processes regarding adaptations to climate change. Its goal was to achieve a high level of community involvement, ensure that participants gained value from the giving of their time, educate community members about climate change and provide them with an opportunity to discuss climate change issues with technical experts. Previous researchers have suggested that this combination of a case study approach and participatory methods is particularly suited to climate change research (Berkes & Jolly, 2001).

Method

Whitianga (Coromandel Peninsula, North Island, New Zealand) was chosen as a setting for a case study for a number of reasons.

1. the community currently faces a number of coastal hazards, primarily flooding from coastal inundation and coastal erosion associated with storm events (Stewart, *et al.*, 2005), and thus has some understanding of current issues at the coast;
2. it is a major growth hub for the Coromandel. The township comprises a mix of permanent residents and second home owners. It is a popular holiday destination during weekends and holidays and has a diverse community structure with a range of different interest groups. Its population was projected to increase from about 3,800 in 2006 to about 6,000 by 2040 (although the peak population is much larger being 17,800 in 2003/04).
3. the research team has a good working relationship with the two relevant councils (Environment Waikato and Thames-Coromandel District Council); and
4. members of the research team had a good knowledge of the area through experience with coastal erosion and community planning issues, and the area is in relatively easy reach for the research team.

Furthermore, there was enough technical information to build useful maps showing areas likely to be inundated during storm events, delineate coastal hazard zones and areas prone to erosion and define habitat (intertidal vegetation) changes likely to take place in the harbour as a consequence of climate change.

Over and above the normal challenges associated with community engagement, (i.e., how to engage in a meaningful and active manner and how to solicit a wide range of perspectives from the community) (Few *et al.*, 2007) the topic of “community adaptation to climate change” presents three additional areas of focus;

The first was the need to provide robust technical information on projections of the nature and potential impacts of climate change on the coast in an easily understandable manner, which would be informative and easy to understand, but at the same time stimulate thought and debate. Considerable discussion in the team led to the following areas of focus being selected:

- The potential effects of climate change on coastal inundation and drainage, coastal erosion and shoreline change and vegetation change within the estuary were selected as scenarios to present to the community.
- It was decided to present the information on coastal inundation, erosion and habitat change via large A0 size coloured maps generated by importing aerial imagery and other technical information into GIS. Having LiDAR (airborne laser mapping of ground topography) data to build detailed terrain models

was very valuable in building these maps. The maps were kept simple as additional technical information was to be communicated by personal interaction as opposed to displays, written material or seminar style presentations.

- The potential effects of coastal inundation and drainage, coastal erosion and habitat change were mapped for the present situation, the year 2050 and for the 2090s. The coastal inundation and drainage and coastal erosion (temporary or permanent cut back of the shore line) corresponded to the worst likely situation corresponding to the 1% Annual Exceedance Probability (AEP) or 100 yr Average Return Interval (ARI) erosion.
- Sea level rise was an important component of the predictions and the information used was taken from the MFE booklet "Preparing for coastal change – A guide for local government in NZ" (Table 1) as being 0.35 m by 2050 and 0.8 m by the 2090's (Ministry for the Environment, 2009).

Secondly, because of the technically complex nature of the science around climate change and an unknown level of public knowledge on the topic, any public forum needed a strong learning component. Consequently, the method of engagement employed in this study needed to present both a learning opportunity to as many participants as possible and a chance for discussion and debate among those community members who were interested.

Finally, people are typically not concerned about a particular hazard if they have no experience of it, this is especially evident in coastal erosion (Cooper & McKenna, 2008). If the potential effects of climate change cannot be personalised it may be difficult to get traction around how to protect what the community values into the future. An appropriate method for this study must attend to this problem and seek to illustrate how individuals may be affected by climate change.

After careful consideration of these issues, a two-stage process was developed.

Stage One: Climate Change Open Day

The Open Day was designed to engage with as many locals as possible over what the impacts of climate change on Whitianga could be and how the changes might affect what they value about the community. It was held in the local town hall and was widely advertised in the local media. On entering the hall participants walked through a "time tunnel" illustrating Whitianga's history and some of the key local storm events and resulting impacts from the last 100 years. A member of the team was there to greet them and provide advice as requested. Once through the tunnel participants were presented with a large aerial image of Whitianga and asked to write on post-it notes what they valued about living in the community. This was positioned to get participants thinking about what they appreciated about the community prior to being faced with projected climate change impact maps. Next stop were three tables with large A0 size coloured GIS maps (1200mm x 800mm) depicting different projected local impacts of climate on: coastal inundation and flooding, coastal erosion and habitat change. Each 'map' was attended by two scientists. The aims of the maps were three-fold: firstly to generate discussion around the potential local impacts of climate change between participants and researchers, secondly to provide the participants with a chance to engage with and question researchers, and finally to collect information on what the participants valued that could be potentially affected by climate change. Participants were encouraged to mark on the photos (by writing on a small flag) what it was that they valued about Whitianga that could be affected by climate change. In this manner, the flags of information populated the three maps during the day to build up a picture of how life in the community may be affected by climate change. Additional members of the team were 'floating experts', available to answer additional questions and contribute to more detail discussions that emerged away from the tables. Participants were also debriefed by another team member at the end of the line as to what they thought of the process and they were also encouraged to attend the follow up workshop.

Stage Two: Workshop

This was designed to promote further/more detailed discussion on how the community could act to protect the things which are valued in the future. Discussion groups were set up based around the clusters generated from the Open Day maps (see table below). Each topic was attended by a scientist and facilitated to help the group consider how they might act to adapt to climate change in ways which protect the things the community values. This Workshop had not been held at the time of writing but further discussion will be provided in the conference presentation.

Results and Discussion

The Open Day was considered a success by both the research team and the participants. Feedback from the participants proved to be unanimously positive with most finding the day extremely informative. In particular, participants reported that they appreciated the opportunity to ask the scientists questions about coastal hazards, habitat in the harbour and climate change. The large coloured GIS maps illustrating the projected impacts of climate change were especially well received. Over the course of the 4 hour period between 70 and 100 people attended the open day.

What do you value about Whitianga?

The key themes of comments from participants were around: aesthetic value of local beaches and landscapes; the importance of local natural ecosystems; ease of beach access for walking and swimming, an appreciation of the recreational opportunities afforded by living in Whitianga (e.g., fishing, swimming, boating, walking), and availability of local infra-structure, (e.g., boat ramps and ferry access).

Projected impact tables

The large coloured GIS maps depicting projected impacts of climate change proved to be a valuable tool for initiating and focusing discussion. Personal interaction as the sole means of providing learning opportunities was highly successful as participants were able to freely discuss their topic(s) of interest with the scientists. In addition, the maps allowed the objects of value to be tied to specific locations, which will be advantageous for Workshop discussions over how to respond to both climate change related impacts and other local planning issues.

Those things which the community valued which were likely to be affected by climate change can be divided into 6 main groups;

Recreation: <i>Inundation:</i> boats and trailer parking areas, parks and reserves flooded open drains may be unsafe, playground & picnic areas, beach use <i>Erosion:</i> playgrounds and reserves, swimming (young children use Brophy's beach, schools use the area for trips, adults swim around the main toilets on Buffalo beach), What will happen to the surf? beach access for recreation and public use <i>Vegetation change:</i> navigation issues, raft race route, open space for boats & kayaks, boat mooring, loss of reserves, food gathering/fishing (flounder and snapper) and effects on local shellfish
Infra-structure: <i>Inundation:</i> harbour/wharf area/ferry/boat ramps underground parking area may flood, road access in out and around the town <i>Erosion:</i> several roads under threat, effects on wharf/ harbour area.
Aesthetics <i>Erosion:</i> beach view and natural character <i>Vegetation change:</i> estuary landscape
Ecology and Biodiversity <i>Inundation:</i> specific trees and habitats may be affected.

<p><i>Erosion:</i> loss of reserves along the beach</p> <p><i>Vegetation change:</i> natural ecosystems, impacts on wildlife and birds, natural landscape</p>
<p>Private Property and Businesses</p> <p><i>Inundation:</i> homes/businesses flooded</p> <p><i>Erosion:</i> property under threat</p>
<p>Community</p> <p><i>All:</i> affect the appeal of the area as a nice place to live – affect community feel – people may move away</p>

The vast majority of the comments reflected the potential impacts on recreation, such as the use of parks and reserves, waterways for boating and fishing (and food gathering in general), and beach access. It is immediately clear that these objects of value cannot all be protected into the future, so that trade-off and compromises will be necessary. For example, overall, participants illustrated a strong desire to protect the beach, beach front reserves and associated recreational activities they provide into the future. This is not surprising as previous work has ascribed high aesthetic and recreational values to beaches (Becker et al 2007; Dahm, 2003). However, property owners have indicated their wish to protect their investment, perhaps with rock revetments (rock walls). Sea level rise and resulting shoreline change will bring these values into direct contention. This clash of interests has occurred numerous times previously at different locations throughout New Zealand (see Blackett et al. 2010). The challenge for this team is to use the upcoming Workshop to help start discussions between the Whitianga community and their local councils, that the wider community can begin to adapt to climate change impacts on their coastline.

Duplicating this process

The final outcome of this research programme is to produce best practice guidance to help other coastal communities adapt to climate change, and as such we aim to make key aspects of this work transferable. To date our process has identified a number of key areas that are likely to be pre-requisites for wider application:

- A certain level of expertise and skill within the project team is required to create the climate change projection maps, engage with participants and answer climate change related questions.
- The commitment of the local councils to the process is a key element to success.
- LiDAR data are very important for calculating the projected areas of impact, however, many coastal areas lack this information.

Of these pre-requisites, obtaining LiDAR information is likely to be the most expensive. However, development of sound, science based projections of potential impacts of climate change on coastal communities may be problematic without these base data.

Conclusions

To date this process has been very successful as the data generated has provided an insight into not only what people value about Whitianga, but also what the likely conflicts will be as the impacts of climate change become evident. The spatial component of the work allows for more detailed rather than general discussion to occur as to what can be done to protect particular valued objects into the future. However, the things the participants valued which would be affected by climate change cannot all be protected. There will need to be tradeoffs between protecting natural ecosystems and landscapes, retaining access to the estuary, beach, and parks and reserves for recreational activities and food gathering, retaining beach access, and protecting private interests in property and local infra-structure. However, this process will help inform these choices.

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