



## Step 2: Understand past, present and future risks

Identifying, developing and choosing an appropriate pathway requires an understanding of the nature, extent and impact of past events. Insight into what the future impacts of climate change might be is also crucial.

*Me hoki whakamuri, kia ahu whakamua, ka neke.*



Sediment left after the flood waters from Cyclone Bola receded from Te Ngarue flood plain, 1988. Tangoio Marae circled.

This step is about developing a shared understanding of the past, present and possible future issues associated with climate change. Reaching a shared understanding of the past and present situation provides a solid platform from which to consider and analyse possible futures and, identify and develop adaptation pathways.

### Step 2

There are two parts to this step, the first (2a) focusses on understanding historic flood events and associated impacts on the marae and the local community. The second (2b) focusses on the potential implications of different climate change scenarios over a range of future time-frames. This information sheet describes the methods adopted for the Tangoio Marae project.

#### a. Understanding past and present risks

Understanding past and present risks and issues starts with gathering information. At Tangoio Marae, this included:

- collating and verifying records from historic events
- interviewing kaumātua and others with history in the area to explore their experiences of such events
- developing a computer model of a known event (e.g., Cyclone Bola) to better understand the extent and depth of flooding. The results of the modelling were also verified by observations from those who lived through the event.

Technical and experience-based information often complement and enhance each other. Weaving this information together helps communicate the nature of past and present risks. At Tangoio Marae the technical and lived-experience information was intertwined through:

- hui
- videos to communicate the experiences and impacts of the events
- murals and posters e.g., a history of flooding mural brought together photos and comments from many sources and articulated the frequency, extent and impact of flooding in the valley, how people responded and the impacts on the community
- animated models and illustrations e.g., showing the flood water levels relative to marae buildings.

## **TIP: Additional ways to achieve this step**

If the climate change issue is not clearly defined, start scoping with the people who initiated the discussion. Do your homework. Pull together all the relevant technical information you can find.

After all the ground work is done and you have some understanding of the past and present risks, communicate the issues through stories or narratives. Where possible, let those who have experienced the hazard or the impact first hand tell the story.

If no-one locally has experienced the hazard draw on the stories of others in similar situations.



*Interview in progress to record lived experiences with flooding at Tangoio Marae.*



*Hoani Taurima indicates high water mark on his whare next to Tangoio Marae resulting from Cyclone Bola, 1988.*



*Floodwaters downstream of Tangoio Marae during Cyclone Bola, 1988.*

## b. Understanding the future risks

There are many important elements involved in considering the potential implications of climate change on a community. Determining an appropriate level of investigation and communication methods will depend on the community, the risks faced, and where the community is on their adaptation journey. The methods used at Tangoio Marae to help define and improve understanding of possible future climate change risks and impacts included:

- demonstrating the concept of probability using a range of methods and relating that back to known events
- introducing some of the science around climate change
- acknowledging the uncertainty around climate change projections
- selecting several potential climate change scenarios and time-frames to test in the model (refer to Table 1).
- using the model (Step 2a) to assess the future risks and issues arising from climate change.

The scenarios investigated were selected to cover short, medium and long-term periods.

**Table 1: Example: Modelled climate change scenarios<sup>1</sup>.**

Scenario	Year	Climate change scenario	Assumed sea level rise associated with RCP <sup>3</sup> (metres)
Bola <sup>2</sup>	Present	None	None
Bola + Climate Change Scenario 1	2040	RCP <sup>3</sup> 6.0	0.2
Bola + Climate Change Scenario 2	2090	RCP 6.0	0.5
Bola + Climate Change Scenario 3	2120	RCP 8.5	1.36

### Footnotes:

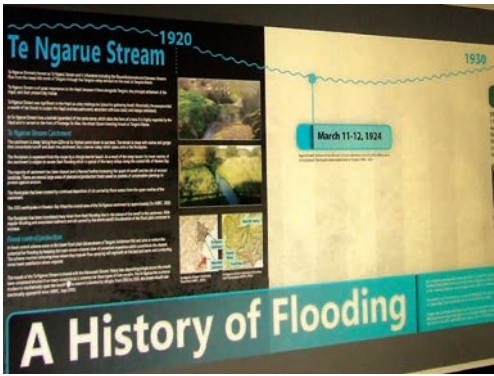
<sup>1</sup> The modelling undertaken as part of the project was not a comprehensive climate change impact assessment, but rather work from which to focus a conversation around the potential impacts of climate change on the marae and surrounding areas, and possible adaptation options.

<sup>2</sup> Cyclone Bola was selected as the base storm event for the modelling assessment because information on the event was available to calibrate the model. However, Cyclone Bola is not considered to be the "worst" event on record experienced at Tangoio Marae.

<sup>3</sup> RCP stands for Representative Concentration Pathway. RCPs are predictions of how concentrations of greenhouse gases in the atmosphere will change as a result of human activities. There are four RCPs which range in concentration from very high (RCP 8.5) through to very low (RCP 2.6). A moderate scenario of RCP 6.0 was used to look at potential impacts of climate change. A stress test using RCP 8.5 was also undertaken.

The results of the climate change impact assessments were communicated by:

- focussing on the key concepts or outcomes, rather than specific modelling results i.e., more extreme weather, more often = increased likelihood of flooding = increased risks
- using posters and modelling simulations showing the differences between the known past event (e.g., Cyclone Bola) and future events.



Mural documenting historic flooding records and experiences from the Te Ngarue Stream catchment.



One of the two video productions made to convey information and experiences on specific flood events that affected Tangoio Marae.

## Tangoio experience

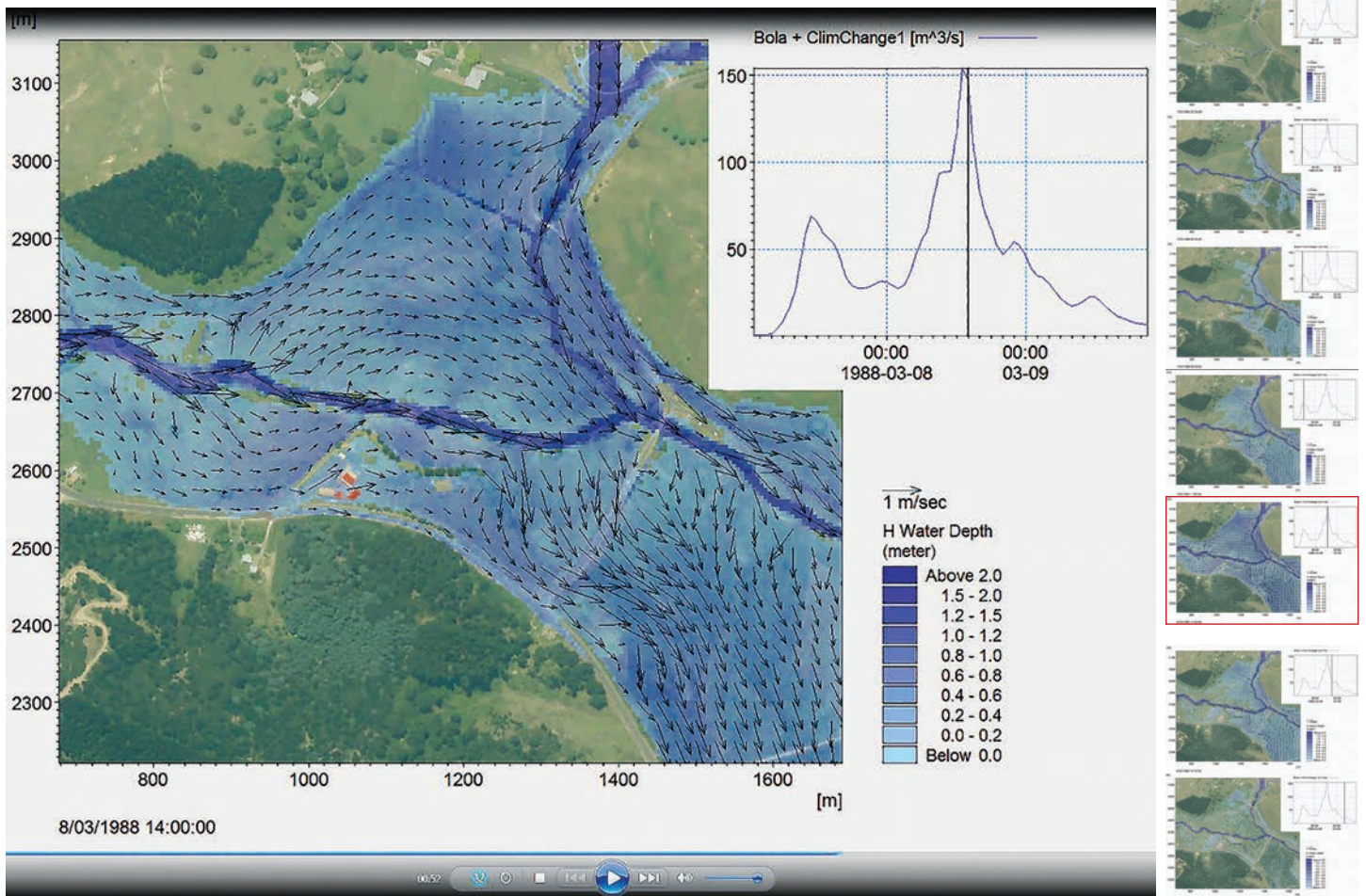
The information – data, stories, scenarios and models were brought together at a single hui to provide a seamless and integrated overview of the past and potential future flood events in the Tangoio Valley. It was important to do this all at once so that the social and physical impacts of flooding, as already experienced by some, were still fresh in the minds of those at the hui and remained connected to potential future risks and what could happen.

The mural and videos enabled those who have experienced flooding at the marae to share their experiences. Those who had not experienced flooding were also given better insight into the impacts of flooding.

More than 75% of the people who attended the hui felt the videos had increased their understanding of what a flood could be like, with more than 80% agreeing that the videos were a good way to help those who had not experienced a flood to understand what it could be like.

*“Shows the effect it had on people at the time that lived in affected area” and “it gives a good indication of what happened and what could happen”*

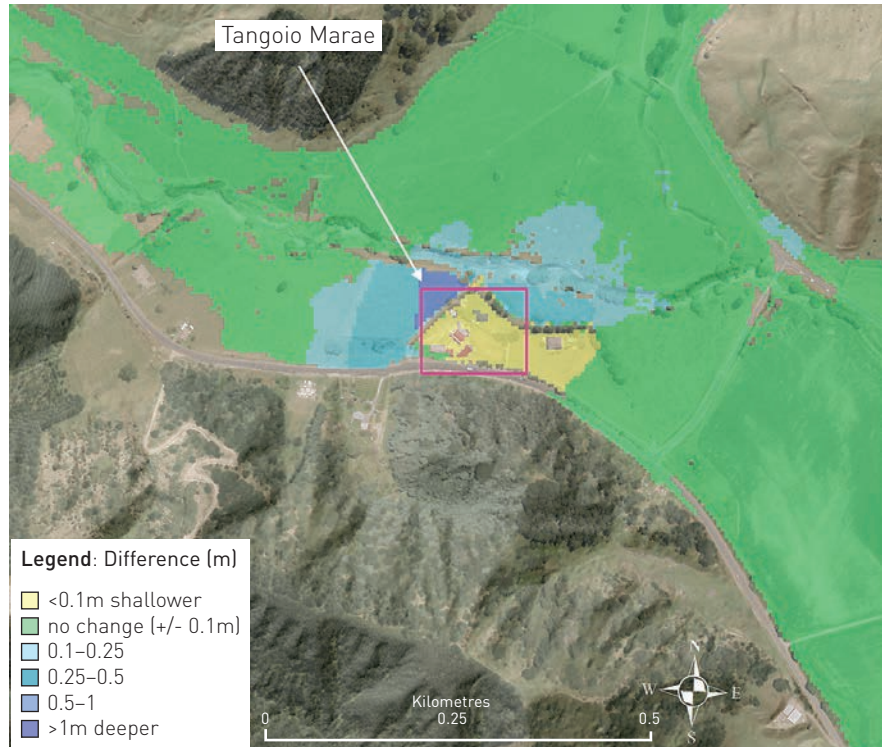
The calibrated model provided a sound foundation to assess potential impacts of a range of possible climate change scenarios.



A screen shot of the 'Bola + Climate change scenario 1' (RCP 6.0 out to 2040) modelling animation. The animation shows the floodwater extent and depth. The vectors (arrows) indicate the flow direction and velocity. The red points are buildings at Tangoio Marae.



Tangoio Marae whānau workshoping to identify options that contribute towards the agreed vision and objectives, and consider the current flood risks and possible future climate change impacts.



Modelling results showing possible future impacts of climate change RCP 6.0 out to 2040 compared to Cyclone Bola in 1988.

The modelling for the different climate change scenarios (including sea level rise) predicted increased peak water level downstream of the marae, but little change at the marae compared to the flood levels experienced during Cyclone Bola.

To put this into context, it was noted that flooding from Cyclone Bola is not the worst experienced at Tangoio Marae, and that the modelling results don't mean there is a low flood risk at the marae. In addition, the important themes associated with climate change still held true for the marae, and were taken forward to identify, define and evaluate different mitigation options and adaptation pathways:

**Climate Change will result in more extremes in the weather, more often -> increased likelihood of flooding -> increased risks**

Most hui attendants (more than 85%) agreed that the hui helped them gain a better understanding of what sort of floods could be experienced in the future. More than 85% believed there were things they could do to reduce the effect of floods on the marae and would take part in further hui to consider their options.

The ground work completed to develop a shared understanding of past and future issues and risks set the stage for exploring and defining potential options for the future.

*"From this presentation/hui we are better able to make informed decisions"*

At the end of the hui, attendees worked in groups to contribute towards Step 3 (Identify Options), to ensure they left with a positive view and sense of control over the adaptation decision-making process.

Find resources and more information at [www.niwa.co.nz/te-kuwaha/tools-and-resources](http://www.niwa.co.nz/te-kuwaha/tools-and-resources)

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