

Planning for Climate, Weather and Other Natural Disasters – Tourism in Northland



Susanne Becken
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Abstract

The weather is an important ingredient for tourism, but it is also a potential source of hazard, with natural disasters resulting from extreme events not being uncommon in New Zealand. Using the tourism sector in Northland as a case study, this research sought to identify key concerns and issues relating to climate and weather, and to understand the flow of information between weather information providers and users, including tourists. The research also assessed tourism's preparedness for natural disasters and involvement in local or regional civil defence responses. Interviews with key stakeholders were undertaken in three stages and analysed to generate insights into the relationship between climate, weather and tourism.

The key issue identified by tourism stakeholders related to the image of Northland as a tourist destination and the impact of weather forecasts on domestic visitors, mainly from the Auckland market. Seasonality of visitation is also an issue. Climate variability (i.e. changes in every-day conditions such as rainy days) was not perceived to be a big problem; in fact most tourism stakeholders reported relatively little disruption from unfavourable weather conditions. Non-tourism stakeholders expressed concerns about longer term issues, such as climate change and its impacts on extreme events, such as flooding and drought, and sea level rise. The analysis of crisis and disasters resulting from extreme weather events revealed that, while there are regional and local response plans and processes in place, tourism is not explicitly integrated into those. A few gaps, such as communicating road closures or early warnings, were identified and could be rectified by better cooperation between tourism and civil defence organisations.

In summary, the Northland climate and weather appears generally very favourable for tourism although there are some seasonality issues arising from the current reliance on coastal and water-based attractions. Efforts to both attract visitors outside the summer season and to improve summer visitation numbers may be directed at addressing perceived image problems. There is also scope to increase the capability of tourism stakeholders to deal with emergency situations.

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Introduction

The weather is very important to tourism: it allows tourists to participate in a wide range of activities, influences satisfaction and affects a business' bottom line. The weather is also a potential source of hazard, with natural disasters resulting from flooding and strong wind not being uncommon in Northland. Climate change will exacerbate some of the current risks and also change how weather impacts on tourism. While it is not possible to influence the weather or the climate, one can proactively reduce vulnerability, manage negative impacts and prepare for likely changes. Lincoln University is researching the current relationship between tourism and the weather, with a longer term view of understanding the impacts of changing climatic conditions in New Zealand. Northland – and in particular the Far North – is a case study which will generate learnings on aspects of weather perceptions, flow of weather information and the impacts of natural (weather and others) disasters that relate to the tourism sector.

Different time scales apply to climate variability, extreme events and climate change (Figure 1). Variability relates to the weather as it can be observed at present. Here, weather can enable tourism activity or impede it. Understanding the weather and planning for it is a key to maximise tourism benefits and improve the image of a destination. Extreme events, leading to crises are distinct events that occur at irregular intervals, but are predicted to occur more frequently in the future due to climate change. In the last four years, Northland has experienced a number of flooding events (and three small tsunamis) which have disrupted transport networks, destroyed property and threatened lives and livelihoods. While such emergency events require immediate response, they also demand preparedness and recovery initiatives.

Climate change relates to changing climatic conditions over time. New Zealand scientists have already observed changes to the New Zealand climate over the last hundred years and further changes are expected. Increasing extreme events and rising sea levels will be a key concern for beach-based destinations, such as Northland.

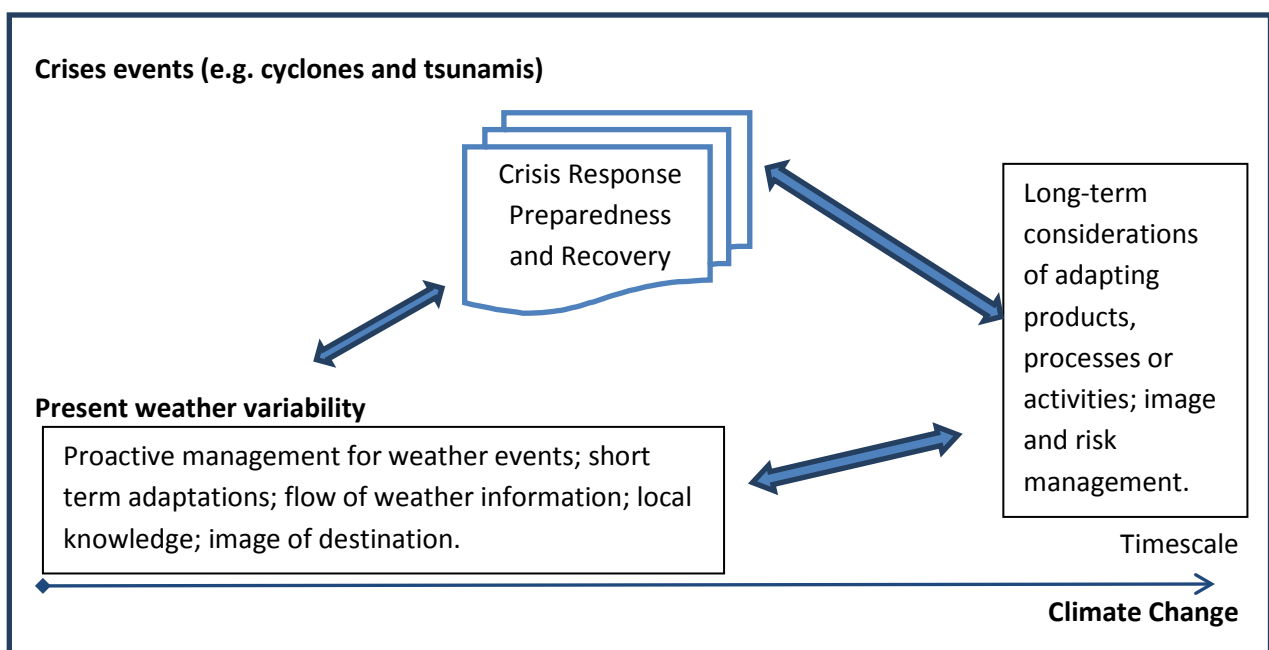


Figure 1 Overview of time scales and issues.

Using Northland as a case study, the objectives of this research are threefold:

1. Identify key concerns and issues relating to climate and weather and the tourism sector in Northland;
2. Understand the flow of information between weather information providers and users, including tourists;
3. Assess tourism's preparedness for natural disasters and involvement in local or regional responses.

This report will first provide a background to this research, starting with a brief description of the tourism sector in Northland (especially in the Far North) and an overview of the climate and weather conditions in Northland. This is followed by a brief review of civil defence matters in New Zealand and tourism crisis responses evident from the tourism literature. The methodology of this research will outline the different research phases and the types of data collected and analysed. The results will be broadly structured into the three research objectives above. A conclusion will summarise the key issues emerging from this research.

Background

Tourism in Northland

Tourism in Northland is well-established and many tourist operators, especially in the Bay of Islands, have a long involvement in the tourism industry. Tourism businesses range from large corporate companies, such as Fullers Great Sights, to smaller owner-operators. The focus in the area is on water-based activities (Photo 1), alongside a significant number of cultural and heritage attractions of national importance. There is a considerable range and number of accommodation options available including hotels, motels and camping grounds; there are also a significant number of second homes – many available for rent – in the region. Transport companies – with the exception of those operating car and passenger ferries – appear to be less well represented than in other regions in New Zealand. This is most likely because visitors are primarily either domestic holidaymakers (with their own vehicles) or independent international travellers (i.e. travelling by campervan or rental car). Some businesses also offer services beyond the tourism market – e.g. air operators who operate scheduled air services and are contracted to assist with rescue and infrastructure work in the region, as well as operating scenic flights.



Photo 1 Tourist activities in the Bay of Islands (J. Wilson).

The Far North District Council operates three i-SITES in the area – at Kaitaia, Hokianga and Paihia; another i-SITE is located in Whangarei (funded through the Whangarei District Council). There are also a number of privately owned information centres, for example in Russell. Destination Northland is the region's Regional Tourism Organisation; it is an organisation within the Northland Regional Council (NRC) structure. The Department of Conservation (DOC) is responsible for a network of walking tracks around the region, a forest camp and tracks in Puketi Forest, historic (whaling and whaling station artefacts, lighthouses, and Maori cultural and archaeological) and coastal (some with camping grounds) sites. The largest camping ground is on Urupukapuka Island and holds 450 people at its peak; Cable Bay (also on Urupukapuka) holds 250 people. Most campers are domestic. DOC does not have a visitor centre in the area and relies on their website and the internet to manage bookings, distribute information and contact people.

The Northland visitor market is strongly domestic: in 2009, for example, 85.1% of total visits and 70.3% of visitor nights were generated by domestic visitors (Tourism Strategy Group & Ministry of Economic Development, 2010). Tourism in Northland is also very seasonal with a clear peak in January. Based on the Commercial Accommodation Monitor, guest nights in January are typically between 300,000 and 350,000 (Figure 2). This means that on an average night there could be over 10,000 additional people in Northland that would need to be informed and looked after in the case of a crisis or disaster. Holiday parks and campgrounds are by far the most popular accommodation choice in Northland, in particular in the peak summer season. Backpacker accommodation, whilst smallest in number, is the least seasonal. The visitation of motels shows a slightly different pattern from the other accommodation providers, with an extended summer/shoulder season until April; and in some years a small peak in July/August. Visitors at campgrounds (and those freedom camping) are potentially more vulnerable to disaster, especially in extreme weather events, because of their coastal locations.

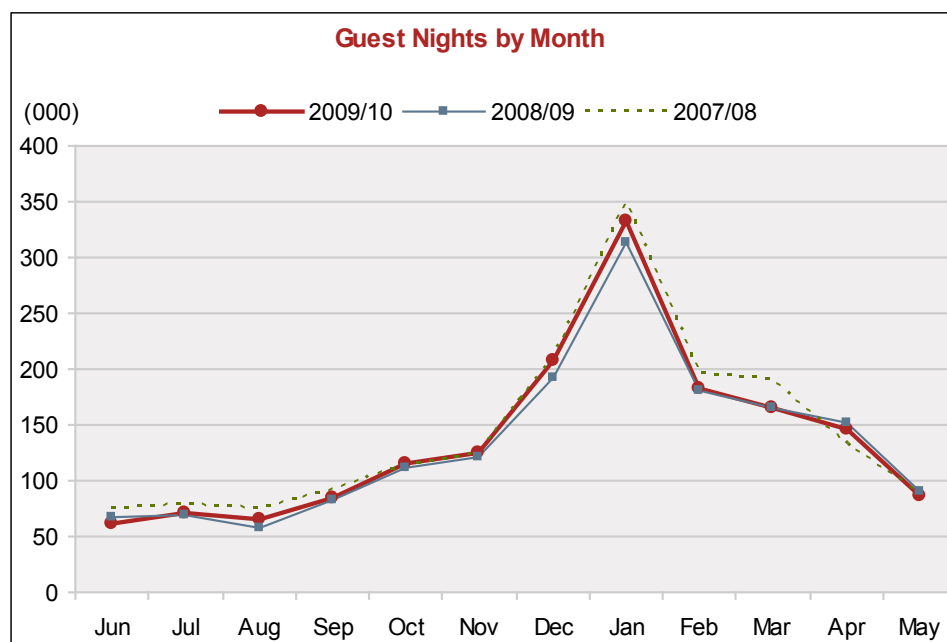


Figure 2 Guest nights in Northland based on the Commercial Accommodation Monitor (www.tourismresearch.govt.nz).

Climate, weather and other natural hazards

The Northland climate is very favourable for tourism, particularly in the summer season. However, the region faces the challenge of being a sub-tropical 'wet' destination that is also prone to extreme weather events. Weather forecasts play a key role in attracting the Auckland market to Northland (and the Bay of Islands) rather than to other regions. Expanding tourism into the winter seasons is a major goal of the destination, and special events have been put in place to achieve this (e.g. seafood festivals).

The main natural hazards in Northland are weather related (Gray, 2003). Some of these are likely to be exacerbated by climate change (see below). Weather hazards typically relate to the occurrence of extra-tropical cyclones (on average one a year) and associated effects such as high winds and heavy rain. North Tasman Lows that produce so-called weather bombs are also of concern as they bring heavy rain and wind. Weather in Northland is influenced by El Nino/ La Nina phases with north-easterly winds being more common during La Nina, bringing higher rainfalls and more cyclones that pass close to New Zealand (McMillan, 2010). The topography of Northland, with the combination of steep hills and flat terrain, results in intense orographic rain with slow draining river systems, prone to flooding. Tidal river mouths intensify flood risks. Some examples of weather events and their impacts on tourism are shown in Appendix A.

The anticipated climate change impacts for Northland are summarised in Box 1. Some may cause problems for tourism whereas others might provide opportunities, for example warmer temperatures.

- Warmer temperatures: about 0.2 to 2.6 C by 2040 and 0.6 to 5.9 by 2090;
- Relatively greater warming in summer and autumn than in winter;
- Likely decreases in precipitation, more likely in the winter months (annual decrease of between 13 to 5% by 2040 and -22 to 5% by 2090);
- More intense rainfall events are likely;
- The extended winter rainfall period currently observed for May to October is expected to shorten under various climate scenarios (to June – September);
- Depending on the scenario, mean daily rainfall in winter could be reduced substantially;
- Extreme rainfall events are likely to be more frequent in summer (but not during the other seasons).

Box 1 Climatic Changes for Northland (Ministry for the Environment, 2008).

NIWA produces seasonal outlooks that inform local stakeholders about "likely" weather conditions for the next three months. An example is provided in Figure 3 for the summer period of 2010/11. For example, Northland can expect higher than average temperatures and normal or above normal rainfall on average over the three months.

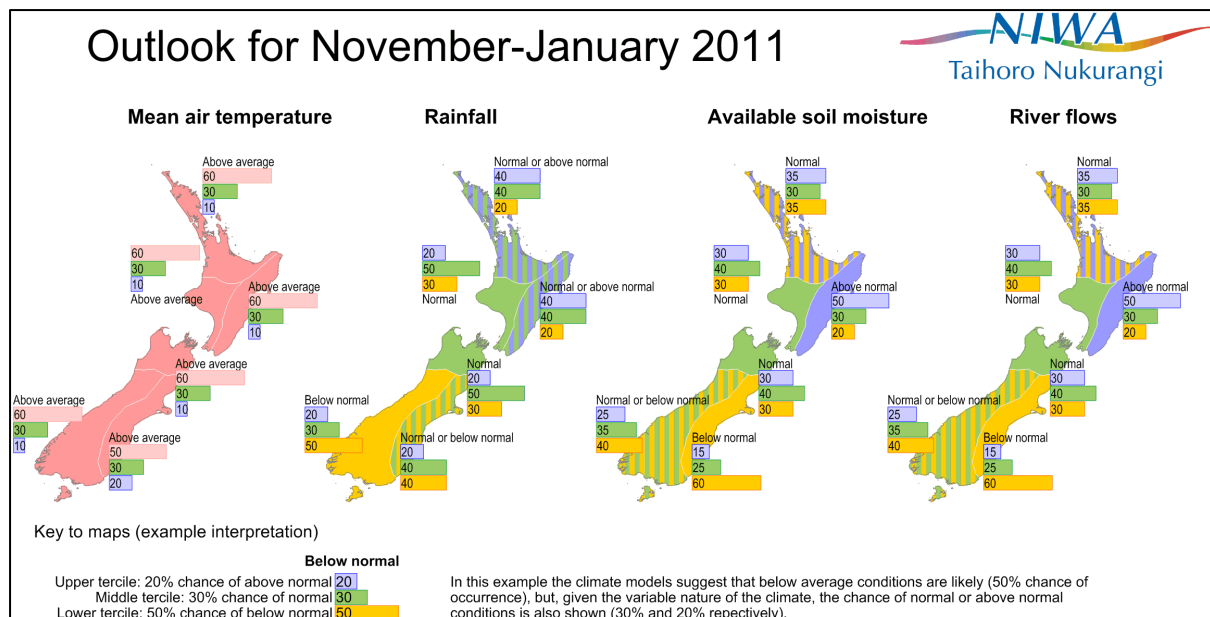


Figure 3 Seasonal outlook for November to January 2011 for New Zealand, including Northland.

In addition to weather hazards, Northland is also exposed to coastal hazards. Coastal hazards partly relate to extreme weather events such as storms that produce high waves and increase erosion. Other coastal hazards relate to tides and sea-level fluctuations. Northland's west and east coasts differ substantially in terms of topography, beach types and wave action. Beaches on the west coast are sandy with active dune systems, whereas those in the east form part of an irregular shoreline with headlands, sandy bays and mangrove forests. The east is more sheltered from waves, but is prone to high waves in north-easterly winds (Bell & Gorman, 2003). The vulnerabilities of coastal areas are exacerbated by i) increasing demand for coastal development, ii) extraction of sand, iii) historic land use changes such as deforestation, iv) climate change and sea level rise. Coastal erosion can pose major problems for assets and ecological habitats¹.

Other natural hazards identified in a 2004 GNS report on Northland were earthquakes, landsliding, tsunamis, volcanic hazards, and mine subsidence (Beetham et al., 2004).

Crisis and disaster

The central government agency for crisis management is the Ministry of Civil Defence and Emergency Management (CDEM). The CDEM Act (2002) requires Regional Councils to prepare specific plans that align with the national CDEM plan. The four key principles (the 4 Rs) are:

- Reduction;
- Readiness;
- Response;
- Recovery.

¹ A GNS report undertaken on planning for a retreating coastline in Oamaru, North Otago, for example, highlights a range of risks, observed erosion rates and possible planning responses (Forsyth, 2009).

A large amount of resources is invested into emergency preparedness, but a substantial number of New Zealanders are not fully prepared for crises or disasters. A 2010 Colmar Brunton study for the Ministry of Civil Defence and Emergency Management found that only one in every nine New Zealanders (11%) are fully prepared for an emergency. However, the percentage of people using lack of information as a reason for not being prepared has dropped from 15% at the start of the campaign in 2006 to 9% in 2010 (Colmar Brunton, 2010). No similar study could be found for disaster and emergency preparedness amongst businesses. Increasing business resilience would involve addressing vulnerability in order to minimise the on-going impact on business activity after an emergency event. A business continuation plan forms part of such a wider strategy. A tool kit to help tourism businesses address crisis and disaster events was developed by Tourism Victoria (2010) in Australia, largely in response to the bush fires in 2009.

Information on emergency situations is essential. An early 2010 study (i.e. before the Canterbury earthquakes) on the disaster preparedness by residents in Canterbury revealed that people draw on both passive (e.g. brochures or television advertisements) and active information. Active information includes community activities (e.g. drills), workplace activities and discussions. These were found to be more effective than passive information and should be included in civil defence and emergency management strategies. Addressing the population more directly is even more important given that people generally do not think about hazards and their concept of what a hazard is and what preparedness means differs from that of official authorities (Becker, 2010).

Research on past events can help to us understand the strengths and weaknesses of emergency management plans. The 2006 snowstorm in Canterbury, for example, highlighted problems associated with a lack of telecommunication and electricity, poor intelligence gathering, an under-utilising of the Defence Force, and lack of resources (e.g. adequate machinery for clearing roads) (Wilson et al., 2009). Respondents to the snowstorm survey noted that the communication between agencies was not ideal and that they were not clear about what was expected of them. Some people also believed that they received inadequate warning of the event. Those who received warnings reported nine different sources of these including the MetService, television, radio and newspapers.

New Zealand civil defence agencies are involved in the organisation of emergency drills to improve preparedness. A tsunami test was carried out in Northland in late 2010. “Exercise Tangaroa” involved more than 90 people from both local and national agencies in a simulation of the effects of a hypothetical tsunami generated off the coast of South America. The exercise was the third national Civil Defence test held since 2006 (Northland Regional Council, 2010a).

Tourism often occurs in remote natural areas and coastal environments, both of which are potentially exposed to natural disasters or other crises. Tourism is also highly dependent on functioning of critical infrastructure such as transportation networks, electricity, sewage, telecommunications and water (Ritchie, 2004; Orchiston, 2010). Tourism in remote areas is also dependent on supply chains, for example for the provision of food. Natural disasters can have major effects on tourist safety and arrivals in the long term. According to Orchiston (2010) a tourism crisis relates to:

- A sudden event which requires exceptional response measures by the affected community;
- An event which challenges the operation and survival of an organisation;

- An event which leads to a turning point in the organisation, which may have both negative or positive outcomes, determined by decisions made by the organisation.

Useful examples of crisis plans for tourism come from Australia. Australia's National Tourism Incident Response Plan (Commonwealth of Australia, 2007) "sets out a process for delivering a coherent national response aimed at minimising the impact of incidents on the Australian tourism industry" (p. 7). Based on this Australian national plan, Tourism Queensland (2007) developed a template for Regional Tourism Organisations to design their own crisis plans. This template suggests that a response and recovery plan is structured into actions that relate to preparedness and response and those dealing with recovery. Marketing and business assistance are key elements of recovery.

A small number of studies are available to illustrate aspects of emergency or crisis management for tourism. For example, research on tourism's response capacity to tsunamis in Washington, USA, highlighted challenges relating to safe evacuation locations close to the beach and also the need to identify routes for evacuating by car. The particular case study showed that there were a number of locations, including the local holiday park, where the warning sirens could not be heard, and tourism stakeholders suggested regular tests of the siren, e.g. on an annual basis. Tests should be well advertised to avoid panic amongst tourists. The importance of staff training in tourism businesses was recognised, but high staff turn-over is a challenge (Johnston et al., 2009).

The 2006-07 bushfires in Victoria, Australia had a significant impact on tourism. While the operators themselves felt that they were well-prepared and informed, the media reporting was considered to be too negative and to have unnecessarily increased the negative effects on visitor arrivals (Sanders et al., 2008). The existence of prolonged media attention was identified as a key challenge to recovery, alongside a lack of explicit forward planning by tourism businesses. The appointment of a recovery officer was suggested as a measure to address these issues. Also, the allocation of contingency funding in case of future events (by an RTO for example) was seen as a useful measure to aid recovery. Funding could be used, for example, to publicise the messages of satisfied post-bushfire visitors.

A recent doctoral study on a (hypothetical) magnitude 8 earthquake on the Alpine Fault in New Zealand showed that tourism activities would be disrupted substantially for a prolonged period of time, for example as a result of road closures (which might take up to 6 months to repair) (Orchiston, 2010). This research also suggested that tourism operators – while understanding the likelihood of an earthquake – are not aware of the potential consequences for their business. The tourism operators interviewed believed that they were not sufficiently prepared for a large earthquake. Orchiston (2010) recommended the provision of tourism-specific information to operators to improve preparedness. In particular, it was found that "levels of continuity insurance and disaster planning were found to be inadequate and in need of significant improvement in light of the expected outcomes of a future Alpine Fault earthquake on business function" (p. ii). The events surrounding the September 2010 and February 2011 Christchurch earthquakes have illustrated the very real consequences of earthquake disruption on tourism businesses.

Methodology

The focus of this research case study is on the Far North, i.e. within the boundaries of the Far North District Council (FNDC). However, it became clear that a wider perspective (i.e. Northland as a region) has to be taken to appropriately address issues relating to climate and natural disasters. This research comprised three distinct stages for data collection:

1. Initial stakeholder consultation (N= 8)
2. Interviews with tourism operators and stakeholders (N= 10)
3. Interviews with the Civil Defence community and tourism stakeholders (N=12)

The first consultation was undertaken on the 14 and 15 July, 2010. Meetings were held with the Far North District Council, Te Runanga a Iwi o Ngapuhi, Taitokerau Maori & Cultural Tourism Association, and Destination Northland and five tourism operators. The goal of this consultation was to understand the key issues that the tourism sector faces in Northland with respect to climate change. The main emerging issues related to the image of the destination and the impact of weather forecasting, the impacts of flooding, and drought. Sea level rise was not perceived to be a threat.

Ten further interviews with tourism operators and other stakeholders were carried out in November 2010. Operators were selected to represent a broad spectrum of the tourism sector in the Bay of Islands. Interviewees included accommodation operators, boat operators, operators of cultural attractions and historic sites, an air operator, DOC, and the Paihia i-SITE. The focus was on how weather affects tourism operations and what adaptations are put in place to remedy adverse effects or to capitalise on opportunities presented by the weather conditions. Further, these interviews explored the flow of weather and climate information to identify potential issues around the provision of weather information and weather forecasting. Early warning of extreme events was also discussed in these interviews. Tsunami warnings were discussed when interviewees raised them.

Thirdly, twelve interviews were undertaken with representatives from the Civil Defence community², as well as tourism stakeholders³ in March 2011. In these interviews, the focus was on preparedness and response to natural disasters and how the tourism sector integrates with existing initiatives. The extra-tropical cyclone Wilma, as well as recent tsunami warnings, were used as examples to explore current systems and processes.

Most (not all) of the interviews were taped and written up for further analysis. Analysis sought to identify key themes across a wide range of stakeholders and issues. It was not the aim to identify (statistical) trends or to make statements about the whole tourism sector. Further research would be required involving a larger and representative sample of tourism participants.

In addition to the primary data collected through the interviews, the CDEM Plan Northland Regional Council and other public documents relating to crisis management were analysed.

² Northland Regional Council, Far North District Council, Fire Service, District Health Board, New Zealand Transport Agency and Highways North

³ Whangarei District Council, DOC, Hotel operator (2), i-SITEs (2), Destination Northland

Results

The results are presented according to the research objectives. Issues relating to tourism and climate/weather are discussed first, followed by the flow of weather information between providers and users. The analysis of civil defence material and interview data that covered crisis planning and civil defence questions are presented last.

Key concerns relating to climate and weather

Responses by tourism stakeholders indicate that it is not the weather or climate that causes problems, but rather the perception of it. As one interviewee noted, they need better “PR” for Northland regarding the weather and climate; another suggested that media reports of storms and flooding do not contribute positively to the image of the “Winterless North”. Weather forecasts play a key role in attracting the Auckland market in particular to Northland, rather than to other regions. The MetService (and in particular the forecast as presented on the television news) is blamed by many for inaccurate forecasting that puts potential visitors off travelling to the Bay of Islands.

In terms of actual weather problems, heavy rain and wind were mentioned as the most disruptive for tourism. Drought – while problematic for agriculture – was generally seen as a positive condition for tourism, despite the potential need to truck water into resorts (e.g. in Russell). More detail on operators’ responses to specific weather conditions is provided below.

Rain

While rain does not often disrupt water-based activities (e.g. boat trips for sightseeing or fishing) it can significantly affect the customer experience. Also, if it is raining people are less likely to book boat trips. Boat operators also need extended periods of dry weather for boat maintenance (e.g. 7 days of dry weather). Wet weather can be a bonus for some accommodation providers, e.g. visitors might stay away from campgrounds and book motels. Because there are few wet weather activities or options available, during long periods of bad weather (or following a rainy forecast) overall visitor numbers are very low and decrease even further due to negative word of mouth.

Those involved in events and festivals face additional costs when the weather is wet. If there is heavy rain during big events, like Waitangi Day celebrations, traffic plans may have to be changed and organisers need to reinforce the number of covered areas they have and let people know about changes in advance (i.e. contact the media), all of which take time and additional resources. Heavy rain and flooding can also severely damage properties (including historic buildings), and damage the surrounding grounds (many of which have archaeological heritage in their gardens). In wet weather there is more deposition of dirt into buildings by visitors which adds to maintenance costs and can damage property. After heavy rain events it can take a long time to clean up the grounds around attractions like Waitangi as large numbers of visitors can severely churn up the grass and grounds. After flooding events the surrounding beach and sea areas can be muddy and swimming might be prohibited.

Many of the DOC tracks are affected by rain (as a result of their large catchment areas Northland rivers can rise quickly) and tracks may be closed for extended periods after heavy rain events. Often repairs to tracks can take a significant amount of time (e.g. in 2010 some parts of tracks were still closed from the 2007 floods). Some of the delay is because DOC needs to assess what the best

options are for upgrading or moving tracks. Air operators may be contracted to help with emergency and repair work after floods, as was the case after the 2007 floods.

Strong winds

Tourism operators reported that easterly winds are the worst as they often require changes in boat trip itineraries and lead to large swells, which make mooring difficult. The gustiness of the wind is an important factor, as well as the size of the boats being used. Swimming with dolphins generally only goes ahead if the dolphins are located in sheltered waters. The operating threshold is approximately 25 knots of wind, in combination with a strong ocean swell. High waves/swell conditions can also compromise snorkelling conditions as water inside the bay is less clear. Vehicle ferries are not often affected by wind, but the passenger ferries between Paihia and Russell can be affected due to docking difficulties. Strong wind impacts on the management of DOC assets, e.g. helicopters are often used to transport materials to remote areas. Rough seas can also make it difficult to access the islands to service huts, tracks and camping grounds.

High winds can cause tree problems around many historic buildings and is a factor in the spread and control of forest fires. Strong gusty winds, particularly strong easterlies, are a problem for both scenic and scheduled flights. Similarly, strong winds can restrict cruise ship passengers being able to get ashore.

Cyclone events/severe storms

Extra-tropical cyclones typically bring strong winds and heavy rain, causing flooding and landslips. Roads and bridges, both to the north and the south of the Bay of Islands, may be blocked and closed as a result of these severe weather events. Those operators who run trips to Cape Reinga from the Bay of Islands are especially vulnerable to road closures. High tides can exacerbate flooding in some locations. Rain events, in combination with high tides, can cause storm surges which affect low lying properties. Ultimately sea level rise could be an issue. The salt water environment also affects properties on land and can increase maintenance costs.

Cyclones can result in emergency situations, either locally or regionally. These will be discussed further below.

Poor visibility

Scenic flights are also disrupted by poor visibility and low cloud. Low visibility and fog with drizzly rain are problems year round for air operators. Rain coming from the east contributes to this.

Drought

Northland has experienced a number of droughts. In terms of tourism hotspots, the mainland areas of the Bay of Islands are less vulnerable to drought than Russell, although operators reported pressure on water resources across the entire region during dry summers. Drought can cause problems for historic buildings or other older buildings, as they are more susceptible to damage from drying and cracking ground. Drought can increase the risk of forest fires.

Weather information

The types and sources of climate and weather information are different for different types of tourists, most notably domestic and international tourists. Climatic information is more relevant for international tourists who make decisions on a longer time horizon, whereas the weather forecast (e.g. the weekend forecast presented on the Thursday evening news) is critical for short-term domestic visitors. From a destination perspective, poor weather forecasts may result in cancellations and lower visitor volumes. This is particularly problematic ahead of long weekends outside the peak months around Christmas. Operators in the Far North region are very sensitive to weather forecast that are overly 'pessimistic', or that do not take into account local variations. International tourists visit despite day-to-day weather forecasting.

It was also reported that, while photographs of flooding around properties/attractions like the Stone House at Kerikeri (Photo 2) make great media shots, it is exactly these extreme images that people remember. The effect might be a poor image for the destination in terms of weather and disasters. The media is also blamed for making stories about cyclones worse than the reality of the event, i.e. for the Bay of Islands there might be a day of the weather building up, a day of bad weather and a day to dry up; however it is believed that on-going media reports do not portray these rapidly changing conditions adequately and discourage tourists from travelling north.



Photo 2 The risk of flooding at the Stone House in Kerikeri has been reduced through a bypass and removal of a bridge that added to the flooding hazard (S. Becken).

Use of weather information by tourist operators

Tourist operators source their own weather information from a range of suppliers. Public weather websites like MetVUW and MetService are the most popular, with the former generally considered to be more accurate. MetVUW is also considered more useful as it provides a 7-day forecast. MetService's nowcasting, and their measurement of Bay of Island weather data, was thought to

have improved with the relocation of the local weather station (to the local golf course). One boat operator mentioned using Channel 21, the continuous weather report provided by the Northland Coastguard Service⁴. The i-SITE maintains a website (through the FNDC) that displays information provided by an international weather provider called Freemeteo. All of these different weather forecasts are combined with operators' own assessment of the weather. Some pointed out that it is their local knowledge which is crucial to read the weather and also to read the maps produced by MetVUW. Some noted that MetVUW is particularly useful for 'water work' as it gives wind speed and directions.

Maritime Safety requires boat operators to keep a log of weather conditions, including weather forecasts and what the weather actually was. These are not necessarily analysed however. Because the weather can be different morning and afternoon, recording can be challenging. Air operators have to contract to the MetService as part of their legal aviation requirements. The 12-hour forecast and the rain radar are both perceived to be adequate, but without any MetService representation in Northland it is considered that the data, and local conditions, are not well understood. Again, the MetService was perceived to be acceptable for *nowcasting*, but less good at *forecasting*.

Generally, retail and i-SITE staff are kept fully aware of the forecast for the following 3-4 days and they are all familiar with local conditions. The i-SITE staff put the MetService (from the website) weather forecast for the day on their outside noticeboard and they also have WeatherTrek (a dedicated weather television channel) showing on screen inside the i-SITE (Photo 3). Staff avoid warning people unless a major event is expected. The tourist operators also take weather cues off each other. For example, one boat operator puts his boats up the river (where it is more sheltered) when he sees that another operator has taken their boats to Opuia; the air operator also responds to these actions by boat operators.



Photo 3 WeatherTrek screen in the Paihia i-SITE (J. Wilson).

⁴ One boat operator reported paying Ken Ring (the "moon man") for some forecasting services (which they then used to book boat maintenance time).

Tourists' understanding of the weather

There are perceived problems with the ways in which the public reads forecasts, for example if the forecast is for "sun with a bit of rain" people focus on the rain (in contrast farmers would be happy that some rain was forecast). It was noted that it would be useful for tourists to know the timing of rainfall. Rain during the night, for example, would not be relevant whereas day time rain would potentially affect tourists' plans. International tourists understanding of New Zealand weather conditions varies considerably as they tend to visit Northland either at the very beginning, or at the end of their New Zealand trips. The i-SITE manager also thought that domestic tourists probably "understand" the weather forecast differently from international ones.

There is perceived to be a general lack of understanding on the part of tourists about weather and water conditions. For example, a wet but calm day could provide a better experience than a sunny and rough day. Also, the "look" of the water affects tourist bookings as often they will wait to see what it looks like before booking trips. This makes advance planning for tourism operators more difficult and is often made worse by the fact that the water looks worse (rougher) at the shoreline in Paihia, than what the actual conditions are like further out. One operator suggested that the erection of a sea wall around the Paihia foreshore and wharf area (which would reduce onshore swell and block the sea breezes that build during the day) would increase their afternoon trips by 25%. The sea wall – for which plans have been approved – would also help to anchor sand on the beach area closest to town.

Activity operators (particularly water-based ones) are asked about the weather a lot by tourists. They may explain that weather does not matter for some of their activity, or that the weather can change quite quickly. Some tourist operators reported spending their lives telling tourists that the weather is "not as bad as it looks", but they were also "professional enough" to tell people who might suffer from sea-sickness that they might want to re-book or postpone their trips if conditions were marginal. They also find that some tourists are very pedantic about the weather and will not do any activities unless conditions are perfect, i.e. if any rain or cloud is forecast they will delay their activities. Generally, when boat operators decide to go out in marginal conditions they give passengers a fair briefing so that they understand exactly what they are going to get. They also give them a chance – at no cost – to change their bookings where possible.

Disaster preparedness

Context – the Northland CDEM Plan

The Northland Regional Council released its 5-year CDEM plan in March 2010 (Northland Regional Council, 2010b). The mission of the plan is “Working together to create resilient communities in Northland”, and four goals are specified.

- Goal 1. Increasing community awareness, understanding, preparedness and participation in CDEM;** through public education initiatives and community-led CDEM planning.
- Goal 2. Reducing the risks from hazards in Northland;** by improving the Group’s understanding of hazards and by developing and monitoring a Group-wide risk reduction programme which demonstrates how individual agency initiatives contribute to overall regional risk reduction.
- Goal 3. Enhancing capability to manage civil defence emergencies;** through increasing the number and capability of CDEM staff and by having effective plans, systems and procedures in place to respond to emergencies.
- Goal 4. Enhancing capability to recover from civil defence emergencies;** through a continued focus on Recovery Plans, Professional Development and Exercises.

The CDEM plan first provides the context for hazards and risks in Northland. A multi-criteria hazard analysis has identified the priority hazards (a combination of likelihood and consequence). The most important hazards are: localised heavy rain and flooding, a local tsunami, severe widespread storm, electricity failure, human pandemic, fuel supply disruption, and a regional tsunami. All of these are relevant for tourism. The plan also specifically identifies compounding issues, such as the remoteness of many places/communities and the large number of holiday homes (baches). Tourism is not specifically mentioned. This is not unusual for CDEM plans in New Zealand, with only few exceptions (e.g. for Queenstown).

The plan provides details on Risk Reduction, Readiness, Response and Recovery. Two relevant initiatives for Reduction are “Identifying High Priority Catchments” and “Tsunami Modelling”. The former has identified 27 high priority flood risk catchments and potentially affected roads, businesses and properties. Of particular interest for tourism is the Waitangi catchment with the high-risk areas around the Haruru Falls (Photo 3). The flooding models also include climate change as an exacerbating factor for future flooding occurrences (Northland Regional Council, 2010c). The tsunami maps have been completed for 20 coastal settlements. These and further tsunami mapping will be of high interest to the tourism sector. DOC, for example, indicated that they will look at the tsunami maps and, in partnership with its GIS experts, compare sites and hazard lines.



Photo 4 Haruru Falls Resort, picnic area and campground (S. Becken).

Readiness initiatives outlined in the CDEM plan relate to community awareness and preparedness. The Community Response Plans, initiated by local councils, are a key measure to achieve this. Over 40 such plans⁵ have been put in place across Northland (14 in the FNDC), some of which include 'tourism communities' (e.g. Russell). Other major resort communities (such as Paihia for example), however, have no plan as yet. Efforts are under way to establish further plans. It is critical to incorporate tourism into these 'grassroots' plans. Warning systems are another integral part of readiness. Tsunami warnings, for example, are issued through the Ministry of Civil Defence and Emergency Management in Wellington, based on information from the Pacific Tsunami Warning Centre. The warning is then passed through a regional and local system via telephone, text and email. Weather warnings are initiated by the MetService.

Emergency Response starts at a local level and will be escalated to higher levels if necessary. Different kinds of emergencies require different activation levels (e.g. partial or full) with implications for staffing and involvement of various groups. Communicating between groups during an emergency is key, and if compromised can result in a wide range of negative outcomes. The Northland CDEM plan specifies which agency is authorised to do what. The police, for example, are authorised to close roads.

Recovery after an event relates to immediate, medium and long-term regeneration of communities and businesses. Collaboration of stakeholders is required for an effective recovery. It took over three years to recover from the 2007 floods. Different recovery task forces (social, built, economic, natural environments) coordinate activities and a hierarchical structure of recovery managers is in place (local, regional, national).

⁵ Plans could include small communities, such as Teal Bay (about 80 houses of which 9 are permanently occupied), or larger ones such as Hokianga or Russell.

A large number of groups and organisations are involved in the Northland CDEM plan (Figure 4). The governance group is the Northland CDEM Group with representatives from the three councils, police and fire. Much of the 'hands-on' work happens at the level of the Coordinating Executive Group (CEG), which includes a wider range of interest groups, amongst others the District Health Board and DOC. In addition, groups such as scientists and the Welfare Advisory Group, provide input and become part of the plan when necessary. Tourism could become involved as a group at this level or it may also be represented in the CEG. At present, tourism is not formally involved in CDEM.

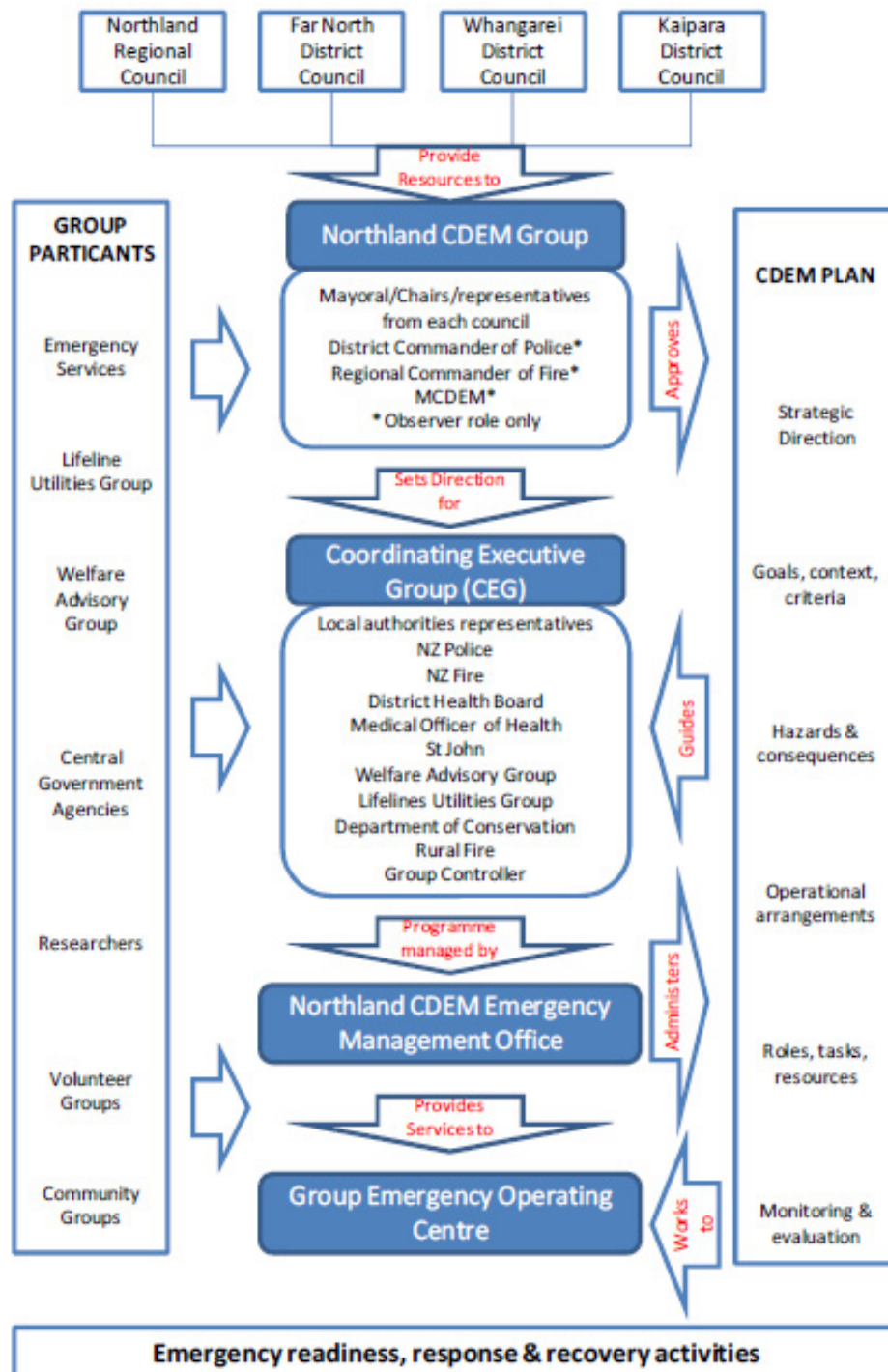


Figure 4 Management and governance structure of the Northland CDEM (NRC, 2010b).

Reduction and Readiness in the tourism sector

The interviews did not focus on reduction initiatives; however, it became clear that some aspects of tourism would benefit from systematic inclusion in risk reduction measures. In particular, this concerns those businesses that are located in areas prone to hazard, in particular flooding, storm surge (i.e. shoreline) and tsunamis. It was also repeatedly pointed out that there are inherent risks associated with tourists travelling around without connection to any networks (e.g. through their accommodation). In particular, freedom campers have been identified as a very vulnerable group of tourists, especially when they are camping near rivers or beaches. Specific warning and communication systems might have to be implemented for these groups.

It is believed that awareness about natural disasters is generally high amongst tourism businesses, especially since the Boxing Day tsunami in 2004, the Northland floods in 2007 and several tsunami warnings in the last 2 years (Chile, Samoa and most recently Japan). While awareness may be high, this does not necessarily lead to higher preparedness and a few interviewees noted that many tourism businesses might be underprepared to deal with natural hazards. Awareness of the role of tourism in natural disasters was implicit (rather than explicit) amongst stakeholders dealing with civil defence issues with the exception of the District Health Board that had great concerns about tourists' health and safety issues, especially in relation to the Rugby World Cup and special events. Also, DOC, who considers themselves as an important player in tourism, have local CDEM plans for their area offices and are conscious of tourists as a vulnerable group (e.g. Bay of Islands: DOC, 2007).

The interviews did reveal that some operators are very well prepared, mainly as a result of previous experience. Preparations made before a storm/flooding event, include the clearing of gutters to improve drainage, the evacuation of guests from low-lying areas, preparation of rooms (e.g. take mattresses out) and garden areas (secure furniture etc.). A number of tourism operators also reported that they need to be prepared with water, candles, and battery radios, in response to both emergency situations and power cuts (which are common in the area). One operator made specific investments to reduce the damage from future floods, for example special tiling in bathrooms and beds with metal posts that are not prone to water damage.

A major component of readiness is warning systems. There are no formal arrangements for the tourism sector at present, but tourism is linked into existing warning systems on a case-by-case basis. The current system of warnings is ad hoc and not systematic and a number of inconsistencies were uncovered in the interviews. Tourism is not well integrated with the CDEM system, and based on past events there appeared to have been gaps within the CDEM system itself. For example, it was reported that the local and regional councils' 0800 numbers did not provide clear information ahead of an event. For tourism to be included in warning networks it would be important to have a) one clear contact for tourism and b) a tourism internal network that passes on the information.

Currently, the Paihia i-SITE manager receives a phone call from the FNDC civil defence controller in the case of an impending event. She then passes the message/warning on to other key tourism stakeholders. In other events (e.g. the Samoa tsunami), the FNDC contacted the duty motel with the request to warn other accommodation providers. Some tourism operators receive warnings directly from the MetService. One hotel operator reported receiving a tsunami warning from their chain's head office in the South Island. In the case of weather warnings, which give a longer time frame to respond than tsunami warnings, the i-SITEs have also provided the information to tourists, for

example through whiteboards. DOC mentioned that they are unable to inform people of the likely conditions on a case-by-case basis, but they do have some generic weather and river information on their pamphlets. Because camp bookings are done on-line they are unable to contact people personally. They do warn people booking huts if there is really bad weather forecast and then leave them to make up their own minds. If people are caught by bad weather they can always stay an extra night in huts. DOC will warn people and advise them to leave, but they have never ordered people to leave an area.

The case study of extra-tropical cyclone Wilma on the 28th of February 2011 (Figure 4, see Appendix B for more detail) highlights the difficulty in making decisions about early warnings. In this case a storm on the weekend before Wilma had not materialised to the degree it was forecast, which may have led to a tendency to underestimate the effect of Wilma. Also, the MetService underestimated the amount of rainfall (by about half) and, accordingly, warnings were potentially not issued with the urgency that was required. The difficult balance between warning communities and businesses and creating false alarms is amplified in the tourism sector that greatly depends on 'positive' outlooks and messages for visitors to travel to the area. This is particularly delicate for holiday weekends, as was the case for the weekend of Wilma (Auckland Anniversary Day).

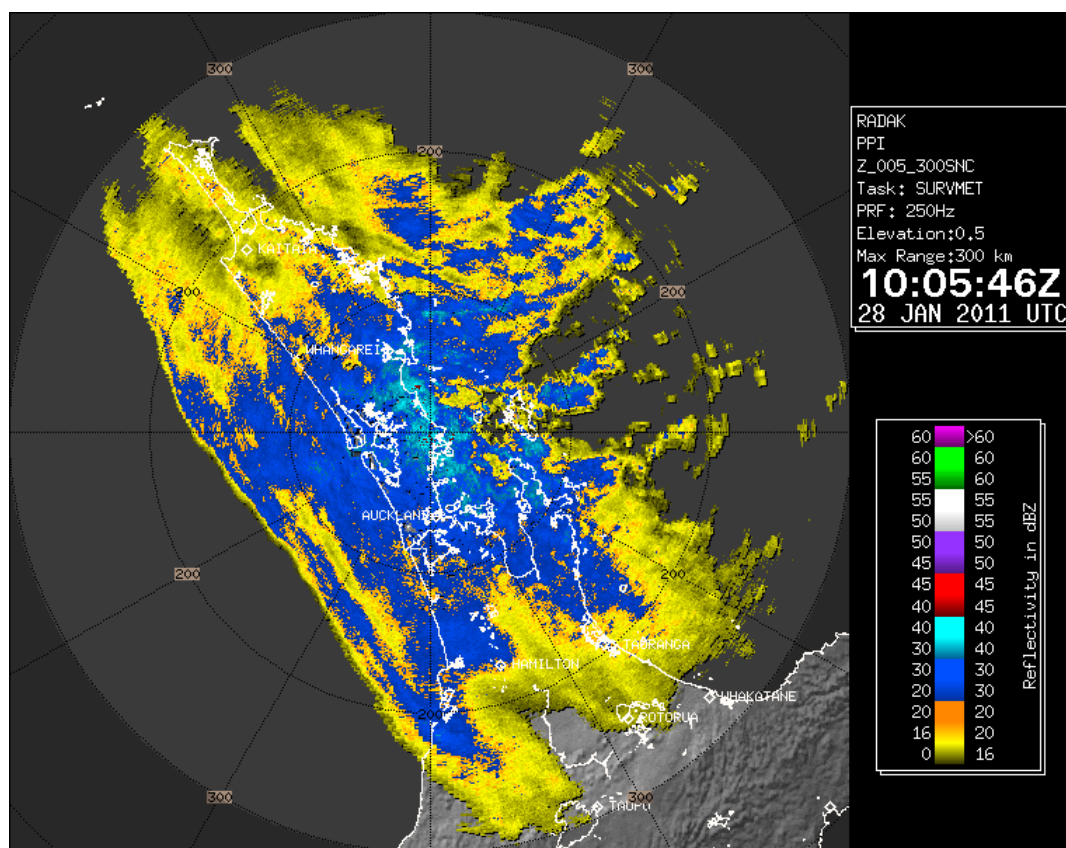


Photo 5 Wilma (Radar image provided by the MetService).

Response for and by tourism

A number of aspects relating to disaster response were discussed in the interviews. These related to:

- Evacuating tourists
- Rescues
- Communication during the event
- Road conditions

To date, there has not been a natural disaster large enough to enforce a mass evacuation of communities, including tourists. However, past events (most notably the Samoa tsunami) led some operators in Northland to evacuate parts of their premises to ensure tourist safety. It was reported that the messages from the top (e.g. councils) regarding evacuation were unclear and inconsistent and tourist operators had to make the decision on their own accord. One motel operator stated that it is very difficult to decide on how to respond to warnings, especially when they occur during the night and one has to wake guests up. In the past, this led to the situation where some businesses evacuated and others did not, with potential negative repercussions on how tourists perceived the situation was handled at a destination level. The i-SITE had issued warnings to tourists for the Japan tsunami. Some tourists were still seen swimming in the water that particular morning. There had been no specific responses to ensure that those tourists who were not at commercial accommodation were warned. There are no sirens for tsunamis, although the NRC is installing about 60 in the Whangarei area. The use of sirens (for tsunami or even fire⁶) is not consistent across the region with potential for confusion amongst tourists, especially international ones.

While the FNDC civil defence controller noted that there are designated areas for evacuation in the case of a tsunami, tourism stakeholders were not necessarily aware of those (apart from “just going uphill”). The implementation of Community Response Plans, for example in Paihia, might rectify this gap, if tourism is sufficiently included. It was also mentioned that there might be a need for training on how to effectively evacuate tourists. Also, more information on tourists might need to be collected at check-in to have a better understanding of who is where in the case of an emergency (e.g. including passport numbers). This may be inconvenient for tourism businesses, but potentially necessary from a civil defence point of view.

Rescues are an important part of responding to an event. Rescues are typically done by the fire service and police. There is no distinction as such between tourists and non-tourists; however many of the people requiring rescue from their vehicles are non-locals. If an event happens during holiday time or a weekend the numbers travelling and potentially at risk are larger because of tourists in the area. Visitors may also be less familiar with the local conditions and therefore more at risk. Very few tourism stakeholders realise that the fire service is voluntary (everything north of Whangarei, except the DOC rural fire service) and there are high expectations that cannot be met due to severe resource constraints. There are a number of resource constraints – e.g. staff, financial and equipment – on many public and voluntary agencies in predominantly rural regions (with a low populations and a low rate-payer base) such as Northland. DOC can also be involved at this level, amongst others because they have the resources to respond to emergencies, including staff, 4WD vehicles and a (solar-battery) radio network.

⁶ For example, the fire sirens in Kerikeri (which alert the voluntary fire brigade) are not used between 11pm and 7am in consideration of tourists and residents.

While the Northland CDEM provides a framework for communication during an event it appears that this system does not always work in practice. Confounding issues relate to under-staffing, other resource constraints, human error, outdated contact details, absences of key people (especially during a holiday weekend), and adverse conditions brought on by the event itself. For example, during Wilma extensive road flooding and landslides made surveying impossible and critical information was not collected until later in the event. The interviews with tourism representatives highlighted a number of issues related to communication:

- Designated phone numbers at councils did not provide information or were not available;
- Websites did not contain information (e.g. on road closures) or key contacts were not updated;
- 111 calls remained unanswered (or delayed);
- Messages were ambiguous.

The main issue that was discussed by tourism stakeholders related to the condition of the roads. There were two dimensions. One relates to finding out about which roads are closed and for how long. The other one is about how to get this information to tourists. While tourism operators and i-SITE staff check the websites of councils (local and regional) as well as the Automobile Association (AA) website, it was believed that tourists would more likely rely on the AA. This is largely appropriate as the AA covers State Highways which are the main roads tourists travel on. In terms of local information, tourists would have to listen to the radio (and know which station to tune in), enquire at an i-SITE or ask locals. The i-SITE have found that many tourists come specifically to them to find out what was happening with regard to road closures, most probably because they are known as (and expected to be) a public provider of information. This causes a problem in cases where even the i-SITE staff do not have access to the latest information. At this point, i-SITE does not put transport information on their website. It was mentioned that for tourists travelling during the Rugby World Cup, there might be a direct AA link to the RWC website. Some accommodation providers print AA pages for tourists. They also warn bus drivers that they work with (e.g. for tour groups) about road conditions.

The transport stakeholders reported that eight large electronic signs have now been installed in strategic places between Auckland and the Far North. These were used during Wilma to warn tourists about road closures. However, a tourism operator who was travelling at the time reported confusion amongst motorists and angry travellers stopped in Kawakawa because the text on the signs was not sufficiently clear. There may be potential to improve the messaging to maximise the communication impact of these road signs. Better information (and potentially) training of police in charge of stopping travellers might also reduce frustrations amongst visitors in the future.

It was also mentioned that popular tourist maps (e.g. Jason's Northland map) do not adequately reflect the nature of roads, for example major versus minor roads, as they portray tourism values such as scenicness. The highlighting of the Twin Coast Discovery Highway leads tourists to believe that the recommended roads are all major roads in good conditions, when this is not necessarily the case. Better maps for tourists with information on potential flooding spots and other hazards could reduce overall risks.

Recovery

The recovery of tourism businesses, or the destination as a whole, after an event or natural disaster was not the focus of the interviews, but a few important points emerged. First, even localised events or those that result in casualties can have severe repercussions for the destination and its image. Communication and media liaison need to be carefully managed to this effect. The NRC has its own media team and they tend to ‘bundle’ information from various groups (e.g. police) when they interact with media. There is a potential for tourism to link in with those services and networks. However, it was also noted that some media requests are specifically directed at tourism (specifically the CEO of Destination Northland) and this can sometimes happen during or straight after an event. In addition, longer term recovery marketing strategies might be necessary. The Christchurch earthquake will provide valuable lessons in this respect.

Another specific concern in Northland was the contamination of waters and shellfish and the need to warn people (for 28 days after an event) of the health impacts. Tourists are less likely to hear and understand these warnings.

The issue of insurance was mentioned in one case, where a property was no longer able to secure insurance against flooding. It is unknown to what extent this is a wider problem in the tourism sector or not. Insurance is an important element of business continuation after an event and it may be worthwhile to find out more about insurance policies and constraints (e.g. in the case of a tsunami). Some interviewees noted that it is unlikely that many businesses have a formalised business continuation plan.

The Bay of Islands CDEM plan prepared by DOC (2007) suggests that the key activities for recovery would be:

- The assessment of the needs of staff affected by the emergency
- The co-ordination of resources and implementation of actions directed at achieving rehabilitation and restoration
- The introduction of new measures to reduce hazards and risks.

These could be used as a starting point for a similar plan developed for tourism, with the specific inclusion of “tourism staff and tourists” in the first bullet point.

Conclusion

The focus of this research was the relationships between climate, weather and tourism, with a particular focus on what kinds of climatic conditions might cause problems for tourism (now or in the future), how tourism stakeholders and tourists use weather information, and how tourism is dealing with extreme weather events that might lead to a situation of crisis.

It was found that the Northland climate is generally very benign, making the region a popular summer tourist destination, especially for domestic tourists. The largest market, by far, is Auckland. Tourists are attracted by water-based activities, but also enjoy recreational opportunities such as walking and cultural attractions. While the research identified that little “adaptation” to weather variability as such is required, greater challenges were uncovered in the area of communication, destination image and weather information. It was generally believed that Northland is portrayed as ‘too wet’ and that false or generalized weather forecasts cause significant damage to Northland’s tourism business. Many interviews indicated that the perceived issues lie with both weather forecast providers and the media in a more general sense (for an elaboration see Wilson & Becken, 2011). International tourists were not seen to be affected by forecasts as they would make decisions on longer time frames. More detailed research would need to confirm whether concerns about Northland’s image in relation to weather are justified or not. Such research could also investigate opportunities for domestic tourism beyond the Auckland market.

The most adverse conditions are heavy rain and north-easterly winds. These may lead to the cancellation of boat trips and other water-based activities. With few ‘weather-proof’ indoor attractions (except, most notably, the Waitangi Treaty grounds), there is a risk of reduced tourist volumes and negative word of mouth of those returning home. The greatest impact on tourism, however, is due to extreme events that may cause wide-spread flooding, road closures, and loss of power. Extreme events in the past, such as the 2007 floods and extra-tropical cyclone Wilma in January 2011, caused severe disruptions to business (e.g. through cancellations), damage to property (e.g. from flooding and fallen trees), frustrations amongst tourists and businesses (e.g. due to poor road conditions and lack of information), and the potential for reinforcing a negative image of the destination.

Detailed interviews on how Northland as a region deals with emergencies resulting from extreme weather events (and also other natural events such as tsunamis) revealed that a well thought-through emergency management system is in place. However, it became also apparent that the civil defence and emergency management system faces a few challenges, such as lack of resources and the risk of misjudging an upcoming event. Tourism is currently not explicitly linked to the civil defence system and there are no warning systems or networks for tourism operators to be informed about an upcoming hazard. The vulnerability of freedom campers was also raised numerous times. While it was believed that people involved in tourism are generally aware of natural disasters, they may not have the training or plans in place to deal with them effectively.

In response to a range of gaps identified in this research a detailed crisis management plan will be developed for the Northland tourism sector. This plan will be drafted with input from tourism stakeholders and those involved in civil defence and emergency management to ensure complementarity and compatibility.

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Appendix A – Weather events

Weather events reported in the media for Northland (after Becken & Wilson, 2010)

Year	Newspaper	Event	Impacts on tourism
1989 (Jan 20):	<i>New Zealand Herald</i>	Cyclones Eseta and Delilah	Effects of on the Bay of Islands holiday season. Mentions Fullers Corporation.
1997 (Jan 13):	<i>The Daily News:</i>	Cyclone Drena	Forecast of Drena frustrated northern tourist operators; anger after warnings of a second cyclone within a fortnight appeared an over-estimation
1999 (April 25):	<i>Radio New Zealand Newswire</i>	La Nina weather	Drop in visitor numbers. Destination Northland said these weather conditions hurt a region popular for outdoor pursuits, also widespread predications of cyclones took their toll on visitor numbers
2002 (Feb 4):	<i>The Northern Advocate</i>	Temperature measurements	Whangarei – want measurement site moved
2005 (Feb 16):	<i>MetService Press Release</i>	New weather station at Waitangi	Combined efforts of Destination Northland, tourism operators and local business associations – hope to give visitors a better idea of weather, more domestic visitors will help Northland to extend its tourism. Destination Northland designated as new owner of weather station
2007 (Jan 10):	<i>New Zealand Herald</i>	El Nino	Lower than normal surface sea temperatures – around Upper North Island between 1C and -2C cooler, open fire ban around Mangonui, water shortages
2007 (Feb 2):	<i>Radio New Zealand Newswire</i>	“Weather bomb”	Stranded tourists at Waitaki Landing, near Cape Reinga. Power cuts caused by lightning strikes, roads closed, bridge washed out at Te Rangi station, Waitaki Landing bridge under water with high tide.
2007 (Mar 30):	<i>The Dominion Post</i>	Heavy rain in Northland	Haruru Falls Resort flooded (and landslide, guests evacuated), motorists stranded, Whangarei’s business district evacuated, power cuts in region, Kerikeri Mission Station and Stone Store endangered (staff protected artefacts, archives and other treasures and tried protecting the buildings with sandbags)
2007 (Mar 31):	<i>The Dominion Post</i>	Fierce storm	Bay of Islands a health menace, swimming and shellfish gathering off-limits as tonnes of sewage swept into sea, access roads damaged, camping ground was swept away when Waitangi River burst its banks
2008 (Oct 30):	<i>New Zealand Herald</i>	Weather forecast	Caused thousands of holidaymakers to cancel Labour weekend breaks– motels, hotels, pubs, restaurants and tourism ventures all missed out on long-weekend trade, Doubtless Bay Information Centre in Mangonui confirmed that a large number of people had cancelled Labour weekend accommodation (town had been pressing TV3 for inclusion on nightly weather reports)
2008 (Nov 27):	<i>New Zealand Herald</i>	High winds	Cape Reinga signpost destroyed
2010 (Jan 6):	<i>The Northern Advocate</i>	Summer / drought	Perfect summer weather contributing to unexpected bonanza for regions’ tourism operators: Lot of last minute bookings

Appendix B – Case study Wilma

Following intensive rain on the weekend of the 22 of January, the ex-tropical cyclone Wilma caused heavy rain in Northland and resulted in widespread flooding (see Appendix for precipitation data) on the 28/29 of January. The following table summarises some of the activities that could be observed through media releases.

Selected media releases in relation to Wilma (January 2011)

Date/time	Organisation	Information
Tue 25 Jan, 13.54	MetService	Severe Weather Outlook: rain expected to spread over Northland, Auckland Coromandel etc Friday night
Wed 26 Jan, 13.17	NZ Herald	“Cyclone Wilma to hit Northland by weekend” based on interpretation by Philip Duncan from WeatherWatch
Wed 26 Jan, 13.18	TV3 www	“Cyclone Wilma set to hit Northland” (as above)
Wed 26 Jan	Northland Regional Council	MetService severe weather watch posted on website
Thu 27 Jan, 10.23	MetService	Severe Weather Watch – widespread rain over Northern half of the North island late Friday and Saturday morning
Thu 27 Jan	Northland Regional Council	More heavy rain, strong winds predicted
Sat 29 Jan, 5.20	Northland Regional Council	Update 1 – Flooding, detailed rain fall data
Sat 29 Jan, 6.00	Far North District Council	Update 1 – Emergency media release – Far North Flood
Sat 29 Jan, 9.30	Northland Regional Council	Update 2 - Rivers dropping, clean-up begins
Sat 29 Jan, 11.00	Far North District Council	Update 2 – water supplies a major concern, conserve water, power cut, road closures (no further detail)
Sat 29 Jan, 13.00	Far North District Council	Update 3 – damage assessment
Sat 29 Jan, 15.00	Far North District Council	Update 4 – Detail on road closures
Sat 29 Jan, 17.00	Northland District Health Board	Public Health advice for northland district councils (no swimming etc.)
Sun 30 Jan, 14.30	Far North District Council	Update 5 – Detail on road closures
Sun 30 Jan, 15.30	Far North District Council	Update 6 – flood waters receding
Mon 31 Jan	TVNZ	Welfare centre set up for Far North flood victims
Mon 31 Jan	NZ Herald	Holidaymakers escape Wilma's fury
Tue 1 Feb	Far North District Council	Flood costs begin to emerge - \$5 million in repairs, all but two roads in the Far North were open to traffic
Thu 3 Feb	News Talk	60 homes seriously damaged after Wilma

Appendix – Rainfall figures for 28 & 29 January 2011

Location	1 to 22 mid Jan 2011	22 midn to 24 at 0700 Jan 2011 (55 hrs)	C Wilma 28 Jan 08.00am to 29 Jan 0300 (19 hrs)	Jan 2011 Total	Jan Average mm	% of Jan Average
	mm	mm		mm		
Cape Rienga	13.6	100.8	93	207.4	67.2	309
Kaitaia	18.1	121.8	123.5	263.4	91	289
Oruru	11.5	116.5	190	318	85	374
North West Mangamuka (Te Rore)	14	105	115.5	234.5	108	217
North East Mangamuka (Mangakawakawa)	18	134.5	139	291.5	110	265
North Hokianga (Rotokakahi)	38.5	144.5	117.5	300.5	120	250
East Kaeo Hills (Touwai)	60.5	138.5	279.5	478.5	145	330
South Kaeo (Western Hills)	30.5	118	219.5	368	133	277
Purerua (NE Kerikeri)	24.8	165.4	260.4	450.6	124.7	361
West Kerikeri	31.5	150	220.5	402	123	327
North Kawakawa (Oromahoe)	43	154	276	473	99	478
Ohaeawai	15.5	132.5	223	371	102	364
Kaikohe	22.4	132.8	210.2	365.4	112	326
Omapere	11.5	153	84.5	249	78	319
Tutamoe	25.5	180	123.5	329	107	307
Dargaville	7.2	103.2	99.4	209.8	85	247
East Tutamoe (Opouteke)	17	149	166	332	119	279
South Kaikohe (Twin Bridges)	11.5	124.5		136	103	132
Opua Wharf	27.5	139	237	403.5	99	408
Oakura Bay	45.5	240.5	227	513	106	484
Puhipuhi	53	187.5	276.5	517	126	410
Motatau	36.5	140	216.5	393	104	378
Hikurangi Swamp	27.5	130.5	198	356	86	414
Glenbervie (East Whangarei)	57.5	157	255.5	470	109	431
Ngunguru Northern Hills	73.5	173	249	495.5	118	420
Whangarei	41.8	139	239.4	420.2	107	393
Maungatapere	8	100.5	163	271.5	99	274
Marsden Point	14	54	229.5	297.5	94	316
Whangarei Heads	9.7	147	274.2	430.9	100	431
West Ruakaka	27	113.5	253	393.5	100	394
Brynderwyn	21.5	91	189	301.5	87	347
Maungaturoto	18.5	107	193.5	319	98	326
Paparoa	10.5	126	152.5	289	90	321
Mangawhai (Tara)	26.5	116	246.5	389	91	427
Awaroa (Ruawai)	4.5	95.5	92.5	192.5	68	283
Pouto Point	6.5	59.5	54.5	120.5	86	140