NIWA Taihoro Nukurangi

Update

NIWA Natural Hazards

setting the foundation for a safer future

And the winner is ...

If there were a competition for 'Natural Hazard of the Year', the winner for 2004 would be indisputable: flooding.

In this issue of *NIWA Natural Hazards Update* we fill you in on some of NIWA's work behind the scenes to help regional councils, insurance companies, and others better prepare for and respond to flooding.

After the deluge

The storm of 14–17 February produced widespread flooding and extensive infrastructure damage in the lower North Island. Estimating the likelihood that such an event will happen again is an important part of determining how to respond. So, how rare was the February storm?

Horizons Regional Council, which covers most of the affected areas, commissioned NIWA to produce maps of the average recurrence interval of the maximum amounts of rain which fell in a 12-hour, 24-hour, and 48-hour period during the storm. The maps show that, over large parts of the region, the heaviest rainfalls during the storm have recurrence intervals of more than 150 years. It was indeed an extraordinary event.

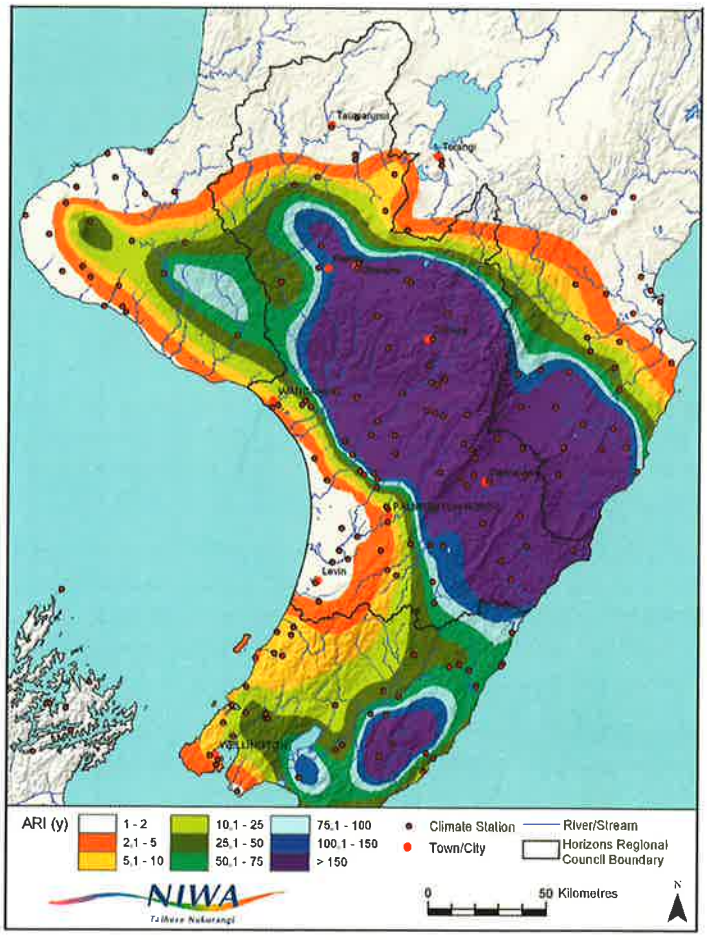
We use HIRDS (High Intensity Rainfall Design System) software, developed by NIWA, to estimate the average recurrence intervals (or return periods). HIRDS can estimate the frequency, depth, and duration of rainfall at any point in the country. It can help city and district council planners and engineers to determine the intensity of downpours with which stormwater drainage systems and other structures should be designed to cope.

Preparing for the future

NIWA has nearly completed a wide-ranging study for Horizons Regional Council, scoping the risks posed by the full list of weather-related hazards, from lightning strikes, hailstorms, and fog, to drought, wildfires, and coastal erosion.

We are preparing maps and figures showing overall patterns, trends, and the extremes of these hazards. We are analysing past events, looking at the meteorological factors which led up to them and the resulting damage. We are defining the risks associated with these hazards – their size, their likelihood, their consequences.

The regional council is also looking further into the future and has asked us to assess how these hazards might alter with climate change. It is especially interested in the potential impacts of climate change on climatic processes such as rainfall, temperature, and wind; the frequency and severity of extreme weather; and sea level rise and coastal processes such as erosion, storm surge, and extreme tides.



Average Recurrence Interval (years) of the maximum rainfall in a 24-hour period for the February 2004 storm.

Europeans use NIWA expertise

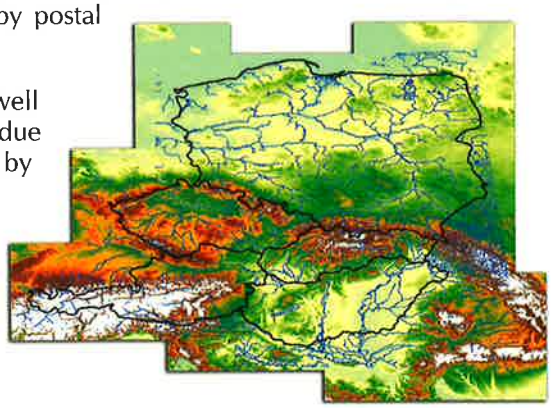
Work by NIWA scientists in New Zealand will be used to assess flood risks in five Eastern European countries.

HydroGIS is a UK company specialising in hydrology, flooding, and geographical information systems (GIS). It has subcontracted NIWA to develop a GIS-based flood risk model for Austria, Czech Republic, Hungary, Slovakia, and Poland.

The model will be used by large insurance and re-insurance companies which want to estimate the flood risk posed by extreme weather conditions, and assess their potential financial cost, as part of setting insurance premiums.

NIWA's complex computer modelling for this job uses topography data from NASA space shuttle flights. The model will generate inundation maps for flooding scenarios based on historical events. It will be sufficiently detailed to produce information on the flooding risk and cost of damage for areas defined by postal zones.

The project is well underway and due for completion by June 2005.



Saving Ashburton's lifelines

It's not possible to stop natural hazards occurring, but steps can be taken to reduce their impact. Acting now can save lives, reduce damage and disruption, and lead to faster recovery when disaster strikes.

One aspect of this is to minimise the impact of natural hazards on engineering lifelines and emergency services. The lifelines include water supply, sewerage, drainage, telecommunications, electricity supply and distribution, broadcasting, transport, and building services.

Environment Canterbury has commissioned NIWA to assess the weather-related hazards and their possible impacts on engineering lifelines in the Ashburton district.

We'll be conducting a detailed review of extreme weather which the region has experienced in the past, and generating realistic scenarios for extreme wind, snowstorms, and heavy rain which could hit the district in future.

As part of this project, we will produce a series of maps of wind speeds, snowfalls, high intensity rainfall, and lightning strikes. The maps will be used by engineering lifeline owners and operators to assess the vulnerability of their infrastructure, such as where wind and lightning might damage communication towers, or where snow could block roads or cause aerial power cables to break.

Flood forecasting system installed

In November 1999, several major river catchments in Southland flooded. This event highlighted shortcomings in the flood forecasting procedures used at the time, including large uncertainties in the predicted peak discharges, and short lead times.

The regional council, Environment Southland, engaged NIWA to review the flow forecasting procedures for the Mataura and Oreti Rivers, and as a result embarked on a 5-year programme to upgrade the flood forecasting system.

NIWA has just installed a new computer-based flood forecasting system at Environment Southland's Invercargill office. The system is based on software we developed, called FLOWROUTE.

Currently, the system is operating for the Mataura River at Gore and gives up to 16 hours warning of a flood. Environment Southland has now contracted us to apply FLOWROUTE to the Oreti River as well.

FLOWROUTE includes an easy-to-use graphical user interface, with classic Windows-style drop-down menus. It seamlessly connects to telemetered river flow data. The system can be scheduled to run with the most up-to-date flow data for several catchments automatically.

NIWA has provided software training to Environment Southland staff as part of the contract. We are currently working on extending the forecasting system to incorporate state-of-the-art models which link weather forecasting systems to rainfall-runoff models, thereby increasing the forecast time to several days.

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