

# Climate forecasting as a support tool for farm management.

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## Abstract

Climate variability has a significant impact on climate sensitive industries in New Zealand, including farming. Droughts, floods, and other extreme or unseasonable weather events all have an impact on primary production, and ultimately, profitability. NIWA has recently established the National Climate Centre to improve the flow of climate information to climate sensitive industries, including the farmer. The Centre's goal is to help New Zealanders manage for climate variations, by providing accessible, easy to understand, climate information. This paper will provide details about some of the basic NIWA National Climate Centre climate information that is available, and how to access it.

**Keywords:** climate, El Niño, forecasting, La Niña, risk management, weather

## Introduction

On 21 April 1998, the Ministry of Agriculture and Forestry estimated the likely farm gate cost of the 1997/98 El Niño event at \$256 million (Basher 1998). Downstream valued-added agricultural production, whose value is about three times the on-farm returns, would also have been affected. However, farm managers can use climate data, seasonal climate predictions (including El Niño/La Niña assessments), or specialised climate advice, to reduce their exposure to major negative climate impacts, such as drought, severe facial eczema, flooding and pugging, etc. For example, there is evidence that affected farmers managed the 1997/98 El Niño event better than previous events (e.g., by de-stocking early) due to a better understanding of El Niño impacts, and improved scientific prediction of the event (Basher 1998).

Climate data and up-to-date climate projections can be used as part of the decision making process, in conjunction with other data and advice, to form better risk management strategies, or to actively benefit from climate conducive to good farming returns.

Climate shift or climate change information is also valuable when considering the questions “will my agri-

business still be profitable in the future?” or “will alternative crops, stock or management be more appropriate in the future?”.

## The NIWA National Climate Centre

The recently established NIWA National Climate Centre for Monitoring and Prediction was set up in order to improve the flow of climate information to the public, and to climate-sensitive user groups such as farmers. The Centre provides free, accessible, and easy-to-understand climate information, via the NIWA National Climate Centre web page located at [www.niwa.cri.nz/ncc](http://www.niwa.cri.nz/ncc).

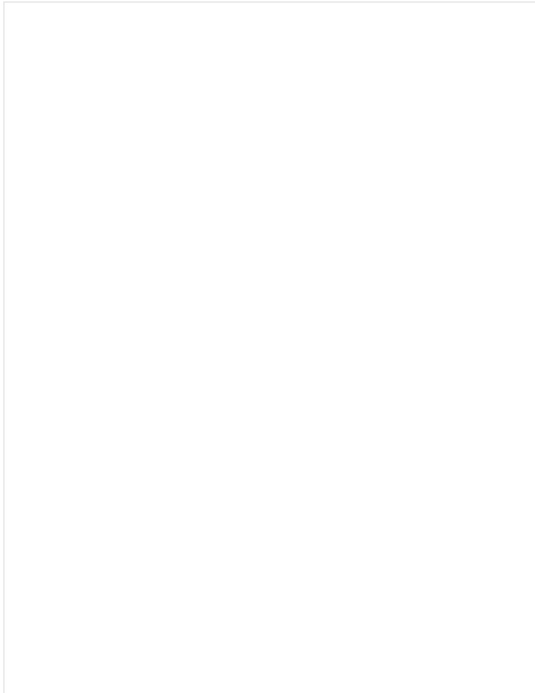
The primary source of this information will be the monthly publication *The Climate Update*, available on the Centre's web page, and through public libraries. A secondary (but equally important) source of climate information are the national Tours, provided by National Climate Centre staff around the regions. The Tours provide an opportunity for local communities to hear the Centre's experts speak, and a chance to discuss important climate issues affecting your region. The Tours also provide essential feedback to the National Climate Centre staff. More information about scheduled Tours can be found on the Centre's web site.

## The Climate Update – climate data and climate projections

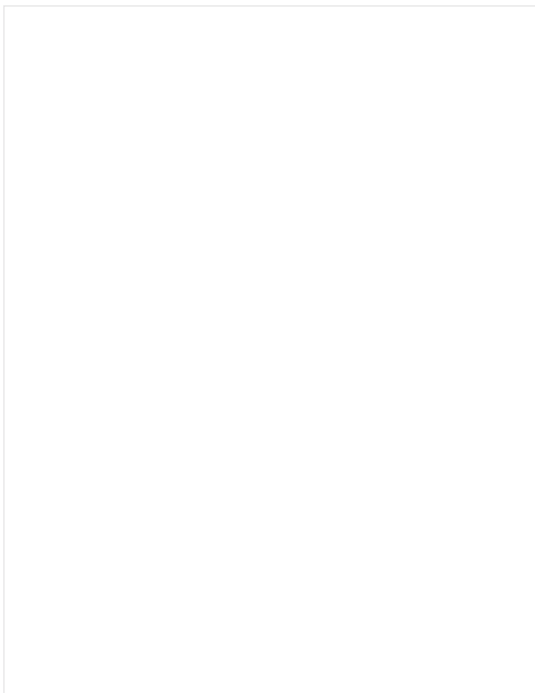
The *Climate Update* contains graphical information about the current state of New Zealand's climate, including air temperature, rainfall, stream flow and soil moisture data. The current climate 'status' can give the farmer quantitative information about their area's recent climate, usually with a comparison to 'normal', or to the previous year. Examples of rainfall, air temperature and river flow maps typically used in *The Climate Update* are shown on the following page.

The *Climate Update* also contains rainfall and temperature predictions for six broad regions around New Zealand, for a 3 month period. These projections are based on the water temperature and circulation patterns in the oceans around New Zealand, the state of any existing El Niño or La Niña conditions, typical climate expectations for the time of year, and computer

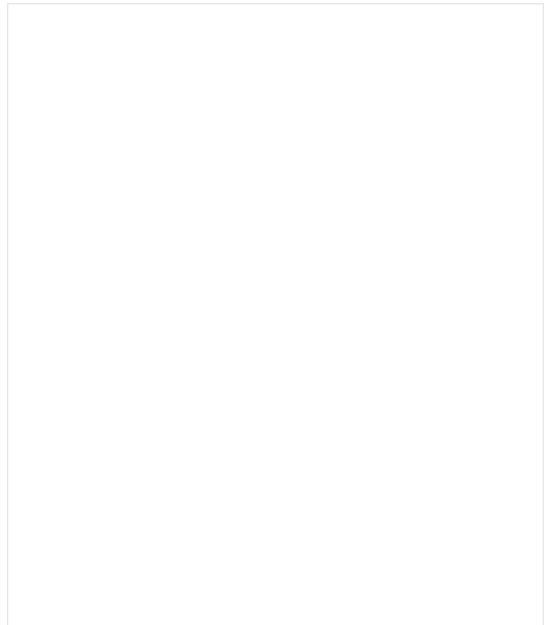
**Figure 1** Example of a rainfall departure map – showing monthly rainfall total for June 1999 as a percentage of normal. Black dots represent climate recording stations.



**Figure 2** Example of an air temperature departure map – showing monthly mean air temperature for June 1999 as a departure from normal. “Deg” refers to degrees Celcius.



**Figure 3** Example of a river flow map – showing monthly river flows for June 1999 as a departure from normal. Note that over time, more river catchments will be included in this map, as other agencies who monitor river flows are invited to input data.



models of global climate. Note that all rainfall and temperature projections for New Zealand are referenced to ‘normal’, or ‘average’.

Projections typically fall into three categories – above average, near average, or below average. For example, a prediction for above average rainfall in a 3 month period indicates that rainfall in the top third (highest third) of historical rainfall over that same 3 month period is expected. Similarly, projections for near average and below average rainfall indicate an expectation for rainfall in the middle third, and bottom third, of historical falls, respectively. (This information is also applicable to temperature projections).

Note that the ‘historical’ data is normally the data recorded over a ‘standard normal period’. The current standard normal period is the 30 year period 1961–1990. In the year 2001, the standard normal period will change to 1971–2000. The standard normal period is used to ensure consistency between sites, and to ensure that a representative, long-term record is used when calculating averages, and departures from average.

### **Climate shift and climate change information**

In August 1998, NIWA scientists identified evidence of a shift in New Zealand’s climate since 1977 (NIWA

press release). More westerly winds over central and southern New Zealand were identified, producing approximately 10% wetter and 5% cloudier conditions on the west coast of the South Island, with more damaging floods. Conversely, the increase in the westerly winds has resulted in approximately 10% drier and 5% sunnier conditions in the north and the east of the North Island, with more droughts.

Mean temperatures over the entire country have increased in the last 21 years, with an increase in the annual temperatures since 1977 of 0.15 degrees in the northern half of the North Island, up to 0.25 degrees in the southern half of the North Island, and up to 0.15 degrees in the east coast of the South Island. Noticeably, the night time minimum temperatures have increased, with frost frequencies much reduced since 1977. All of these factors have significant implications for climate sensitive industries, especially the primary production sector. For further details about the New Zealand climate shift since 1977, see the web site

[http://www.niwa.cri.nz/press\\_releases/aug6\\_98.html](http://www.niwa.cri.nz/press_releases/aug6_98.html).

Climate change information and scenarios are also important when assessing risk over the longer term (greater than a decade), particularly for forestry or in areas marginal for a chosen business activity. Regional scenarios (Whetton *et al.* 1996) have been produced, and these are available on the internet site

<http://katipo.niwa.cri.nz/ClimateFuture>.

## Conclusion

Climate variability has a significant impact on climate sensitive industries in New Zealand, including farming. Climate data, information, and up-to-date climate projections can be used as part of the farmer's decision making process, to form better risk management

strategies, or to actively benefit from climate conducive to good farming returns.

The NIWA National Climate Centre offers farmers, and other users of climate information, free and easy-to-access climate information and advice. The monthly publication *The Climate Update* contains both the current climate status, 3-month climate predictions, and other valid information regarding the state of the global climate.

By the time this paper is presented (October 1999), the climate patterns affecting New Zealand will have changed compared to when the paper was written, and the regions experiencing challenging climatic conditions may well be different from those presently having difficulty. This just underlines the need for good quality, up-to-date climate information and advice, for planning and risk management on the farm. Trial the climate information available from the NIWA National Climate Centre, and evaluate its merits as part of the decision-making 'toolbox' for your business.

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