

DROUGHT, CLIMATE CHANGE AND HEALTH

This factsheet presents the latest data on drought in NZ, and shows links to health

Models project more droughts for parts of New Zealand

There is now clear evidence that the world's climate is changing. One of the changes that climate scientists have measured is an increase in the intensity and frequency of drought in some regions - particularly the Mediterranean and West Africa. Climate scientists believe that the main cause of these changes is anthropogenic (human-produced) activities, rather than the earth's natural variation.¹

The Intergovernmental Panel on Climate Change has assessed global research and concluded that there has been no (upwards or downwards) trend in drought occurrence in NZ since 1972.² Looking to the future, the amount of time spent in drought conditions in eastern NZ is projected to increase by 10% by the mid-21st century.³

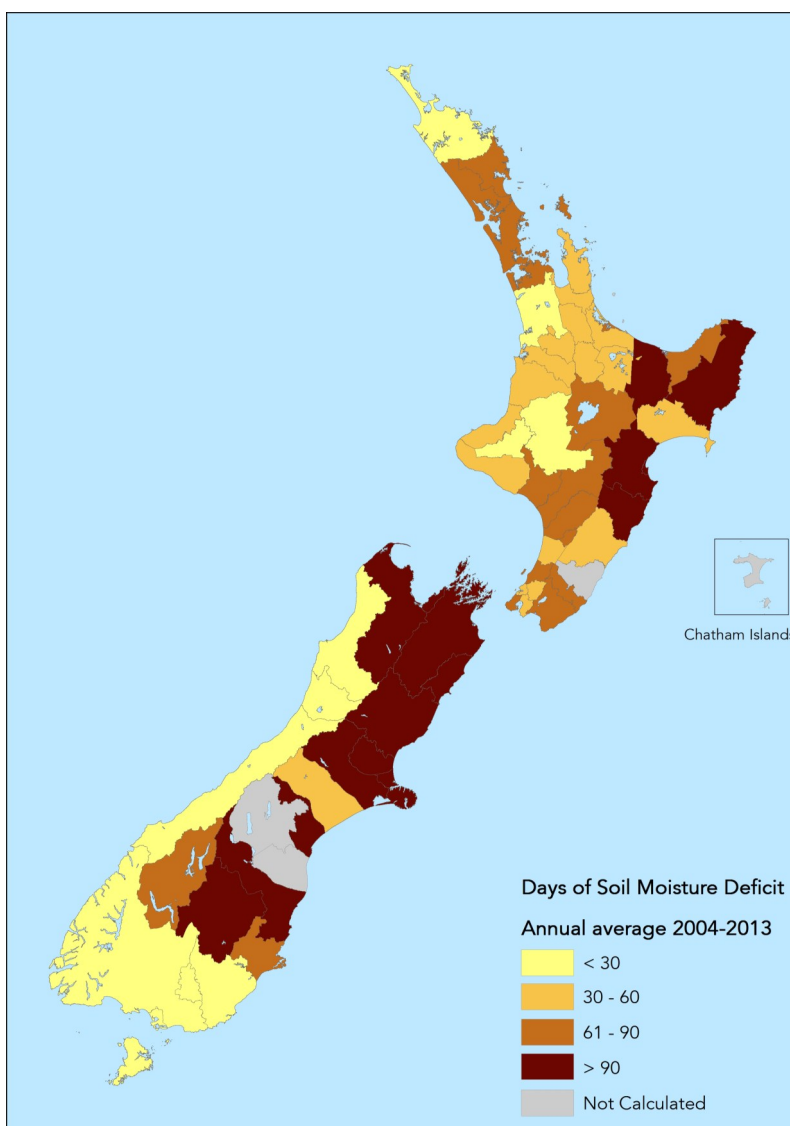


Figure 1
Annual average number of days of soil moisture deficit in NZ regions
Data Source: NIWA

*The declaration of drought is made by the Ministry for Primary Industries based on several factors.

Eastern NZ is drier

The Centre for Public Health Research (CPHR) used National Institute of Water and Atmospheric Research (NIWA) data to determine which regions have more frequent dry periods. We looked at the average number of days spent with a soil moisture deficit. Soil moisture deficit is one measure of drought*, and measures the amount of soil moisture (in millimetres) available to pasture plant roots.

Our results show that eastern regions had more dry periods from 2004-2013, and that the eastern South Island was particularly affected (Figure 1). Our website shows how these dry periods changed over 2000-2013, and gives more detail about the data.

Droughts have effects on health

Droughts can affect health in several ways.

A severe and prolonged drought can reduce the amount of drinking water available. New Zealand's populations that rely on rainwater tanks for their supply can be particularly affected. Drought can also affect health by reducing crop production, meaning there is less (and possibly more expensive) food available for consumption.

Rates of cryptosporidiosis and giardiasis are affected by rainfall patterns. Research suggests that periods of low rainfall concentrate giardia and cryptosporidium cysts in groundwater sources and water storage. When rainfall subsequently occurs, the runoff from dry land washes these cysts into waterways where it can contaminate drinking water sources.⁴

DROUGHT, CLIMATE CHANGE AND HEALTH continued

Some NZ evidence has shown that cryptosporidiosis and giardiasis rates have increased with periods of rainfall.⁵ On balance, however, studies have not consistently shown whether the rates decrease or increase in drought conditions.

Finally, drought can have a significant effect on mental health, particularly for those in rural areas who rely on favourable climatic conditions for their livelihoods.⁶

Climate changes affect vulnerable populations the most. This includes young children, elderly people, those on low incomes, indigenous populations, and those with chronic disease and disability.

Long term data needed to determine whether climate change is affecting disease rates

Overall, there is no observable increase or decrease in notifications for giardiasis or cryptosporidiosis.

We reviewed cryptosporidiosis and giardiasis rates in NZ from 1996 (Figure 2). Although the results appear to show an increasing number of cryptosporidiosis cases over time (R^2 for trend= 0.20), this is largely based on an increase in notifications in the first few years of the national surveillance EpiSurv database (for 2000-2013 data only, $R^2=0.01$). For giardiasis, $R^2=0.0004$ for the full dataset, and $R^2=0.18$ from 2000-2013.

There are no data available to monitor drinking water availability around NZ, or mental health effects of drought.

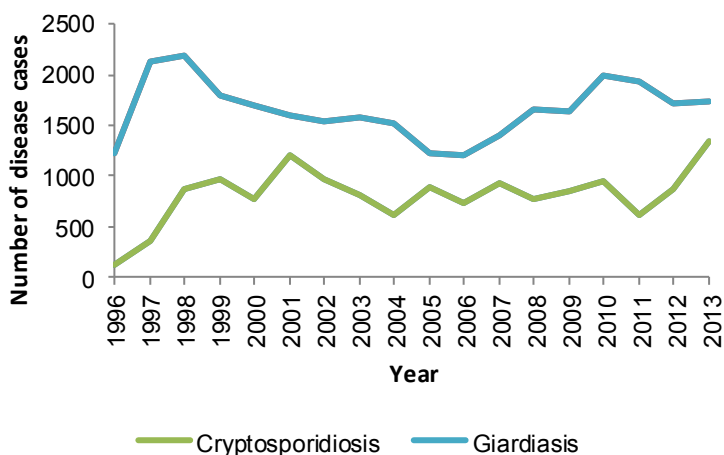


Figure 2
National notifications of cryptosporidiosis and giardiasis, 1996-2013
Data Source: Institute of Environmental Science and Research Ltd (ESR)

References

1. IPCC. Summary for Policymakers. In: Stocker T, Qin D, Plattner G-K, et al., eds. Climate Change 2013: The Physical Science Basis Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge, UK and New York, NY, USA: Cambridge University Press; 2013.
2. Reisinger A, Kitching R, Chiew F, Hughes L, Newton P, Schuster S, et al. Australasia. In: Barros VR, Field C, Dokken D, Mastrandrea M, Mach K, Bilir T, et al., editors. Climate Change 2014: Impacts, Adaptation, and Vulnerability Part B: Regional Aspects Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge, United Kingdom and New York, NY, USA: Cambridge University Press; 2014.
3. Clark A, Mullan A, Porteous A. Scenarios of regional drought under climate change. NIWA Client Report WLG2012-32. Wellington: National Institute of Water and Atmospheric Research; 2011.
4. Lal A, Baker MG, Hales S, French NP. Potential effects of global environmental changes on cryptosporidiosis and giardiasis transmission. Trends Parasitol 2013;29:83-90.
5. Britton E, Hales S, Venugopal K, Baker M. The impact of climate variability and change on cryptosporidiosis and giardiasis rates in New Zealand. Journal of Water and Health 2010;8:561-71.
6. Berry HL, Bowen K, Kjellstrom T. Climate change and mental health: a causal pathways framework. Int J Public Health 2010;55:123-32.

RELATED FACTSHEETS

Temperature, Climate Change and Health
Health effects of climate change
Vulnerability to Climate Change

For more information, please contact Fei Xu on f.xu@massey.ac.nz

Disclaimer: Information from the Centre for Public Health Research (CPHR) is based on data from a wide range of organisations, each of whom take responsibility for the information they submit. Whilst every effort has been made to ensure accuracy, CPHR accepts no liability or responsibility for the data or its use. All data displayed on outputs from CPHR are from publicly available sources. If you believe that any of this information may be inaccurate, please contact us.