

How well do current public and private conservation lands encapsulate the full climatic range across New Zealand's main islands?



Summary

This uses information from climatic databases and spatial databases of New Zealand's public and private land set aside for conservation.

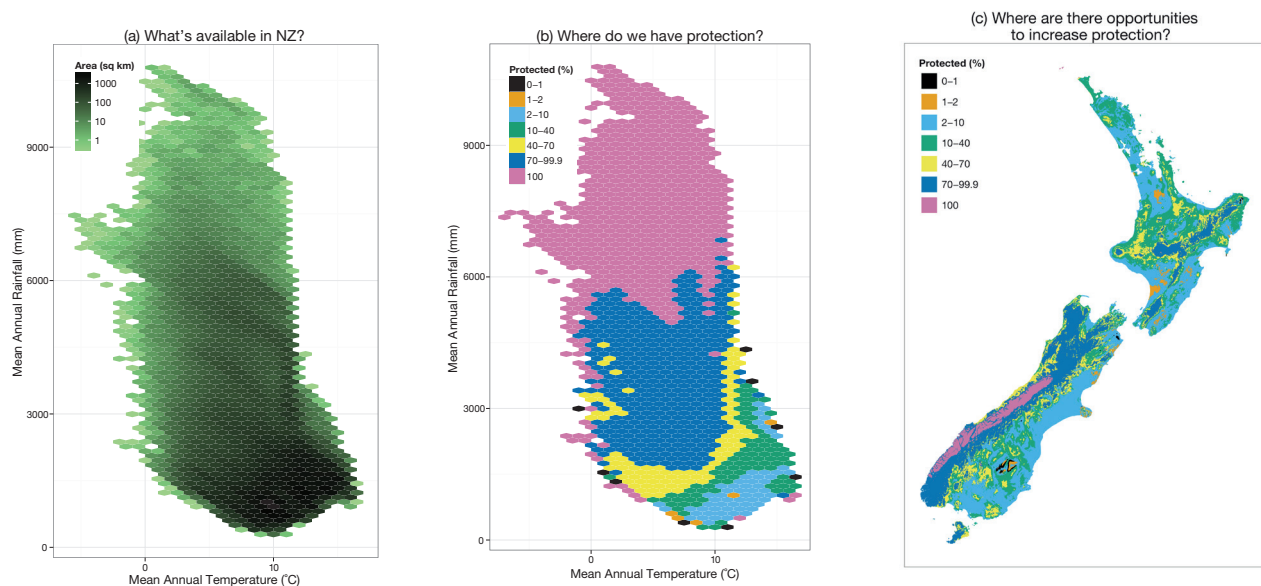
The data shows that most of New Zealand's climatic range includes land managed for conservation. It also shows some areas that are unrepresented; especially some cool and dry areas (eastern Central Otago, some of inland Marlborough), some hot and dry areas (lowland Hawke's Bay and coastal Marlborough) and some warm and wet areas (near East Cape). Representative parts of these areas need to be a focus for protection.

Main findings

- Most of New Zealand's environmental space, in terms of its climatic range, has some representation in protected areas; either in public conservation land or through other initiatives (e.g. QEII or Ngā Whenua Rāhui covenants).
- However, some distinctive environments do not have adequate representation; notably, cool and dry areas (mostly in eastern central Otago but also in the Awatere Valley, Marlborough), hot and dry areas (lowland Hawke's Bay, coastal Marlborough) and warm and wet areas near East Cape.

Factors influencing this:

- Some distinctive environments in New Zealand have histories of land tenure and management that have not conformed to conventional conservation management techniques (e.g. designation of public or private conservation reserves).
- Future extensions of the approach used here could include measures of soil fertility as this is a major environmental aspect that we cannot currently include.
- The approach used here complements established classifications such as the LENZ Threatened Environments that also consider the amount of indigenous vegetation remaining in specific environments.



Why is this important?

Representation is central to the selection of sites for protection or management of ecosystems that represent or sample the full variety of biodiversity. This analysis clearly identifies three types of environment where there is insufficient protection at present. These are (i) cool, dry environments found in eastern Central Otago (and in some inland Marlborough sites) (ii) warm, dry environments typical of lowland Hawke's Bay and coastal Marlborough and (iii) warm, wet environments characteristic of East Cape. These areas could either be a focus for conventional means of protecting land for conservation (e.g. Nature Heritage Fund, QEII or Ngā Whenua Rāhui covenants) or places to try new initiatives for conservation.

Definitions and methodologies

- We placed 0.5-km grid over New Zealand and obtained estimated climate data at each intersection of the grid from the Land Environments of New Zealand (LENZ) database.
- We chose mean annual temperature and mean annual total rainfall because these broadly define the major climate gradients that drive species distributions, vegetation structure and ecosystem function.
- New Zealand is definitely a wet place, but 74% of the points on our grid had mean annual rainfall < 2 m/year. Rainfall > 4 m/year only occurs on 4% of points and most of those were in Fiordland. About 20% of New Zealand has mean annual rainfall < 1 m/year.
- About half of New Zealand has a mean annual temperature between 8°C and 12°C. Ten percent of New Zealand has a mean annual temperature < 6°C, which is about the temperature limit to tall tree growth.
- We categorised each point as protected by public conservation land (PCL), protected by other initiatives, including private land (PRIVATE) and other land (Rest of NZ).
- PCL was defined using DOC's National Property and Land Information System (NaPALIS) database.
- Privately-protected land was defined using NaPALIS and the Protected Areas of NZ (PANNZ) layer developed by Landcare Research.
- We aggregated climate data into bins; rainfall into 100 mm bins and temperature into 0.5°C bins.
- For each combination of temperature and rainfall bins, we calculated the number of points in NZ that occurred on PCL, PRIVATE and REST of NZ.
- We identified the combinations of temperature and rainfall bins where < 1% of points were protected by PCL or PRIVATE initiatives.
- We checked sensitivity of results to different sizes of climate bins. The details of shown in graphs (b) and (c) change when different sized bins are used, but the broad picture remains similar.

Where can I find more information (links)

<http://www.landcareresearch.co.nz/resources/maps-satellites/lenz>

Leathwick, J.R., Overton, J.M. & McLeod, M. 2003. An environmental domain classification of New Zealand and its use as a tool for biodiversity management. *Conservation Biology* 17: 1612-1623

<http://www.landcareresearch.co.nz/resources/maps-satellites/pannz>