Invertebrate conservation with computer-based tools

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The New Zealand Department of Conservation (DOC) is responsible for managing thousands of species of threatened invertebrates. To improve their conservation we need tools to:

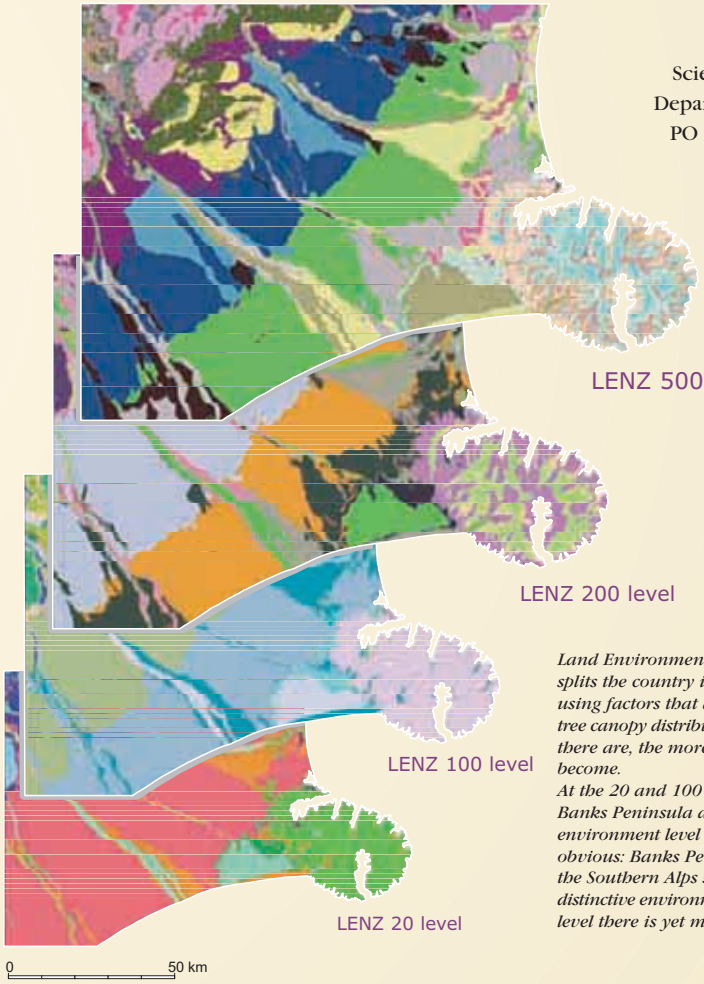
- Help us identify gaps in our knowledge and management.
- Show whether our conservation actions are making a difference.
- Prioritise our actions so that we conserve the most important habitats and species.

DOC collaborates in tool development projects to store and manipulate data on species distributions: for example LENZ (Land Environments of New Zealand) developed by Landcare Research. It comprises a database and map of 15 environmental variables that have been measured or estimated for every part of the country. These variables are known to be drivers of canopy tree distribution. Using this data, New Zealand can be split into 20, 100, 200 or 500 different abiotic 'environments' throughout the country.

LENZ adequately captures the distribution of different forest types, but we need to find out:

- How well it captures invertebrate biodiversity, and
- Whether we can manipulate the underlying data to better predict this.

We will look at three major aspects of this tool over a 3-year period, and plan to start invertebrate sampling soon.



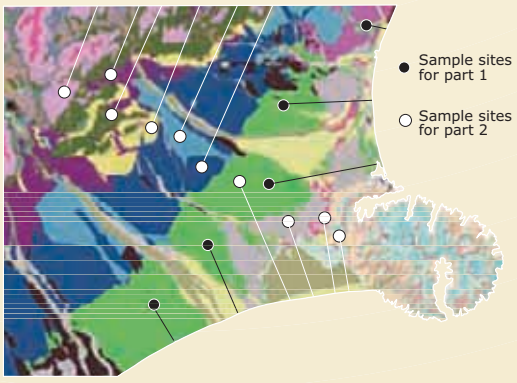
Land Environments of New Zealand (LENZ) splits the country into different 'environments' using factors that are known to be drivers of tree canopy distribution. The more environments there are, the more defined the land forms become.
At the 20 and 100 environment levels, most of Banks Peninsula appears uniform. At the 200 environment level the river plains become more obvious: Banks Peninsula and the foothills of the Southern Alps start to be recognisable as distinctive environments. At the 500 environment level there is yet more detail.

Research questions

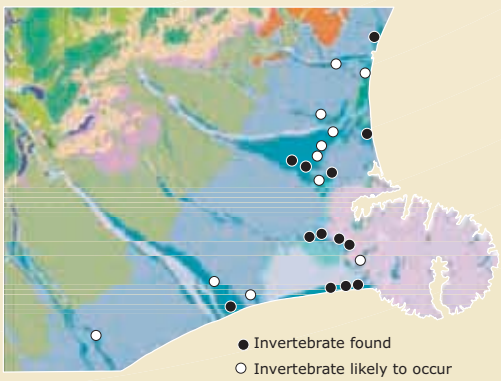
Part 1—How do invertebrate communities vary across the geographic range within one environment?

Part 2 —How do invertebrate communities change from one environment to another?

Part 3 —Where do our threatened invertebrate taxa occur and can we predict where similar, yet unknown hotspots are?



We will sample invertebrates within one environment over its geographic range, and across adjacent environments. This will show whether variation is greater over the range of one environment than it is between adjacent environments.



We will plot the coordinates for distribution of threatened invertebrates in relation to the LENZ environments. We may then notice other areas where the environment is similar that may also contain those threatened species.

Methods to answer them

Part 1

- Choose a suitable environment at the 500 level, one with a wide spread through the country.
- Sample invertebrates using pitfall traps, sticky traps and leaf litter samples two times a year over a wide geographic range.
- Compare diversity of different samples to examine complementarity between them.
- Use data from the underlying databases for each sample to see if we can better predict invertebrate biodiversity (using Neural Networks and GRASP: Generalised Regression And Spatial Prediction).

Part 2

- Use the Part 1 samples as well as sampling adjacent LENZ environments at the 500 environment level until collected through a 20-level environment boundary.
- Compare diversity within and between samples in each 500 environment level, then compare diversities between the 200 environment levels, then the 100 and the 20 levels. How different are all these environments in terms of the variation in their invertebrate diversities?

Part 3

- Compile a database of available data on threatened invertebrate distribution.
- Associate their distribution with the 100 level LENZ environments. Do certain 'environments' have several threatened species? Are there invertebrate hot spots?
- Are there any areas that are similar to places where threatened invertebrates occur but have not yet been sampled?

For more details on LENZ see '*Land environments of New Zealand = Nga taiao o Aotearoa*' by Leathwick et al. 2003. David Bateman in association with Manaaki Whenua—Landcare Research [and] Ministry for the Environment, Auckland, N.Z.184 p.

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