



Eco-index[®]

Guiding Biodiversity Investment

Rationale for a minimum 15% ecosystem land cover target

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The Eco-index team developed a [2121 National Biodiversity Vision](#) that sets long-term goals to Protect, Restore and Connect native ecosystems in Aotearoa New Zealand by 2121:

National Biodiversity Vision: Protected, Restored, Connected by 2121



This document expands on the rationale behind the minimum 15% ecosystem land cover target in the Restore – Whakahou, element of this vision:

Restore native ecosystems in every catchment to a minimum of 15% of original ecosystem land cover

Kia whakahoki te mauri o te Taiao ki te taumata e hiahia ana e tātau

To restore the mauri of the ecosystem to the standard we want

This rationale is presented as:

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1. The relationship between species richness and ecosystem land cover

Native ecosystems once cloaked Aotearoa New Zealand. Forests, herb fields, wetlands, sand dunes and many more ecosystems were woven together with diverse and flourishing communities of plants, animals, invertebrates and fungi. Human-driven replacement of these ecosystems with non-native or mixed-origin species assemblages means that native ecosystems now exist in a patchwork of fragments that are much smaller than their original land cover, especially in lowland areas (see Fig 1a & 1b).

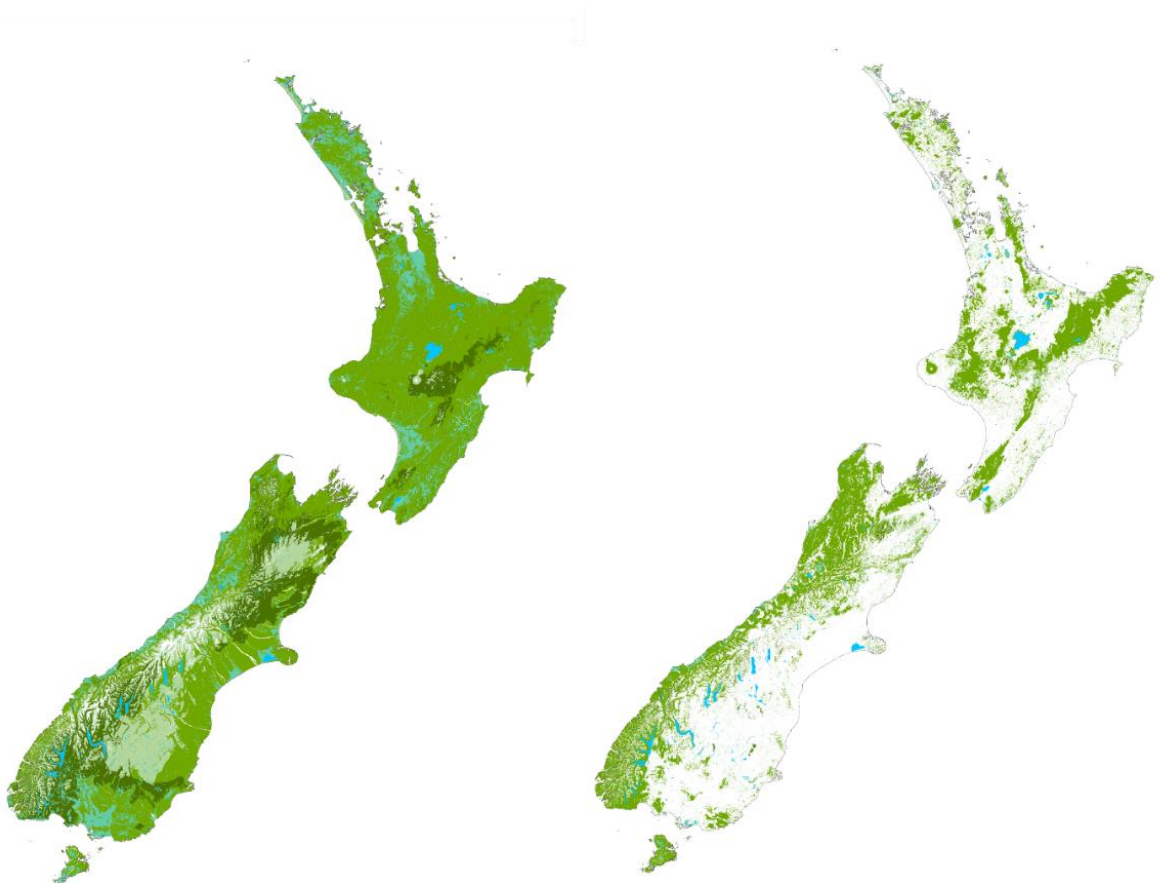


Fig 1a. Aotearoa New Zealand with a complete cloak of native ecosystems before human arrival.

Fig 1b. Current patchwork of native ecosystem fragments across Aotearoa New Zealand.

Credit: M. Hall 2022. Maps based on GIS layers from the Ministry for the Environment ("Prediction of wetlands before humans arrived" and "Current wetland extent, 2013") and LRIS ("Potential Vegetation of New Zealand" and "LCDB v5.0 - Land Cover Database version 5.0, Mainland New Zealand")

Large tracts of native ecosystems support more native species than small, fragmented patches can. Scientific observations of a range of ecosystems and their constituent species indicate that once the area of an ecosystem drops below 10-20% of its original land cover, the number of species (i.e. species richness) it can support (carrying capacity) declines suddenly (Fig 2). This is called the species-area curve, and it illustrates that the rate of species loss increases as ecosystem area decreases in a non-linear relationship. Although this relationship is complex, understanding the general principle provides guidance for setting management targets. This species-area relationship suggests it is important to conserve ecosystem land cover area that is already above 15% and restore those that sit below it.

The Eco-index 2121 National Biodiversity Vision includes restoration of native ecosystems to a minimum of 15% of their original ecosystem land cover with the goal of reversing species loss and restoring self-sustaining species populations.

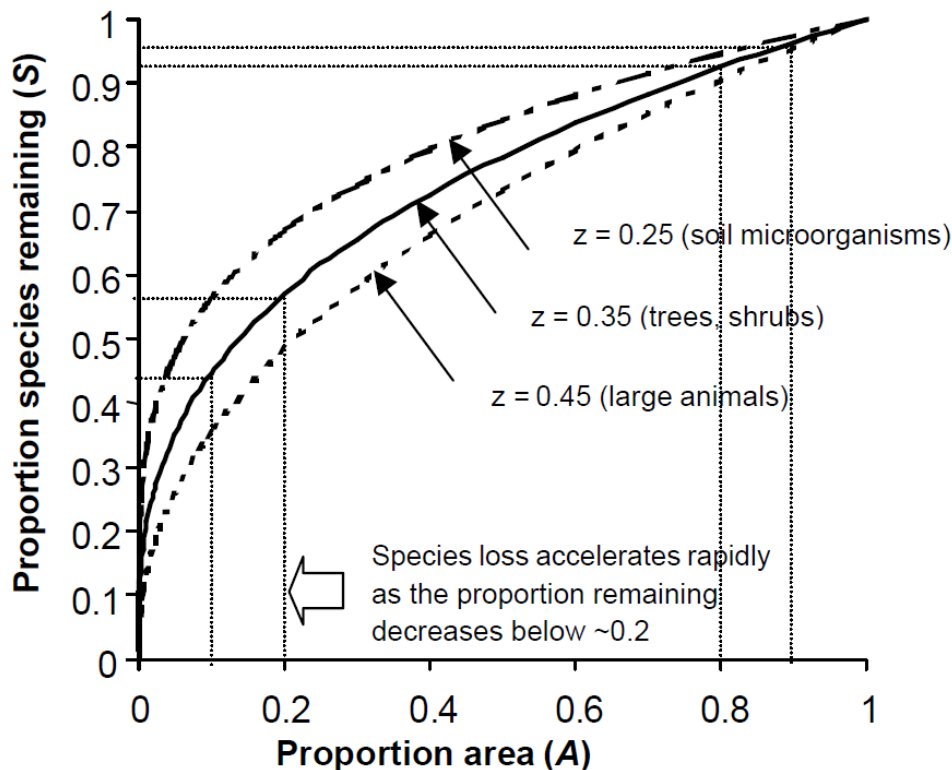


Fig 2. Generalised species–area relationship applied to the proportion of indigenous habitat remaining (A), showing curves for biota of different body size ($z = 0.25, 0.35$ and 0.45). From Walker, Price & Rutledge (2004): *New Zealand's remaining indigenous cover: recent changes and biodiversity protection needs*.

2. Relevant national literature

These national level documents align with a minimum 15% ecosystem land cover concept:

- [Threatened Environment Classification and National Priorities for Biodiversity](#) (Manaaki Whenua Landcare Research, 2012) and [Statement of National Priorities for Protecting Rare and Threatened Indigenous biodiversity on private land](#) (Ministry for the Environment, 2007).
- [Te Mana o te Taiao - Aotearoa New Zealand Biodiversity Strategy](#) (Department of Conservation, 2020).
- [National Policy Statement on Indigenous Biodiversity: Exposure draft](#) (Ministry for the Environment, 2022).

Threatened Environment Classification and National Priorities for Biodiversity

The Threatened Environment Classification for New Zealand outlines six threat categories related to indigenous cover (i.e. native ecosystem land cover):

Category	Category name and criteria
1	<10% indigenous cover left
2	10–20% indigenous cover left
3	20–30% indigenous cover left
4	>30% left and <10% protected
5	>30% left and 10–20% protected
6	>30% left and >20% protected

Taking these categories, Priority One of the Statement of National Priorities for Protecting Rare and Threatened Indigenous biodiversity on private land (represented in Fig 3) is:

“To protect indigenous vegetation associated with land environments (defined by Land Environments of New Zealand at Level IV), that have 20% or less remaining in indigenous cover.”

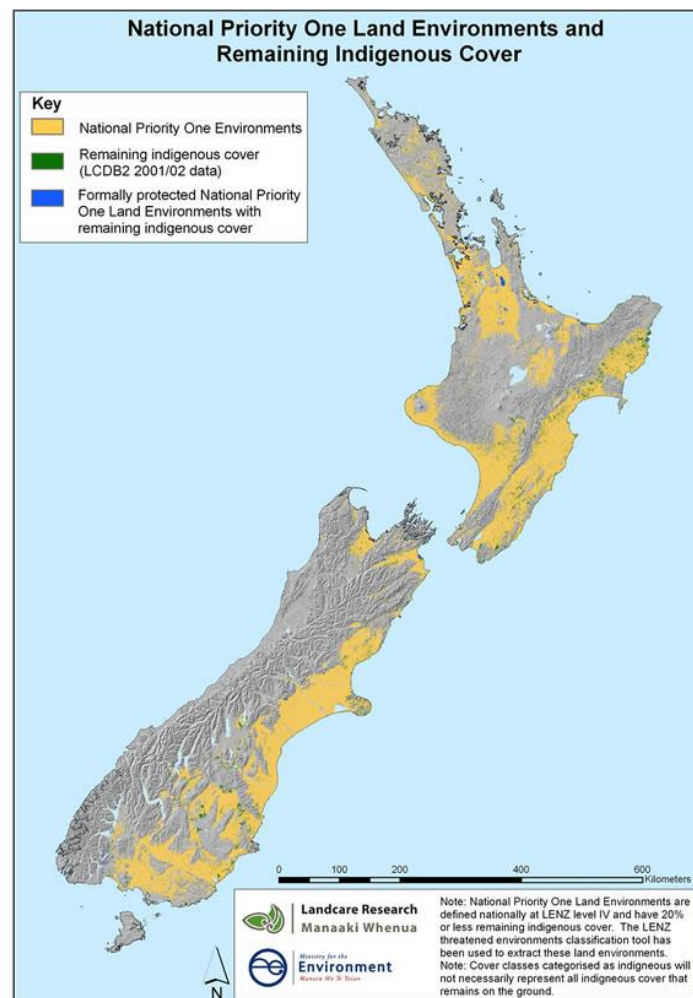


Fig 3. National Priority One Land Environments and Remaining Indigenous Cover.
Source: Manaaki Whenua Landcare Research & Ministry for the Environment.

Te Mana o te Taiao - Aotearoa New Zealand Biodiversity Strategy

Although Te Mana o te Taiao does not include specific targets, the following objectives align with the Eco-index 2121 National Biodiversity Vision and the minimum 15% ecosystem land cover target it promotes:

“Objective 10: Ecosystems and species are protected, restored, resilient and connected from mountain tops to ocean depths

10.3.3 An interconnected series of indigenous land, wetland and freshwater ecosystems have been restored to a ‘healthy functioning’ state and are connected to marine and coastal ecosystems

10.7.3 Indigenous species have expanded in range, abundance and genetic diversity and are more resilient to pressures, including climate change”

National Policy Statement on Indigenous Biodiversity: Exposure draft

The following policies and sub-parts set a target of at least 10% indigenous vegetation cover but allow for and encourage higher targets:

“**Policy 13:** Restoration of indigenous biodiversity is promoted and provided for.

Policy 14: Increased indigenous vegetation cover is promoted in both urban and non-urban environments.

Sub-part 3.22: Increasing indigenous vegetation cover

(3) Regional councils must:

(a) set a target of at least 10% indigenous vegetation cover for any urban or non-urban environment that has less than 10% cover of indigenous vegetation; and

(b) consider setting targets of higher than 10% for other areas, to increase their percentage of indigenous vegetation cover.”

3. Relevant international literature

Providing for a minimum of 15% of the original native ecosystem land cover aligns with many international strategies, targets and policies, including:

- [Kunming-Montreal Global Biodiversity Framework](#)
- [UN Sustainable Development Goals](#)
- [EU Biodiversity Strategy for 2030](#)

Kunming-Montreal Global Biodiversity Framework

Many of the goals and mission targets of the Kunming-Montreal Global Biodiversity Framework are supported by the Eco-index 2121 National Biodiversity Vision:

Goal A

Including "The integrity, connectivity and resilience of all ecosystems are maintained, enhanced, or restored, substantially increasing the area of natural ecosystems by 2050."

Action Targets

Target 2:

"Ensure that by 2030 at least 30 per cent of areas of degraded terrestrial, inland water, and coastal and marine ecosystems are under effective restoration, in order to enhance biodiversity and ecosystem functions and services, ecological integrity and connectivity."

Target 3:

Including: "Ensure and enable that by 2030 at least 30 per cent of terrestrial, inland water, and of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem functions and services, are effectively conserved and managed through ecologically representative, well-connected and equitably governed systems of protected areas and other effective area-based conservation measures, recognizing indigenous and traditional territories, where applicable, and integrated into wider landscapes..."

UN Sustainable Development Goals

The following UN Sustainable Development Goals are relevant to the minimum 15% ecosystem extent target:

Target 15.1: By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements.

Target 15.5: Take urgent and significant action to reduce the degradation of natural habitats, halt the loss of biodiversity and, by 2020, protect and prevent the extinction of threatened species

EU Biodiversity Strategy for 2030

The following sections of the EU Biodiversity Strategy are directly relevant to the minimum 15% ecosystem extent target:

Pillar 1: Protect Nature

Commitment 1: Legally protect at least 30% of the EU's land area and 30% of its seas.

Commitment 2: Strictly protect at least a third of the EU's protected areas - representing 10% of the EU land and 10% of EU sea - including all remaining primary and old-growth forests as well as other carbon rich ecosystems, such as peatlands, grasslands, wetlands, mangroves and seagrass meadows.

Pillar 2: Restore Ecosystems

Commitment 1: Legally binding EU nature restoration targets to be proposed in 2021, subject to an impact assessment. By 2030, significant areas of degraded and carbon-rich ecosystems are

restored; habitats and species show no deterioration in conservation trends and status; and at least 30% reach favourable conservation status or at least show a positive trend.

Commitment 4: At least 10% of agricultural area is under high-diversity landscape features.

4. Selected related literature

[New Zealand's remaining indigenous cover: recent changes and biodiversity protection needs](#)

(2008) by S. Walker, R. Price & D. Rutledge.

[Representativeness of Protected Areas for biodiversity in the South Island High Country](#) (2004) by

S. Walker, B. Lee, J. Willoughby & P. Newsome.

[Conserving biodiversity in New Zealand's lowland landscapes: does forest cover or pest control have a greater effect on native birds?](#) (2016) by J. Ruffell & R. Didham.

[Towards a taxonomically unbiased European Union biodiversity strategy for 2030](#) (2020) by S.

Mammola and colleagues.

Cain, S. A. (1938). The species-area curve. *American Midland Naturalist*, 573-581.

Ewers, R.M. & Didham, R.K. (2005). Confounding factors in the detection of species responses to habitat fragmentation. *Biol. Rev.*, 81(01), 117.

Fahrig, L. (2003). Effects of habitat fragmentation on biodiversity. *Annu. Rev. Ecol. Evol. Syst.*, 34(1), 487-515.

Hanski, I. (1994). A practical model of metapopulation dynamics. *Journal of Animal Ecology*, 63:1: 151-162.

Hanski, I. (2015). Habitat fragmentation and species richness. *J. Biogeogr.*, 42(5), 989-993.

5. Limitations

Generalised ecosystem land cover targets can be complex to shape when considering all types of native biodiversity. Further, broadly-applied ecosystem land cover targets can have perverse outcomes when not contextually relevant. For example, targets may not suit particular landscapes or species, or the minimum 15% ecosystem land cover target may simply not be enough to maintain species richness for some ecosystem types. We encourage decision-makers to consider their local context and envision larger land cover percentages in the long term. We recommend a step-wise approach to setting targets that could begin with 15% but increase to 20% or more, when capability and funding allow.

The 'minimum 15% of original extent' has been selected as an Eco-index target because it:

- is pragmatic, providing the direction and information needed to improve current biodiversity protection and restoration approaches across Aotearoa, generally speaking;
- addresses the important issue of representativeness, encouraging at least 15% of all native ecosystem types;
- addresses the need for a national approach with local applicability;
- aligns with international approaches for directing beneficial biodiversity conservation and restoration action;
- is a relatively simple concept that many people can get behind.