Beyond Nature: Economic Contribution of Public Conservation Land in Aotearoa New Zealand

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Key messages

The Department of Conservation (DOC) is responsible for protecting Aotearoa New Zealand's natural and historical heritage. They manage a vast network of public conservation land across the country, including national parks, forest parks, and coastal areas. In addition to enhancing conservation, the money spent managing these areas has significant benefits for local economies and private businesses. Between 2015 and 2022:

- meshblocks[1] within 2 km of public conservation land (compared to those beyond 2 km) had, on average, 3.4% higher business revenue and 4.4% higher GST returns.

- Considering only meshblocks within 2 km from public conservation land, every dollar spent by DOC in their operations district was correlated with between a $1.75 and $5.78 increase in business revenue, and between $0.26 and $0.74 increase in GST returns across the range of DOC operations district. The benefits are even greater when the impact is assumed to extend beyond 2 km from public conservation land.

Recognising and integrating the economic benefits of public conservation land into environmental conservation and economic development policy frameworks and decisions is important for ensuring regional economic and environmental sustainability.

The Bioeconomy Science Institute Policy Briefs are a continuation of the Manaaki Whenua – Landcare Research Policy Briefs. From 1 July 2025, Manaaki Whenua – Landcare Research became part of the Bioeconomy Science Institute.

Introduction

Aotearoa New Zealand (A-NZ) has distinctive biodiversity and natural landscapes, which are a cornerstone of our environmental stewardship. Approximately 30% of the A-NZ land mass is held as public conservation land (PCL),[2] and since 1987 DOC has been the primary steward for most of the PCL (see Figure 1).

Although the ecological and economic benefits of PCL are widely recognised internationally, its socioeconomic contribution to the A-NZ economy is less well understood. Evidence from countries such as Canada, the USA, Australia, and others suggests that the benefits of PCL extend well beyond ecological preservation, often outweighing the costs of managing such land.[3,4,5]

For example, in southeastern Australia, the creation of new PCL is positively correlated with the number of businesses.[5] Similarly, the establishment of new national parks in the USA has generated sustained economic benefits, including a 4% increase in employment and a 5% increase in income, with the income gains persisting long after the parks are established.[6] These cases underline how conservation land can act as a catalyst for local economic activity.

Although understanding the economic benefits of investment in PCL enables policymakers to make more informed public investment decisions, evidence for the economic benefits of PCL in A-NZ is primarily based on indirect benefits, such as the impact of tourism and its contribution to the national economy.[7,8,9] Existing analyses in A-NZ are also fragmented and limited to specific local areas or projects,[10,11,12] which may not be generalisable to the national scale. To our knowledge there is no comprehensive assessment in A-NZ that has systematically evaluated the influence of PCL on business performance and broader economic outcomes across the country.
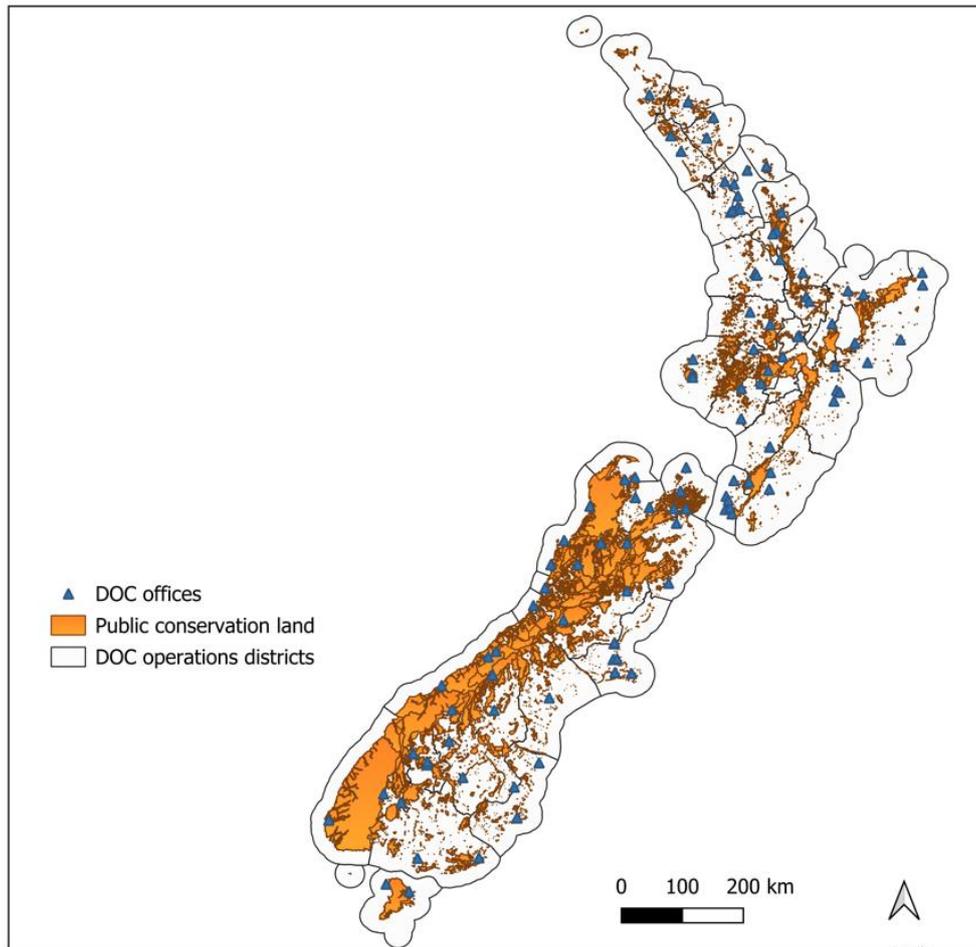
Figure 1. DOC operations districts, offices, and public conservation land.

To provide this evidence, we examined the nationwide economic impacts of terrestrial PCL using geospatial data and DOC's operational budget allocation for this land. Four business performance indicators were assessed:

- employment
- sales revenue
- GST returns paid to Inland Revenue
- the number of firms operating.

By linking these economic indicators with spatial and budgetary data, we were able to analyse the effects of PCL on local economies. The data sources and methods are outlined in Box 1. The unit of analysis is a meshblock, which is the smallest geographic unit for which statistical data are collected and processed by Statistics New Zealand.

The economic contribution of public conservation land

We found PCL to be a powerful driver of local and regional economic activities in A-NZ. Meshblocks located within 2

km of PCL have, on average, 3.4% higher business revenue and 4.4% higher GST returns than those further away from PCL (see Box 2 for details). In addition, a 1% increase in the DOC operations district budget is correlated with increases of 0.02% in business revenue, 0.02% in GST, 0.11% in employment, and 0.07% in the number of firms in an average meshblock (see Box 2 for details).

To see what these figures mean in monetary terms, we estimated the change in business revenue associated with a 1% increase in DOC budget in three DOC operations districts – one in the South Island and two in the North Island. An annual 1% increase in the South Island's Mahaanui DOC operations district budget (about $24,000) is correlated with an additional c. $539,000/year in sales revenue across the district. Similarly, an annual 1% increase in the North Island's Kaitaia DOC budget (c. $16,000) is correlated with an additional sales revenue of c. $26,500/year across the district, and a 1% increase in the Tauranga DOC budget (c. $10,300) with an additional sales revenue of c. $235,000/year.

Looking at the average sales revenue and GST for meshblocks within 2 km of PCL (i.e. about 70% of the meshblocks assessed), we estimate that each additional dollar in an average DOC operations district budget is correlated with an average increase of $3.5 in annual business sales (95% CI: $1.75–$5.78 and a $0.44 increase in GST (95% CI: $0.26–$0.74) per DOC operations district.

The aggregate benefits increase substantially when the benefits for all meshblocks in a DOC operations district are considered (some meshblocks are up to 17 km from PCL). Under this district-wide assumption, a $1 increase in DOC operations district budget is correlated with an average increase of $5 in business revenue (95% CI: $2.50–$8.30) and $0.63 in GST revenue (95% CI: $0.31–$1.10) across an average DOC operations district. Our sectoral-level analysis also revealed that the accommodation and food services, retail, and wholesale sectors all benefit from proximity to PCL and an increase in DOC operations district budgets.

In summary

PCL is a key instrument in protecting and enhancing the conservation of A-NZ's unique biodiversity. We have shown that PCL also plays an important role in strengthening local economies and creating jobs. Recognising PCL not merely as an ecological asset but also as an economic driver provides a platform for developing integrated policies that reconcile environmental sustainability with economic resilience. Strengthening continued investment in conservation provides for long-term national prosperity and sustainable development in A-NZ.

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(Looking toward Wharariki Beach; Photo credit: Suzie Greenhalgh)

Box 1: Data sources and analysis

Data sources

This analysis used a two-tiered approach to data organisation, capturing information at both the PCL level and the local meshblock level. Business activity data from Statistics New Zealand's Longitudinal Business Database (LBD) was used to determine the economic impacts of PCL in A-NZ. These data included business sales, GST, number of employees, and number of firms operating for the period 2015 to 2022. DOC provided their budgetary allocation data for their 46 operations districts (39 of which matched with the business data in our analysis), which allowed us to assess the association between the DOC operations district budget and the business activities in local economies. The spatial delineation of PCL was derived from publicly available geospatial data from DOC.[13]

These rich data sources allowed us to perform a detailed longitudinal analysis. The data set for the analysis contained 6,930 areas of terrestrial PCL, composed of 14 national parks, 3,507 reserves, and 3,409 conservation areas. The business data covered around 40,000 meshblocks across all territorial authorities and regional councils of A-NZ. The distance from the boundaries of each meshblock to the boundaries of the nearest PCL and the location of the DOC office was measured as the Euclidean distance using the *st-distance* function from the *sf* package in R.[14]

Analysis

To identify the causal effect of meshblocks' proximity to PCL while disentangling it from the influence of other confounding factors, we used a two-step empirical strategy that integrates matching with mixed-effect (or multi-level) regression models.

Step 1: Matching based on proximity of meshblocks to PCL

In this step we employed propensity score matching to construct a counterfactual by pairing meshblocks located in close proximity to PCL (within 2 km) with otherwise comparable meshblocks located further away (beyond 2 km). Propensity score matching is particularly appropriate in this context as businesses may systematically self-select into environmentally attractive locations.

As a result of this self-selection bias, meshblocks closer to PCL may differ systematically from more distant meshblocks based on economic conditions, business composition, infrastructure development, and accessibility. Failing to account for this non-random spatial sorting of businesses would therefore confound the estimated effects of proximity to PCL with other economic and structural advantages. Propensity score matching mitigates this selection bias by ensuring that treated meshblocks (within 2 km of PCL) and control meshblocks (beyond 2 km) are comparable across observed covariates prior to outcome analysis, thereby isolating the effect of proximity from confounding influences related to conservation investment and local economic structure.

We implemented the matching procedure using the *MatchIt* package in R[15] and conducting a year-by-year matching to preserve the panel structure of the data in our study.

Step 2: Regression analysis on a matched sample

In the second step, mixed-effect models were used to analyse the impact of PCL on local business activities, considering the hierarchical nature of the data. The analysis in this stage was based on the matched data obtained in the first stage. The data were organised at the PCL and meshblock levels, which are nested within territorial authorities (districts), DOC operations districts, and regions. These models allow for both random intercepts and slopes at different levels (e.g. meshblock, district, DOC operations district, region, and primary purpose of the PCL). The general functional form is specified below:

$$Y_{ijt} = \alpha + u_j + \gamma t + \sum_{k=1}^{K} \beta_k X_{kijt} + \varepsilon_{ijt}$$

where Y_{ijt} is the outcome variable observed at the meshblock level (i) over time (t); j represents the nesting of observations at a meshblock, territorial authority, DOC operations district or regional level; u_j represents the random intercept for meshblock, territorial authority, DOC operations district, region or primary purpose of the PCL; t captures the year fixed effects; X represents the explanatory variables in our model, including proximity to PCL and DOC budget, with k number of explanatory variables; and ε_{ijt} represents the error term.

Our analysis also controls for other factors, such as distance to DOC offices, state highways, the area of the meshblock, the size of the PCL, and the type of the nearest PCL (national park, reserve, conservation area). To estimate the mixed effect models, we used the *lme4* R-package.[16]

Box 2. Change in sales, GST, employment, and number of firms associated with changes in proximity to PCL and DOC budget[17]

	Sales (%)	GST (%)	Employment (%)	Number of firms (%)
DOC operations district budget (Producers Price Index adjusted based on 2010 real prices)	0.02***	0.02***	0.11***	0.07***
Distance from meshblock to PCL (dummy for within 2 km)	3.4***	4.4***	Not significant	Not significant
Number of meshblocks	37,387	37,385	38,326	41,829

*Notes: Statistical significance is denoted as follows: *** P < 0.01, ** P < 0.05, * P < 0.1. In all models we accounted for year fixed effects and random effects of meshblock, territorial authority, region, DOC operations district, and primary purpose of the PCL.*

[1] A meshblock is the smallest geographic unit for which statistical data are collected and processed by Stats NZ. It is a defined geographic area, which can vary in size from part of a city block to a large area of rural land. The optimal size for a meshblock is 30–60 dwellings (containing approximately 60–120 residents). Meshblocks vary in size based on population density. For more information on meshblocks, please see: Statistics New Zealand 2016. Statistical standard for meshblock. www.stats.govt.nz (accessed 16 August 2024). In our analysis, on average, the meshblocks are 2 km away from public conservation land.

[2] Craig J, Anderson S, Clout M, Creese B, Mitchell N, Ogden J, et al. 2000. Conservation issues in New Zealand. Annual Review of Ecology and Systematics 31(1): 61–78.

[3] Wilson JJ, Lantz VA, MacLean DA 2010. A benefit–cost analysis of establishing protected natural areas in New Brunswick, Canada. Forest Policy and Economics 12(2): 94–103.

[4] Sutton PC, Duncan SL, Anderson SJ 2019. Valuing our national parks: an ecological economics perspective. Land 8(4): 54.

[5] Heagney EC, Kovač M, Fountain J, Conner N 2015. Socio-economic benefits from protected areas in southeastern Australia. Conservation Biology 29(6): 1647–1657.

[6] Szabó A, Ujhelyi G 2024. National parks and economic development. Journal of Public Economics 232: 105073.

[7] Schiff A, Becken S 2011. Demand elasticity estimates for New Zealand tourism. Tourism Management 32(3): 564–575.

[8] Li S, Li H, Song H, Lundberg C, Shen S 2017. The economic impact of on-screen tourism: the case of The Lord of the Rings and The Hobbit. Tourism Management 60: 177–187.

[9] Vatsa P, Balli F 2024. How important are prices in long-haul travel? Evidence from New Zealand. Tourism Economics 30(6): 1492–1507.

[10] Russell KJ, Taylor CN, Balanovic JX, Aley JP, Harbrow MA, Russell JC 2017. Predator Free Rakiura social impact assessment. A report for the Department of Conservation. University of Auckland, Auckland.

[11] Cosslett C, Buchan D, Smith J 2004. Assessing the social effects of conservation on neighbouring communities: guidelines for Department of Conservation staff. Department of Conservation Technical Series 29. Wellington, New Zealand, Department of Conservation.

[12] Wouters M 2011. Socio-economic effects of concession-based tourism in New Zealand's national parks. Science for Conservation 309. Wellington, New Zealand, Department of Conservation.

[13] Department of Conservation 2025. Public Conservation Land. https://doc-deptconservation.opendata.arcgis.com/datasets/72354ba9bf7a4706af3fdfe60f86eea1_0/explor (accessed 20 May 2024).

[14] Pebesma E 2018. Simple features for R: standardized support for spatial vector data. The R Journal 10(1): 439–446.

[15] Ho D, Imai K, King G, Stuart E 2011. MatchIt: nonparametric preprocessing for parametric causal inference. Journal of Statistical Software 42(8): 1–28. doi:10.18637/jss.v042.i08.

[16] Bates D, Mächler M, Bolker B, Walker S 2015. Fitting linear mixed-effects models using lme4. Journal of Statistical Software 67(1): 1–48. doi:10.18637/jss.v067.i01.

[17] These results are not official statistics. They have been created for research purposes from the Longitudinal Business Database (LBD), which is managed by Stats NZ. For more information about the LBD, please visit https://www.stats.govt.nz/integrated-data/