people+cities+nature

restoring indigenous nature in urban environments

Environmental Research Institute
Te Pūtahi Rangahau Taiao
THE UNIVERSITY OF WAIKATO

Ministry of Business, Innovation & Employment

THE UNIVERSITY OF WAIKATO
Te Whare Wānanga o Waikato

Our goal

Established in 2016, People, Cities & Nature is a world-leading research programme harnessing expertise from New Zealand and Australia to enhance restoration of indigenous biodiversity in cities.

Urban areas are home to 87 % of the NZ population and 56% of the human population worldwide. Cities are disproportionately affected by ecological challenges, and are critical entry points for foreign pest and weed species. Despite this, cities are a key part of the solution to the global biodiversity crisis and to improved human health. They are a key interface between cultures, and a hub of increasing interest in sustainable living. However, information on how to make urban restoration successful and cost-effective is currently limited.

Our researchers are working in 10 cities across New Zealand gathering data to determine what makes urban restoration successful. People, Cities & Nature has developed and refined best practices and foundational knowledge required for efficient urban restoration. We have cultivated robust relationships with end-users to ensure effective information transfer to local government and community. We believe that restoring nature in urban environments is critical for sustainable, functioning ecosystems, and for human health and wellbeing, and we are working hard to make urban restoration targets achievable in New Zealand and around the world.

RESEARCH LOCATIONS IN

Aotearoa New Zealand

01 Auckland
02 Hamilton
03 Tauranga
04 New Plymouth
05 Napier
06 Wellington
07 Nelson
08 Christchurch
09 Dunedin
10 Invercargill

Current Research

From October 2021 our research programme follows four major themes:

01 Residential design for biodiversity: Aotearoa BiodiverCITY

Residential developments have huge potential to contribute to urban biodiversity through improved and innovative design. But their potential is dictated by residents, architects, planners, developers, landscape architects, and other professionals. Current residential design and planning fails to recognise the vital role biodiversity plays in supporting ecosystem services and human health.

We are identifying strategies and goals for optimal biodiversity to be applied to residential developments, including green spaces and built structures. We are also developing a biodiversity evaluation tool that can be applied to neighbourhoods, gardens and buildings for best practice biodiversity assessment.

02 Retain and restore urban wildlife

We are investigating landscape and habitat features that contribute most to the retention and restoration of native biodiversity in cities. In a range of housing developments we are using birds, lizards and iconic invertebrates as indicators of native biodiversity. We are also working with Predator-Free Wellington to quantify the potential gains and challenges of intensive urban mammal control on native wildlife.

Our research will forge evidence-based recommendations for the design of future developments and policies for retrofitted interventions in existing housing subdivisions and infill.

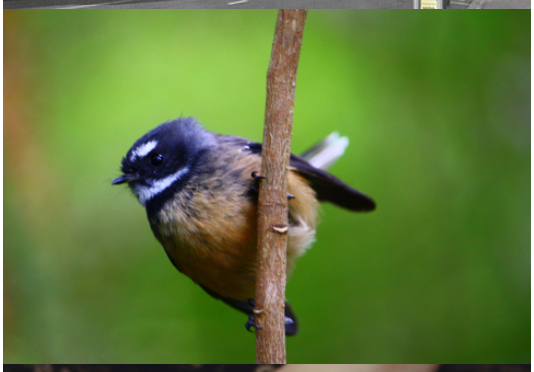
03 Restoring health-promoting soil biodiversity

Exposure to soil biodiversity in urban greenspaces can promote human and wildlife health by impacting their microbiomes. We are investigating soil biodiversity across an urban forest restoration timeline, gauging its development as the aboveground planted forest matures. Network modelling will reveal forest age and soil microbiota associations. In addition, we are experimentally identifying passive exposure to airborne microbiota to derive an 'aerobiome' exposure metric to the soil microbiota from these forests.
Our research will form 'how to' guidelines to restore urban forest soils.

04 Whanake rākau, whakatipu mātauranga, poipoia te tangata: Growing trees, enhancing knowledge, nurturing people

We are using a kaupapa Māori model to explore the multiple benefits of urban forests, including social cohesion and job creation. Partnering with iwi and local communities we will highlight the most effective planting approaches to deliver long-lived native urban forests and determine how to effectively enrich urban forests that provide cultural connection and ecological resilience. To do this we are using data from a chronosequence of planted urban forests established over the last 65 years.

Our findings will inform the nursery sector's plant supply and species availability (currently restoration constraints), and provide insights into the social capital and economics of restoration planting.



Research Outcomes

Results from our research are already informing urban restoration in New Zealand. Here are some of our findings so far:

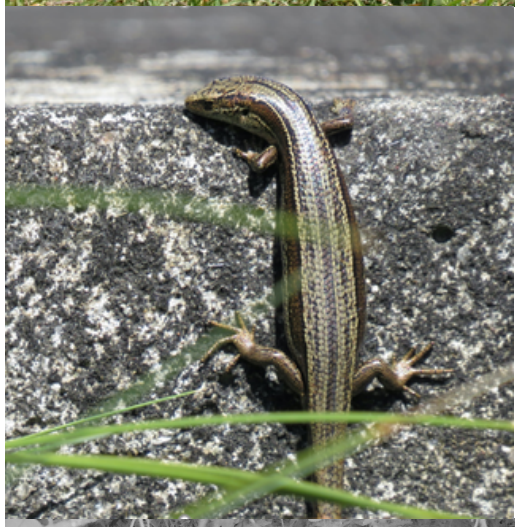
01 Plantings

Our research team have characterised plantings of different ages in New Zealand's towns and cities to better understand the requirements for efficiency and success of these important projects.

- We have identified and addressed weakness in the link between current scientific restoration knowledge and practitioner actions. We recommend prioritisation of interactive, interpersonal modes of communication to strengthen knowledge transfer, as well as time-saving resources, adequate funding, and guidance to navigate socio-ecological constraints.
- We have addressed the prioritisation of early-successional species in restoration planting. We recommended that afforestation and emissions trading policies support the reinstatement of mature-phase tree species to facilitate substantial ecological and ecosystem service benefits.
- We have advanced knowledge of critical thresholds in urban forest restoration to achieve complete ecosystem development.

02 Urban lizards

Our research team have begun to investigate how predator control, habitat size and complexity, and environmental factors relate to urban lizard diversity and abundance.



- We have developed an essential baseline dataset to inform conservation and restoration of indigenous lizards in urban areas.
- Environmental enhancements including vegetation and rock-piles are being evaluated for use in lizard habitat.
- We have proposed a design for rock piles that limits access by mice.
- National links have been developed with permit and consent writers, and practitioners to inform tools and best practice for development in urban landscapes.

03 Mammalian Predators

Our research team have investigated the distribution and abundance of urban mammal pests and best practice approaches for their control.

- We developed methods for standardised monitoring of mice, rats, hedgehogs, mustelids and possums suitable for use in urban environments
- Small mammal pests were found in all urban greenspace types; however, rodents were detected least in residential gardens, possums were detected most often in forest fragments, and hedgehogs least in forest. Rats were most common in residential gardens with compost heaps. Successful urban pest mammal control must be coordinated, target all green space types, and engage urban residents.
- We developed a method for quantifying pest mammal control, and used this to evaluate the efficacy of urban pest control measures on rodents and possums.
- We evaluated the prevalence of roaming cats into an urban reserve and their daily activity to assess the threat they pose to birds dispersing from an adjacent reserve. The majority of neighbouring residents (including cat owners) acknowledged that predation by free-roaming cats was a problem and were supportive of owners taking steps to reduce the threat posed by their animal.
- With Manaaki Whenua Landcare Research, Predator Free New Zealand and Predator-Free Wellington we investigated home range sizes and detection probabilities of urban rats to inform the development of “proof-of-freedom”.
- We discovered rat tracking indices to be lower in urban areas than the “backcountry” and furthermore determined that fledging success among urban bird species was approximately twice that of “backcountry” forest birds.

04 Māori restoration values

Our research team have investigated Māori involvement in urban restoration and how kaitiakitanga can be facilitated.

- We identified challenges for Māori in maintaining connections with the natural world in urban settings. We suggested opportunities to improve environmental outcomes in cities through the inclusion of indigenous values such as kaitiakitanga in the urban agenda.
- New knowledge has been gained on Māori urban kaitiakitanga practices, urban restoration, Māori values, engagement with nature, cultural practices, environmental stewardship and guardianship, and space and place.

05 Green space benefits

Our research team have investigated what motivates New Zealanders of different ethnicities to use green space and engage in urban restoration.

- Our study of biodiversity-enhancing activities people can undertake in their gardens identified participant characteristics associated with adoption of different activities, with main barriers to engagement being cost, lack of information and aesthetics.
- Interviews of three-generation families showed inter-generational patterns and differences in use of and preferences for green spaces and species (native/non-native), and evidence of transmission of family values and attachment to places.
- Our survey of young adults' (18 – 25 yr) awareness of conservation issues and attitudes towards conservation actions revealed a high degree of awareness, but a low level of engagement in formal environmental action. We propose a number of strategies for improving engagement in this poorly researched and targeted age group.
- NZ adults showed very limited association between childhood nature experiences and the time spent in nature as adults, preferences for different landscapes, connection with nature and willingness to engage in pro-environmental behaviours. Hence, even when there is a deficit in childhood nature contact, people can still positively engage with nature as adults.
- While we found some small differences in preferences for landscape types and species between NZers of different ethnicities, in general, people prefer green biodiverse environments, whether these are parks, streets, or their own gardens.

06 Cross-sector alliances

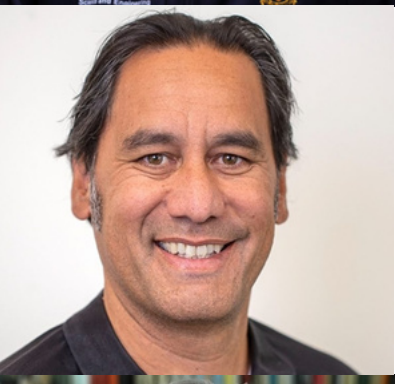
Our research team have identified how these cross-sector alliances can be structured and implemented to achieve effective urban ecological restoration in New Zealand.

- We have discovered that personalities and interpersonal skills of key people play the most significant role in the longevity, success, and impact of cross-sector alliances. These key people act as "connectors" - a new term for the field.
- We classified the cross-sector alliance impact on urban ecological outcomes and wider society, and proposed a new framework for people to conceptualise their own cross-sector collaboration and impact: Connect, Align, Grow and Evolve

Our research leaders

Bruce Clarkson
University of Waikato

Professor Bruce Clarkson is a world-leading expert on urban restoration and leads the People, Cities and Nature research programme. Bruce was awarded the Loder Cup, New Zealand's premier conservation award in 2006 and in 2016 he received the RSNZ Charles Fleming Award for environmental achievement. Bruce is the research leader for project 4: 'Whanake rākau, whakatipu mātauranga, poipoia te tangata' working with Shaun Awatere (Manaaki Whenua), Wiremu Puke (WTG), Sera Gibson (Project Maunga), Hemi Whaanga (Massey University) and Erana Walker (University of Waikato).



Shaun Awatere
Manaaki Whenua Landcare Research

Doctor Shaun Awatere is an expert in incorporating Māori values into economic decision-making. His work enables Maori organisations to make more kaupapa Māori attuned decisions. Shaun is the Vision Mātauranga leader for our programme, and leads our approach to incorporating indigenous knowledge, values and practices into urban design and development.

Yolanda van Heezik
University of Otago

Professor Yolanda van Heezik is an expert on the human dimensions of urban biodiversity. She has worked in New Zealand, Europe and Saudi Arabia on ecology and species management and is currently the director of the Wildlife Management department at the University of Otago. Yolanda is research leader for Project 1 'Residential Design for biodiversity: Aotearoa BiodiverCITY', working with Claire Freeman (University of Otago), Danielle Shanahan (Zealandia) and Maibritt Pedersen Zari (AUT).

Stephen Hartley
Victoria University of Wellington

Associate Professor Stephen Hartley is the director for the Centre of Biodiversity and Restoration Ecology at Victoria University of Wellington. His research interests include Wetland restoration, forest restoration, wildlife monitoring, and urban ecology and citizen science. Stephen is the research leader for project 2: 'Retain and restore urban wildlife', working with Nicky Nelson (Victoria), John Innes (Manaaki Whenua), Deborah Wilson (Manaaki Whenua), Neil Fitzgerald (Manaaki Whenua), Jo Carpenter (Manaaki Whenua) and Anne Schlesselmann (Manaaki Whenua).

Martin Breed
Flinders University

Doctor Martin Breed is an expert in ecology, ecosystem health and genomics. He has worked with the UN and WHO on the links between biodiversity and human health via the microbiome, and served as a patron for the IUCN Species Survival Commission. Martin is the research leader for project 3: 'Restoring health-promoting soil biodiversity', working with Andrew Barnes (University of Waikato), Kiri Joy Wallace (University of Waikato), Gregory Jacobson (University of Waikato) and Craig Liddicoat (Flinders University).

Our Partners

We are working hand-in-hand with local councils, universities and research organisations to deliver world-class research on restoring nature in cities

Visit www.peoplecitiesnature.co.nz/partners to join the team

Publications

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For more information

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