

Title

Promoting social and environmental justice to support Indigenous partnerships in urban ecosystem restoration

Running head

Indigenous relationships in ecosystem restoration

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Author contributions

MMH, KJW conceived and initiated the topic; all authors contributed to writing and editing the manuscript; MMH, KJW, EW are early career researchers mentored through the research and writing process by PW and HW.

Abstract

Urban ecological restoration typically employs western science approaches to restore degraded ecosystems. As yet, few restoration groups acknowledge the history of these degraded urban sites, despite connections, past and present, that root Indigenous Peoples (and others) in these lands. Here, we promote partnership with Indigenous communities from project inception, and present two successful case studies from Aotearoa New Zealand. We specifically note that partnering and building relationships with Indigenous communities in restoration efforts requires recognition of power inequalities and injustices. We consider success to include both restoration of ecological function and biodiversity, and reconnection of all communities to urban ecosystems.

Key words

Aotearoa New Zealand, ecology, Traditional Ecological Knowledge, restoration, Indigenous Peoples, urban

Implications for practice

- Urban ecological restoration success is built with partnerships between local communities and Indigenous Peoples, acknowledging history, place, and connection.
- Rich, holistic restoration visions are formed by encompassing ecological considerations as well as biocultural and linguistic diversity - these elements becoming clear when appreciating connections to place, including relationship history to place (especially Indigenous history), associated land practices, and land alienation.
- Restoration practitioners and communities can educate themselves about the relational history, past power dynamics, and structural biases associated with the place being restored.

- Urban restoration plans should include provision for equitable partnerships and dialogue with multiple stakeholders, particularly with Indigenous communities.
- Publishing stories of restoration partnerships with Indigenous communities in the restoration ecology literature will help others develop similar approaches.

Introduction

Urban restoration ecology is a sub-discipline of restoration ecology focusing on the study of repairing degraded ecosystems in cities (McDonnell 2007; Wehi & Wehi 2010; Wallace et al. 2017).

Restoring these damaged environments is important for provision of ecosystem services such as clean water and air quality, flood mitigation, and enhancement of human well-being through creation of space for recreational and cultural practices (Elmqvist et al. 2015; Sandifer et al. 2015).

Restoration groups may develop extensive ecological restoration plans to improve ecological integrity, but may not always know of, or consider, restoring biocultural relationships associated with the restoration location that are related to history and identity (Black 2014). This is because both the scientific research of urban restoration ecology and its applied form of ecological restoration are largely shaped by western scientific ideas and methods. It is now clear that Indigenous frameworks have a great deal to offer ecological restoration by framing our thinking in different ways (Mistry & Berardi 2016). These frameworks draw our attention to biocultural relationships (Maffi 2005), center social and environmental justice, and emphasize ecosystem baselines that facilitate human-nature relationships and activate inter-generational cultural practices of ecological restoration (Reo et al. 2017). Many restoration groups focus on biodiversity enhancement without incorporating biocultural and linguistic diversity, despite evidence that this is critical (e.g. Maffi 2005), and especially empowering in the urban context where people are an especially integral part of the ecosystem. These groups may lack guidance on incorporation of alternate perspectives, in part because there is generally low Indigenous community participation in these groups (James 2013; Peters et al. 2015).

In many of its forms, western science is reductionist and prone to compartmentalizing the world (including nature) into discrete disciplines. This contrasts with Indigenous frameworks which view the world holistically, as a complex web of relationships (Harmsworth & Awatere 2013; Reo et al. 2017). This holistic perspective aligns with ecology being a discipline studying interconnectedness in nature, and may therefore be more readily adopted by Western-trained ecologists. However, the need for a holistic perspective is, so far, often not well understood, and urban ecological restoration rarely weaves Indigenous Knowledge (IK), history or communities into its narrative (Wehi & Lord 2017). Research indicates that intergenerational IK implemented during ecosystem restoration helps ensure environmental sustainability (e.g., Kimmerer 2000; Uprety et al. 2012; Saylor et al. 2017; Reyes-García et al. 2019), but this approach is also not yet widely embraced.

The holistic approach of indigenous frameworks can be effective in restoring ecosystem services (Harmsworth & Awatere 2013), mitigating climate change impacts, and reversing biodiversity decline (Uprety et al. 2012) by providing a rich narrative of biocultural and linguistic diversity (Maffi 2005; Rāwiri 2012; Wehi et al. 2018) to create a solid foundation for urban ecosystem restoration. Adding layers of knowledge about history, human interactions, and cultural practice to ecological restoration enhances biodiversity (Jupiter et al. 2014; Walker et al. 2019), reveals how social injustice interacts with stories of degraded and alienated land, and highlights the importance of re-connecting people to nature, challenging the 'extinction of experience', which is common for city dwellers (Soga & Gaston, 2016). By incorporating strong partnerships with indigenous communities, we argue that the benefits from ecological restoration are more likely to be equitably and widely spread with enduring project success.

To include biocultural diversity in ecological restoration, the first pivotal step is to build respectful relationships with Indigenous Peoples to collectively recognize history and context of place. Carefully cultivating a strong, equitable relationship between all involved with that land is a pathway to reconciliation (Zurba et al. 2019), but this critical component is often overlooked in restoration

ecology, resulting in a lack of group diversity (Peters et al. 2015; Acosta et al. 2018) and therefore a one-dimensional vision. Urban spaces are complex systems which require multi-dimensional restoration visions for enduring success and stewardship (Elands et al. 2019). The initial conversation (and contributors) shaping a restoration project will define its pathway, progress, and targets. Besides ecological targets, there are many other targets (e.g., cultural, financial, political) forming different drivers of urban restoration projects that should be acknowledged during project formation.

A holistic approach to restoration is promoted by the Society for Ecological Restoration's International Principles and Standards for the Practice of Ecological Restoration document (Gann et al. 2019). The formation of relationships and social elements of the restoration process are articulated in Principle 1, and visualized through the social benefits recovery wheel which we show here (Fig. 1; Gann et al. 2019). We note, however, that although 'Stakeholder Engagement' is part of this wheel, this terminology does not explicitly acknowledge the Treaty relationships or First Nation status of Indigenous Peoples, and the ensuing need for community partnerships where decision-making power is shared or equitable. Centering western science terminology, perspectives and knowledge reduces and alienates Indigenous contributions and frameworks. We therefore encourage users of this social benefits recovery wheel to view through 'Two-Eyed Seeing' (Bartlett et al. 2012) and explicitly engage and include Indigenous People in project designs (see 'Stakeholder Engagement' section of wheel) that go beyond simply reinforcing Traditional Ecological Knowledge (see 'Knowledge Enrichment' section of wheel) during the project. Respectful partnerships with Indigenous People do not selectively cherry-pick IK, but rather recognize that knowledge and people who hold it cannot be divorced and separated (Rāwiri 2012). This plurality of perspectives, respect for multiple frameworks, and equality of power will enrich and safeguard a restoration vision, from whence a plan and action can flow.

Urban ecosystem restoration requires recognition of power inequality

Indigenous Peoples, as with many other groups globally, have been urbanizing (Senese & Wilson 2013). This urban migration has been driven in large part by the effects of colonization - from land confiscation (Barcham 1998; Mata et al. 2020) to genocide (Crook et al. 2018), and the search for employment. Land alienation (removal of Indigenous People from traditional lands) has resulted in lasting intergenerational damage to biocultural relationships (Mata et al. 2020). This alienation diminishes the ability of communities to feed themselves and limits enactment of cultural imperatives e.g., *manaakitanga* (reciprocal responsibilities to care for others) and *kaitiakitanga* (stewardship) in the Aotearoa New Zealand context (Reid et al. 2016). Because cultural environmental practices are transferred between generations, when people move geographically this is broken and designated occasions for sharing intergenerational knowledge are generally lost (Kimmerer 2000). These issues all negatively affect Indigenous Peoples and IK (Kimmerer 2000) and will persist as long as land management practices favor western approaches (Roberts et al. 1997; Broughton & McBreen 2015; Kwaymullina 2016; Crook et al. 2018). Expanding, sprawling cities also create enormous challenges for the Indigenous People on whose lands they are built, and whose voices become marginalized in the plethora of new governmental and legal directives.

Benefits of Indigenous Knowledge and restored nature in urban ecosystems

IK is often undervalued by western science because it is distinctly different, and consequently the domination of western science provides no space for IK and associated worldviews (Broughton & McBreen 2015; Kwaymullina 2016; but see Uprety et al. 2012; Mata et al. 2020). If urban restoration ecology prioritized inclusion of Indigenous communities, it could aid in decolonization, healing, and produce benefits to support self-determination and empowerment of these communities (Smith 2012; Mata et al. 2020). Furthermore, this inclusion would encourage innovative and inclusive ways of thinking (Hofstra et al. 2020).

When built on a firm foundation of multiple ways of knowing and united communities, restored urban nature produces benefits for everyone. Urbanization has developed such that it reduces human-nature contact, with detrimental ramifications for both. For people, experiencing nature reduces mental distress, anxiety, depression, and lowers prevalence of physical disease (Barton 2017; Taylor et al. 2018). Wellbeing is positively correlated with the amount of nature people view from home or work (Taylor et al. 2018). As well, interactive forms of experiencing nature such as harvesting are key to Indigenous Peoples' health and wellbeing. As the majority of the global population lives in urban centers (55.7%; (United Nations 2018)), the importance of restoring urban nature is clear (Elmqvist et al. 2015). The need for urban human-nature re-connection has been particularly highlighted during the city lockdowns experienced worldwide during the COVID-19 pandemic (Samuelsson et al. 2020). Whether Indigenous or non-Indigenous, all humans require connections with nature (Kingsley et al. 2013), and need our urban ecosystems to be healthy.

Indigenous Partnerships in the Pacific

Indigenous Peoples of Polynesia, Micronesia, Melanesia and Australasia share the Pacific Ocean, and important ancestral connections (Hamacher 2019). The fruit of collective journeys by these peoples through the Pacific and Indigenous ways of knowing is an expression of the connection to both land and sea: Oceanic peoples understand IK is about becoming part of the land and water, of the ecosystems within them. This human-land and sea connection feeds and reinforces cultural identity (Stevens 2006; Black 2014), resulting from Indigenous Peoples' interactions with the land (e.g., harvesting) by listening, watching, and caring for it over many generations (Wehi et al. 2018; McGowan 2019). If this connection to the native ecosystems is lost, so too is the connection to identity.

Like the western scientific approach to restoration ecology, IK is dynamic, formed by the past, but future focused. Moreover, IK emphasizes responsibility for coming generations that need to know

how to live well on the land while also ensuring the survival and development of IK for these future generations.

Support from IK is missing from most ecological restoration practices (Wehi & Wehi 2010; Broughton & McBreen 2015; Wehi & Lord 2017), including cities. The relationship between urban indigenous communities and urban restoration practitioners must be built to facilitate input from both knowledge sources (Marques et al. 2018): a position echoed by multiple publications in this area (Wehi & Wehi 2010; Voyde & Morgan 2012; Broughton & McBreen 2015; Wehi 2017; Marques et al. 2018). This relationship requires clear intentions and respect. For example, in Aotearoa New Zealand, the indigenous Māori people are faced with a dichotomy: that their IK (known as *Mātauranga Māori*) will be disrespected, exploited or appropriated by westerners (Barcham 1998), as it has been when shared before, or that it will be lost entirely if not shared (King et al. 2008). Here we provide two case studies to demonstrate the importance of including Indigenous communities in urban ecological restoration. We first introduce a Māori-led terrestrial initiative and then describe a collaborative partnership in freshwater management.

Case Study 1, Māori-led: The Ko Te Pūkākī Program

In Aotearoa New Zealand's largest city of Auckland (*Tāmaki Makaurau*), tribal group Ngāti Whātua Ōrākei has been restoring 82 ha of urban native forest since 2002 (Fig. 2). The program, named Ko Te Pūkākī, seeks to concurrently educate those involved in the restoration and the community about ecology while utilizing IK to restore the land and people's connection to it. The management protocol excludes herbicides, but instead, uses weed prevention derived from traditional practices. Only 'ecosourced' (locally sourced) species are planted, with intention to preserve the kin relationship between these plants and the people (*whakapapa*) (Ngāti Whātua Ōrākei, 2018). The program has prospered socially and culturally, currently employing 14 staff who are trained to a Level 2 National Certificate in Horticulture (K. Makoare 2020, Ngāti Whātua Ōrākei, Auckland, NZ, personal comm.). The education of those in the program has therefore been expanded with

communal IK adapted to the current urban context. The City Council has now adopted the herbaceous weed control methodology that Ko Te Pūkākī has developed, after observing the favorable results. Further, the City Council and a local university have co-designed restoration space as a native living laboratory for real-world experiments to unite learning and knowledge types (Farming Nature Conservation n.d.). Species of culturally treasured (*taonga*) fauna have returned, including nesting of nationally vulnerable Tūturiwhatu/Banded Dotterel (*Charadrius bicinctus*) (M. Kerehoma 2020, Ngāti Whātua Ōrākei, Auckland, NZ, personal comm.). Program success comes from a holistic, ecosystem-based approach, with no emphasis on time frames, except for an intention to benefit future generations (K. Makoare 2020, Ngāti Whātua Ōrākei, Auckland, NZ, personal comm.). Many volunteers, of many backgrounds, return so consistently that they sometimes obtain employment with the program. The ecological restoration work reconnects workers with the land such that following initial restoration efforts many of these practitioners often choose to remain in the area to care for the restored ecosystem. The program leaders attribute success to the empowerment of Indigenous People, because effective programs that promote equality and revitalizing of local IK are run by Māori, primarily to benefit Māori, but also benefiting all people (Broughton & McBreen 2015).

Case Study 2, Collaborative Partnership: Zealandia & Tāranaki Whānui ki Te Ūpoko o Te Ika

In the capital city of Aotearoa New Zealand, Wellington (*Te Whanganui-a-Tara*), in the Kaiwharawhara catchment, a 225 ha fenced wildlife ecosanctuary called Zealandia was conceived by primarily *Pākehā* (European descent) conservationists, and receives ~135,000 visitors annually (Zealandia 2020). In 2017, Zealandia leaders took steps to acknowledge the role and connection of the local Indigenous People to the catchment and initiated co-management with the local tribal group, Tāranaki Whānui ki Te Ūpoko o Te Ika. A joint goal is to restore the catchment and reintroduce the nationally declining native freshwater *kākahi*/mussel (*Echyridella menziesi*) (Michel et al. 2019). Reintroducing these mussels restores ecosystem function through filter-feeding, which

reduces water turbidity (Haag 2012), and supports Māori cultural harvesting traditions (Michel et al. 2019). Both appropriate transportation methods and creating the ideal receiving environment for these sensitive species is vital (McEwan et al. 2020). Collection of mussels is carried out according to Māori protocol (*tikanga*), e.g., local IK guides transport mussels in purpose-built baskets (*kete*) (Michel et al. 2019). Engagement of the local tribal group from the start has been key to the success of this collaboration, relying on in person communications and meetings, which are a critical part of Māori cultural protocols (also see Cisternas et al. 2019) to establish meaningful partnership (Michel et al. 2019).

More progress in joint urban restoration efforts like those discussed in these case studies can occur if community restoration practitioners and policy makers place greater value on Indigenous relationships and histories. The process must include acknowledgement of any history of exploitation and appropriation (Roberts et al. 1997; Crook et al. 2015), and recognize equity principles in restoration practice.

Conclusion

Best practice in urban ecosystem restoration projects involve partnerships between local Indigenous Peoples, multiple community stakeholders, and western science practitioners, with inputs valued by local government and the broader community. Non-indigenous people can support socially and environmentally just outcomes by learning about the history of the land and ecosystems they live near, and about the processes and effects of colonization. This may include learning about recent generations of Indigenous Peoples who have been forcefully removed from ancestral tribal areas. Equitable partnerships that recognize Indigenous Peoples' knowledge and ethos will have a strong foundation for ecological restoration work, also benefiting Indigenous culture and identity. IK held by Indigenous Peoples worldwide provides unique ways of knowing that can support urban ecological restoration research and practice, and we look to treasure and respect those who hold it.

Non-Indigenous urban dwellers, who also suffer from disconnection with nature, will also benefit from restoration, and especially from inclusion of social elements found in IK approaches (Kingsley et al. 2013). Indigenous-led restoration of urban ecosystems provide positive outcomes for the entire community through their focus on empowerment, social and environmental justice, and healthy environments. Given the importance of nature to the wellbeing of urban populations worldwide, including IK holders in restoration partnerships will promote enduring and sustainable restoration of urban ecosystems and all the people who are part of them.

Acknowledgements

MMH and KJW thank R. McGowan who helped develop our ideas about Mātauranga Māori and ecological restoration and T. Irvine, J. Hiscox, K. Makoare and M. Kerehoma from Ngāti Whātua Ōrākei who provided information on the Ko Te Pūkākī restoration project. We acknowledge those before us who acquired and fought for transfer of Indigenous Knowledge, therefore keeping it alive.

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