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Key Māori values strengthen the mapping of forest ecosystem services

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ABSTRACT

Different value-belief systems influence the importance placed upon ecosystem services (ES) and their benefits, in particular cultural ecosystem services. We mapped forest values to interview narratives across four biocultural themes deemed relevant by Tuawhenua Māori in New Zealand: (1) importance of place; (2) capacity of forest to provide; (3) connection between forest and community; and (4) future aspirations. *Mauri* (life force), *mahinga kai* (food procurement), *oranga* (human well-being) and *te ohanga whai rawa* (economic development) were the values identified most frequently across the four community-based themes. *Ahikāroa* (connection with place) and *mahinga kai* were the most frequently assigned values to Themes 1 and 2 respectively, while *mauri* was the value expressed most frequently in relation to Themes 3 and 4. While provisioning services contribute to the immediate well-being of indigenous peoples, cultural services associated with these activities are also vitally significant as they constitute the embodiment and growth of the culture and cannot be substituted. The comprehensive articulation of indigenous peoples' values within an ES framework can assist with developing a common language within environmental decision-making processes and tools across cultures.

1. Introduction

Ecosystem services (ES) are functions of the natural world that are beneficial to human beings (Fagerholm et al., 2012). The established ES framework includes provisioning services (e.g. freshwater water), regulating services (e.g. pollination), supporting services (e.g. soil formation) and cultural ecosystem services (CES; e.g. recreation) on which humans are fundamentally reliant (MEA, 2005). The quantification and valuation of ES can be fraught and comprised by subjectivity, CES are generally accepted to be the most difficult to measure because they are, by nature, often intangible (Daniel et al., 2012). CES are defined as the contributions by ecosystems to non-material benefits (e.g. capabilities and experiences) that arise from complex and dynamic relationships between ecosystems and humans (Chan et al., 2012a; Fagerholm et al., 2012). Six key CES benefits are typically recognised: (i) cultural diversity and identity (e.g., sense of place); (ii) spiritual and religious values, knowledge systems (e.g. education); (iii) inspiration (e.g., typically for the arts and folklore); (iv) aesthetic values; (v) cultural heritage values, and (vi) recreation and ecotourism (Costanza et al., 1997; MEA, 2005).

The characterisation and relative emphasis on ES benefits, in particular CES's in different societies is influenced heavily by social, economic and political organisation and diverse societal worldviews. Diverse cultural worldviews create differences in how societies relate to, value and understand the environment. In a critique of the human-nature relationship within an ES framework, one argument suggest that the framework separates people from the environment, which is contrary to an indigenous worldview as it potentially promotes an exploitive human-nature relationship (Greenhalgh and Hart, 2015). A counter-argument however suggests that ES could reconnect society to nature through its CES (Greenhalgh and Hart, 2015). The central idea held by many indigenous cultures that people are an integral part of nature has led some studies to challenge the efficacy of aligning indigenous peoples' values within CES categories (Pert et al., 2015a). The importance of recreation and ecotourism and the aesthetic qualities of areas were identified as highly regarded values in western societies with access to surplus wealth and leisure time (MEA, 2005). In contrast, indigenous peoples have identified values such as genealogy and cultural heritage (association with spiritual realm and ancestors; support for language and culture); sense of place

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and kinship (internal community relationships, networks and connections); strong indigenous governance and regimes of joint management; and stewardship which includes collective community responsibility for the environment that includes protection and revitalization of culture as highly relevant to their communities (Graham et al., 2003; Gould et al., 2014; Gould et al., 2015; Lyver et al., 2016a). These differences have led some researchers to suggest that it would be more appropriate to align indigenous peoples' values to categories consistent with "interlinkages in biocultural diversity" (Hill et al., 2011; Pert et al., 2015a). It is therefore important to question whether the fundamental relationship between indigenous peoples' and nature are appropriately accounted for within the ES framework (Walker, 2004).

The global significance of forests to humans means they have a deeply ingrained presence within value-belief systems of many cultures. Cultural heritage values associated with forests are linked strongly with peoples' identities and association with place, customs and protocols, stories, songs, dreaming and poetry (Edwards et al., 2016; Gould et al., 2014; Pert et al., 2015a; Plieninger et al., 2013). Indigenous forest peoples in particular exhibit a complex matrix of values that shape and guide their attitudes, beliefs and relationships with the forests in which they live (Rickenbach et al., 2017). The diversity in how forest CES are valued by different cultures however can create potential for conflict between user-groups (e.g. tourists and indigenous peoples), especially as activities like recreation and tourism expand globally (e.g., Fagerholm et al., 2012). The political and social marginalisation of indigenous peoples around the world means that their values have often been subordinate to those of the dominant culture and less well covered within ES assessments (McMichael et al., 2005; Pert et al., 2015a).

While recognising that challenges exist around identifying, describing and measuring CES from the perspective of indigenous people, an increasing number of studies have used participatory approaches to map indigenous perceptions of values and benefits (Chan et al., 2012b; Ens et al., 2015; Greenhalgh and Hart, 2015; Pert et al., 2015b). In this study, we initially mapped forest values to interview narratives across four themes deemed relevant by Tuawhenua Māori in New Zealand: (i) importance of land and forest; (ii) how have the forests and rivers provided for the community: (iii) connection between the health of the forest and community; and (iv) the aspirations of the community for their forests. The framing of interviews and alignment of values initially around these four themes, rather than ES categories, provided context that community members were more familiar with than an ES framework. We follow Olson and Zanna (1993) in defining values as being "generally conceptualised as higher-order evaluative standards, referring to desirable means and ends of action" (Rokeach, 1973), which can be influenced heavily by culture, age, sex and race (Timmer and Kahle, 1983). Therefore, the frequency of values across two age groups was also assessed. Lastly, in the context of our findings we examine whether ES categories provide an effective framework to map indigenous peoples' values. We consider how the loss of key ES influences the viability of indigenous peoples cultures, in particular the delivery and expression of CES.

2. Methods

2.1. Background and study location

The Tuawhenua people are part of the larger Tūhoe nation, an indigenous Māori tribe from in and around the heavily forested Te Urewera mountain ranges in the North Island of New Zealand (Fig. 1). Before the Crown-led land confiscations of the last 150 years, the interests of the tribe extended throughout the Te Urewera – the area recognised as the homeland and storehouse of the tribe. The Tuawhenua settlement of Ruatāhuna is located in the central part of Te Urewera and currently consists of approximately 72 households clustered around 10 traditional marae (meeting places; Morunga and Tahi, 2013). The settlement is surrounded by approximately 20,000 hectares of lands of which more than 95% is covered with mixed oceanic temperate rain forest. These lands are owned by the various sub-tribes of Tuawhenua and managed in part by the Tūhoe Tuawhenua Trust. The area is also nestled within the much larger forested region of Te Urewera (~212,000 ha) – the area that was originally Te Urewera National Park but was devolved as part of co-management arrangements legislated within Tūhoe's Treaty of Waitangi land claim settlement (New Zealand Government, 2014).

Forest canopies on Tuawhenua lands are dominated by evergreen angiosperms such as tawa (*Beilschmiedia tawa*, Lauraceae) and tawhero (*Weinmannia racemosa*, Cunoniaceae) with emergent Podocarpaceae conifers (e.g. *Prumnopitys* spp., *Dacrydium cupressinum* and *Podocarpus* spp.). These conifers are prized for their high quality timber and large size (>30 m height,>1m stem diameter). Selective logging between 1950 and 1975 by a private forestry companies removed a large proportion of the conifers from sections of Tuawhenua lands, but in particular from alluvial terraces and accessible toe-slopes. Regeneration and post-logging recovery has been poor leading to the current dominance by shade-tolerant angiosperms, particularly tawa (Carswell et al., 2007). Current local economic development activities within Tuawhenua's forests are limited to small locally-run eco-tourism and apiculture businesses specialising in guided bush treks and bush honey (e.g. mānuka, *Leptospermum scoparium*) production respectively.

The rivers and forests around Ruatāhuna have historically provided the community with a valued source of native biota for food (e.g., kererū, New Zealand pigeon, *Hemiphaga novaeseelandiae novaeseelandiae*; tuna, long-fin eel, *Anguilla dieffenbachii*); medicinal plants, construction materials (e.g., tōtara, *Podocarpus totara*); clothing products (e.g., mauku, hen and chicken fern, *Asplenium bulbiferum*); firewood (e.g., tawa); and sites for cultural (e.g., *waahi tapu*, sacred sites) and recreational (e.g., camping) activities. Population declines in some native flora and fauna together with protective government conservation legislation has increasingly restricted access and availability of native species to Māori over the last century. Subsequently some exotic species within the forest are now also valued as sources of meat (e.g. red deer *Cervus elaphus*, feral pig *Sus scrofa*) and fur (e.g. Australian brushtail possum *Trichosurus vulpecula*). These exotic species however lack the cultural significance and expressions associated with much of the native flora and fauna. While less than a quarter of the Tuawhenua community now regularly enter and use the forest each week (≥3 times per week; Lyver et al., 2016b) they continue to associate with the forest and its waterways for spiritual, intellectual and physical sustenance.

2.2. Survey interviews with Tuawhenua forest users

This study emerged from discussions between researchers and the Tuawhenua community as part of a 15-year forest research initiative. As a first step the concept was formally introduced to Tuawhenua Trust members for feedback, and then to the wider Tuawhenua community through a series of workshops. Guidelines and ethical approval to conduct the research were considered and approved as part of a Memorandum of Understanding between the host research institute, Landcare Research, and Tūhoe Tuawhenua Trust. In addition, a signed Cultural Safety Agreement between individual researchers and the Tuawhenua Trust detailed obligations around prior and informed consent, intellectual property and ownership of traditional and scientific knowledge, confiden-