

RESEARCH ARTICLE

Key biocultural values to guide restoration action and planning in New Zealand

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A pluralist and cross-cultural approach that accommodates differing values while encouraging the collaboration and social cohesion necessary for the complex task of ecological restoration is needed. We used qualitative and quantitative analyses to investigate value assigned to biocultural restoration of coastal forests in northern New Zealand by 26 interviewees from three groups (environmental managers, Māori community members, and community project leaders). Māori community members primarily emphasized the importance of *Cultural Stewardship* and *Use* in the restoration process, while placing less emphasis on *Ecological Integrity*. Otherwise, all participants shared common trends, culminating in three interrelated value sets: (1) *Personal Engagement*, (2) *Connection*, and (3) the generation and transfer of *Knowledge & Wisdom*. These values demonstrate that restoration's benefits to people and community are as significant as its reparations of ecological components. Despite differences, all stakeholders were united in a broadly common goal to restore socio-ecological systems. Their knowledge and shared passion for conservation signal enormous promise for accelerated and effective restoration of coastal forests, if it is conducted using a pluralistic approach. Because some values expressed were intangible and complex, with cross-cultural dimensions, current valuation tools used by ecological economists to guide management investment fail to adequately account for, in particular, Māori values of ecological restoration.

Key words: biocultural aspirations, coastal forests, community restoration, Māori, values

Implications for Practice

- Cultural stewardship and future customary use of natural resources are often key outcomes desired by indigenous communities from ecological restoration initiatives.
- Restoration values are often inseparable and intangible, with interrelated and complex dimensions based on cultural and professional differences.
- The value to people and community of being involved in ecological restoration is as significant as its reparations of ecological elements and systems.
- Cross-cultural accommodations do more than removing conflict and mobilizing more local resources for restoration; they can also suggest different directions and methods for success, and trigger transformation of personal and community values that extend well beyond and applications to ecological restoration.

Introduction

Historically, conservation management focused on habitat protection and recovery of individual threatened species (e.g. the United States Endangered Species Act). Now, where widespread habitat destruction has been slowed, and species recovery actions are well established, there is increasing emphasis on active restoration of ecosystems and biotic communities as a whole. Such activities have engendered scientific,

technical, and philosophical discussion. However, the values of those people who design, perform, and potentially benefit from restoration are not usually emphasized as integral components of this discussion (Woolley & McGinnis 2000).

A social-ecological systems perspective places humans within nature and emphasizes the reciprocity between environmental and social wellbeing (Berkes et al. 2003; Sterling et al. 2010). In parallel, both literature and practice are now shifting towards empowerment of local communities and environmental actors to protect, use, and restore ecosystems (Agrawal 2005; Berkes 2007). Thus, conservation and ecological restoration must be undertaken as if "people really matter" (Edwards & Abivardi 1998; Aronson et al. 2006). This approach will incentivize and sustain the actions of those who engineer ecological

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change, whereas ensuring that relationships between people and place are deepened rather than dislocated.

A pluralist approach that accommodates differing views would encourage the collaboration and social cohesion necessary for ecological restoration, which can be an exceedingly complex task (Bradshaw 1996). This approach acknowledges that environmental stewardship is a human and ethical construct that varies across communities and cultures. The Society for Ecological Restoration (SER) defines restoration as a process for the recovery of ecosystems that have been degraded, damaged, or destroyed (Society for Ecological Restoration International Science & Policy Working Group 2004). SER has since stated that the concept also includes biodiversity, ecology, spatial, and historical contexts, and sustainable cultural practices (United States Environmental Protection Agency 2013). An approach that includes both pluralism and social-ecological resilience requires this definition to focus more on the recent additions to the concept. The recovery process of mutually interdependent ecosystems needs to include human societies and their communities, shifting the emphasis to strengthening social-ecological links between people and environment, especially when indigenous peoples are involved. Crossing the cultural divide between indigenous and western conservation and science-based approaches to biodiversity protection and restoration however has provided challenging for national initiatives and international platforms (e.g. Inter-governmental Platform on Biodiversity and Ecosystem Services—IPBES; Thaman et al. 2013).

Placing people closer to the center of ecological restoration inevitably forces ecological managers to confront how to accommodate widely varying goals and ways of reaching them. Like all environmental management, restoration is a collective and community contract about how resources and land will be allocated and used. Although many commentators acknowledge values, *value*, and *valuation* as important for ecological restoration, these terms can be easily conflated and confused. We follow Olson & Zanna (1993, p 125) in defining *values* as being “generally conceptualized as higher-order evaluative standards, referring to desirable means and ends of action” (e.g. Rokeach 1973). Such values are viewed as potential determinants of preferences and attitudes. In line with Olson and Zanna’s understanding of values, therefore, the primary goal of this article is to identify the cross-cultural values associated with restoration that may determine preferences and attitudes in future resource allocation decisions.

Our first objective was to identify emergent collective values related to biocultural restoration of coastal forest ecosystems in New Zealand. The terms “eco-cultural” (Martinez 1995), or “biocultural” restoration (Maffi & Woodley 2010), aim to equally improve both biological and cultural diversity. A pluralist approach to valuation may respect and allow for the variety of ways values can be expressed, as opposed to a standard economic approach, which requires value to be judged monetarily (Robertson 2011). Our second objective therefore focused on defining and interpreting values that stakeholders attached to coastal forest restoration.

Methods

Background

New Zealand is considered one of the world’s biodiversity hotspots (Mittermeier et al. 2005) but many of its ecosystems are now highly degraded as a result of deforestation and biological invasions (Young 2004). Prior to the arrival of humans in New Zealand (approximately 1250–1300 AD) forests once covered between 85–90% of the total land area but clearance by Māori and Europeans reduced this coverage to 25% of its original area (Perry et al. 2014). Most of the forests cleared were lowland or easily accessible conifer–broadleaf forest on the coasts and eastern sides of the two main islands—replaced by short grassland, shrubland, and fern land (Dawson 2015). In addition to deforestation effects, the introduction of mammalian predators by humans had disproportionately large impacts (Diamond 1990). For example, 41% of all bird species have become extinct since human settlement (Tennyson & Martinson 2006). To combat these losses, over 100 offshore islands have been cleared of introduced mammals (Townes et al. 2013), around 60 sanctuaries have been established on the mainland and another 16 on near-shore islands (Russell et al. 2014), and an estimated 4,000 community groups are involved in restoration (Butler et al. 2014; Peters et al. 2015).

The Stakeholder Interview Process

Twenty-three semi-structured interviews were conducted with 18 males and 8 females, ranging in age from 20 to 80 years. Snowball sampling was used to identify a potential pool of those directly involved with the facilitation of coastal forest restoration in northern New Zealand (Fig. 1). From this pool, we applied purposeful selection to interview those who would expand or challenge our understanding of the value of restoration (Neuman 2000; Fossey et al. 2002; Polkinghorne 2005). Interviews ranged from 30 to 70 minutes (averaging 45 minutes), and each was audiotaped and transcribed verbatim. Interviewees were guaranteed anonymity. All potential participants we approached agreed to be interviewed.

We sought interviewees within three stakeholder groups: (1) *tangata whenua* (TW; $n = 12$), Māori for “people of the land,” refers to Māori community members; (2) community leaders (CL; $n = 2$), community members of non-Māori descent actively involved in leading restoration projects through nongovernmental organizations; and (3) environmental managers (EM; $n = 10$), process professionals of non-Māori descent employed by environmental management organizations. Two additional interviewees belonged to two stakeholder groups (one TW/EM and one TW/CL), and were separated for statistical analyses and labeled accordingly. The 12 TW interviewees were from three Māori tribes from the northeastern coast of New Zealand (Ngāti Awa, Ngātiwai, and Ngātikahu ki Whangaroa; Fig. 1).

Eight open-ended questions were used to gently guide discussion of restoration goals, motives for supporting and participating in restoration initiatives, and potential benefits provided by restoration: (1) Can you please tell me a bit about your connection to this area, especially in relation to coastal forests and

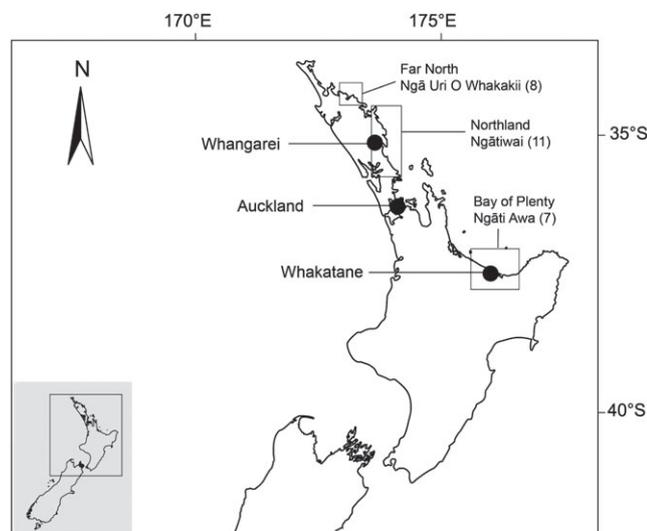


Figure 1. Locations of participant groups and Māori tribes with the number of research participants from each area given in brackets.

islands? (2) What things come to mind when thinking about the importance of coastal forests and island areas? (3) What would you like these areas to be like in the future? (What would “successful” restoration look (feel or sound) like to you?) (4) How would you want to go about achieving restoration and who would be involved, in what capacity? (5) What relevance do you see Māori traditional knowledge, systems, and values having for the restoration process? (6) Do you think the values that are important to you will be reflected as restoration proceeds? (7) What motivated you to be involved in this sort of work? and (8) Are there any other aspects about coastal forests or their restoration that you think are important? Following Campbell and Smith’s (2006) example, codes were used to analyze and indicate stakeholder groups (TW, EM, and CL) and gender (M and F). For this article, quotations were mildly edited to remove stutters, pauses, and grammatical errors, whereas retaining their integrity.

Qualitative Analysis

Because people’s values are complex and variable, a deep and nuanced qualitative analysis is demanded. For this study, we used a grounded theory approach (Strauss 1987; Glaser 1992) to interpret the study’s interviews. This approach was chosen because of its appropriateness for cross-cultural work, where indigenous perspectives are rarely incorporated into existing literature and model-building. Additionally, where a strong verbal tradition is the main communication method, this approach is culturally appropriate. Transcripts were coded inclusively, which enabled similarly labeled segments of text to be synthesized, whereas assessing patterns, connections, and distinctions among them (Fossey et al. 2002; Braun & Clarke 2006). Constant comparisons were used to classify, compare, group, and refine segments of text to identify themes within the data (Glaser & Strauss 1967), satisfying Patton’s (1990) criteria of internal

homogeneity and external heterogeneity. Initial coding to identify the main value sets was completed manually, but the text was later entered into the NVivo™ version 9 (2010) software program to assist with detailed analysis and quantification of the discourse.

To map the words according to both our qualitative and quantitative analyses, we categorized some of the most recurring themes. For the purposes of this mapping exercise, we chose to identify six key value sets as significant to the interviewees: (1) cultural stewardship (*Kaitiakitanga*); (2) use (*Ahi Kaa Roa*); (3) personal engagement (*Whakamana*); (4) connection (*Whanaungatanga*); (5) knowledge & wisdom (*Mātauranga & Māramatanga*); and (6) ecological integrity (*Mauri*). We attempted to match the closest *Te Reo Māori* (Māori language) words to their indirect English equivalents, recognizing, however, that *Te Reo Māori* words may have deeper meaning and interpretation than described here. For the purposes of international understanding, we here use just the English titles. We recognized too that other recurrent but less mentioned themes, such as “place” and “spirituality,” could also have been interpreted as significant.

Quantitative Analysis

Qualitative analysis was our chosen method, to act as the cornerstone of our project. However, we chose to use quantitative analysis to increase dialogue and further support the validity of our qualitative results. Additionally, the cross-analysis of our data allowed us to be critical of our initial results. This novel approach allows transparency, providing greater variance of interpretation and accessibility to readers.

We primarily used quantitative methods to assess the relative importance of each of the six key value sets we had used as examples, after first recognizing their themes through qualitative means. The total number of words coded for each value was counted within *NVivo*. We assumed that, with exceptions, interviewees chose to speak about issues that they considered most pertinent to their values and beliefs; the frequency of words used in the discourse should thus provide a relative index of the importance of each concept for individual interviewees as well as for stakeholder groups.

After conducting the qualitative analysis, we determined that interviewees clearly emphasized different values. We thus applied a principal components analysis (PCA) to the number of words coded for each value set, to formally describe the primary aspect that separated individual participants, as interviewees emphasized different aspects of ecological restoration. To perform the PCA, the total number of words coded for each value set per interviewee was first standardized to have a mean zero and unit variance (Manly 2005). This method ensured that values with the most overall words associated with them did not dominate the analysis of variation between interviewees. The first and second principal components (PC1 and PC2) are therefore an aggregated index of characteristics that make the value emphasis of one interviewee most different from another.

Linear models using residual maximum likelihood (REML) methods were then used to test whether or not the number of

words coded for each value set is approximately equal between stakeholder groups, gender, and age groups. The total number of words spoken in each interview was also included in the REML models, to account for the variable interview durations. All statistical analyses were performed in the REML and Multivariate Analysis routines of GenStat™ version 13, 2011 (Lawes Agricultural Trust, Rothamsted Experimental Station). The distribution of residuals around model predictions was inspected to ensure reliability of the models.

Results

Overview of the Discourse

Overall, interviewees were enthusiastic about prospects of biocultural restoration of New Zealand's coastal forests, with frequent ($n = 187$) statements reflecting positive emotional outcomes to restoration efforts. Instances in rank order of occurrence include words such as "special," "awesome," "happy," "wonderful," "exciting/excited," and "passionate/passion." There was also a collective sense of grief regarding environmental degradation, as well as the loss of one's interaction with the environment. Among the 78 instances of this kind, the most common sentiments were "sorry/sadness/sad," "bad," "unfortunate/unfortunately," "nightmare," "terrible," and "devastated." There were also expressions of worry and tension associated with the challenges, and recognition that the future process for effective restoration requires gradual steps and a large amount of work.

Key Value Sets Revealed by Qualitative Analysis

The cultural stewardship value includes concepts relating to environmental stewardship for one's community, preservation of Māori traditions, and cultural revitalization. All TW interviewees emphasized cultural stewardship, whereas only 25% of the EM interviewees spoke about the importance of this theme. Within this theme, interviewees noted that restoration enables people to provide for and unify their communities, both in present and future generations. They also emphasized their collective responsibility to protect the health of their community and environment. Such comments include: "My biggest worry is [that] my grandchildren will grow up and call me 'useless'" (TW-M3). Other TW interviewees discussed the potential for restoration to act as a vehicle to help communities regain independence, autonomy, and decision-making power. One such example reads, "We've been like a people interrupted in our decision-making capacity. We are regaining our nationhood as a decision-making body" (TW-F3). Both TW and EM interviewees also highlighted the importance of maintaining healthy land because of its spiritual and symbolic significance to Māori culture. Many mentioned the value of restoration to enable communities to maintain their cultural heritage, traditions, and values.

The second value set, use, reflected the ability of restoration to improve both consumptive and nonconsumptive methods of using the environment that benefit people. Interviewees from

all groups noted that restoration efforts enhance such activities as harvest of food and medicine, recreation, employment, and tourism. The ability to maintain customary harvest was especially important among TW interviewees: "If we can restore some of the environment that the coastal areas had, we'll also enhance our opportunities for customary harvest of things like birds" (TW-M7). Values of nonconsumptive use were discussed as well. For example, "[Restoration] is part of our economic future ... if we want to create recreational or tourism experiences" (EM-M4).

The value personal engagement was discussed by 21 of the 26 interviewees and encapsulated the notion that restoration efforts provide direct opportunities for people to act towards a common good, by empowering actors to make a difference. According to interviewees, participation in restoration projects demonstrates that people can make a positive difference, and often inspires participants to pursue future tasks to better their communities: "They've suddenly realized they can do something" (EM-F5). It has also allowed people to gain a sense of personal engagement and self-worth, which has acted as a healing mechanism for individuals. For example, "[Restoration is about] tackling something that people said couldn't be done" (EM-M7).

The value set entitled connection reflected interrelated concepts of restoration's ability to foster relationships both among people and between people and the place being restored. For some interviewees, the role of restoration in building understanding, facilitating cross-cultural linkages, and guiding interactions among people who would not otherwise connect with one another is important. Restoration projects have also allowed collaboration to begin with multiple stakeholders, which helps to build trust and reshape perceptions of the other. "We always treated them [scientists] with suspicion," one interviewee said. "Those suspicion levels have dropped and we're starting to look at it from a whole new perspective" (TW-M7). Connection also highlights the capacity of restoration to maintain or revitalize relationships between people and the environment in which they live. For example, "People are looking for what makes New Zealand special and different and great, and I think part of the answer is our relationship to the character of the land and environment around us" (EM-M4).

Knowledge and Wisdom represents the opportunity that restoration provides for teaching (imparting knowledge on others) and learning (gaining knowledge, both from other people and directly from the environment). In particular, restoration projects allow youth to learn from the environment, and to gain knowledge about caring for the environment and their communities: "You get the young ones involved, it's teaching them important things for life," notes one interviewee (EM/TW-F). Restoration projects also allow elders to teach youth about indigenous and local knowledge. Such an example reads, "Unless you know the story behind it [a pā or village site], it's just a hole in the ground" (EM-M7). In addition, a key interview topic within this theme was the value of experiential learning, when compared with second-hand learning: "You can have a good talk, but when it's got a bit of a walk behind it, then people can grasp things" (TW-M3). Some interviewees noted that

learning from others was both a challenge and an integral value of restoration.

The final value set identified within the interview data, ecological integrity, reflects the value of restoration to protect rare and threatened species, as well as to help build functioning ecosystems, “to lift the biodiversity value in an already important place” (EM/TW-F). Although there were differing opinions regarding whether this restoration should be active or passive, there was overall consensus that New Zealand’s coastal forests are becoming increasingly threatened, and that all threatened species need to be protected: For example, “I’m in it for the birds really, the kiwi [*Apteryx mantelli*]” (EM-M2). As well, restoration was seen as important for the recovery of ecosystem function and structure. Such an example reads, “[Success] would be a healthy and viable coastal forest system where the forest is functioning and you’ve got all the layers: the forest canopy, the undergrowth, and the mid-canopy” (EM-F5). Restoration’s ability to provide suitable habitat for the survival of species was also a key discussion topic: “It would be nice to think that our restoration got to a point that we were able to look at that full suite of animals and plants” (EM-M1).

Key Value Sets Revealed by Quantitative Analysis

We explored variation in the number of words dedicated to each of the six value sets by interviewees, as recognized by the qualitative analysis using a PCA. The PC1 and PC2 explained 32 and 24% of the variation between interviewees. The eigenvectors are the coefficients for PCs; thus, the larger the coefficient, the more that value’s word-count determines the PC calculated for its corresponding interviewee. Interviewees scoring a low PC1 tended to emphasize cultural stewardship, connection, and use values, and gave less emphasis to ecological integrity. Interviewees scoring a low PC2 tended to speak relatively less about knowledge and wisdom, connection, and personal engagement than their counterparts.

When the stakeholder group identity is mapped to PC scores, it becomes clear that TW interviewees have lower PC1 and PC2 scores than EM interviewees (Fig. 2). REML models confirmed differentiation in relative emphasis of each value by stakeholder groups along the first two PC axes (see Table 1). Study group was a stronger predictor of the number of words spoken about three of the six value sets (see Table 1). Tangata whenua interviewees spoke much more about cultural stewardship and use, and much less about ecological integrity, than did CL and EM interviewees (Fig. 3). There was no evidence that stakeholder group affected the number of words spoken about personal engagement, connection, or knowledge and wisdom. Gender and age did not predict a statistically significant portion of variation in either PC or in most value sets (Table 1).

Cross-Cultural Partnerships

Some TW interviewees strongly believed that indigenous approaches were essential for biocultural restoration success and blamed Western societal paradigms and attitudes to land use for the despoliation of their local areas. Although some TW

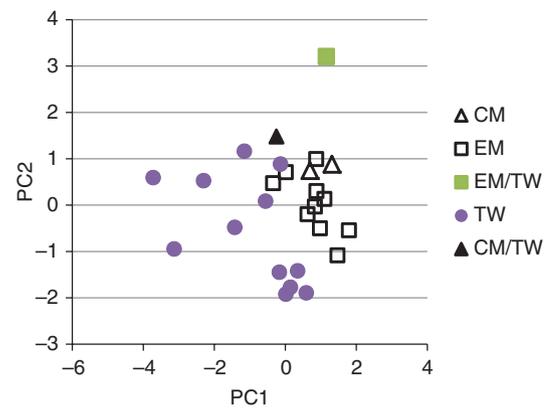


Figure 2. Principal components analysis to explore the variation in number of words coded to each of six value sets by three study groups in 23 interviews about coastal forest ecosystem restoration. One research participant (EM/TW) was a member of both the TW and environmental manager study groups, and another (CL/TW) was a member of both the CL and TW study groups.

Table 1. Linear models to predict the PCA scores and number of words coded to each set of values concerning coastal forest ecosystem restoration during 23 interviews. ^aA square root transformation was used to normalize residuals in the REML model.

Response Variable	Study Group	Age Group	Gender	Total Number of Words
PC1	<0.001	0.083	0.89	0.217
PC2	<0.001	0.052	0.454	0.989
Cultural stewardship	<0.001	0.025	0.639	0.054
Use	0.044	0.216	0.429	0.179
Personal engagement	0.201	0.092	0.142	0.302
Connection	0.859	0.219	0.287	0.981
Knowledge and wisdom	0.737	0.508	0.351	0.685
Ecological integrity	0.001	0.738	0.598	0.763
Consumptive use	0.03	0.336	0.701	0.207
Non-consumptive use (square root ^a)	0.185	0.667	0.716	0.652

interviewees expressed extreme frustration and anger, others acknowledged the pain of colonization while asserting the need to move beyond indifference to reassert their decision-making authority. One interviewee admits, “We’re sad for our environment, we’re sad for ourselves. It’s like being continuously abused by another culture” (TW-M2).

One of the recurring challenges identified by interviewees was the constitutional-level partnership between Māori tribes and the “Crown” (a term used historically in reference to Her Majesty, Victoria, Queen of England, but in more contemporary literature and legislation for the government of New Zealand). This partnership was outlined through the Treaty of Waitangi signed in 1840 between Māori chiefs of the time and representatives of the British Crown and is considered to

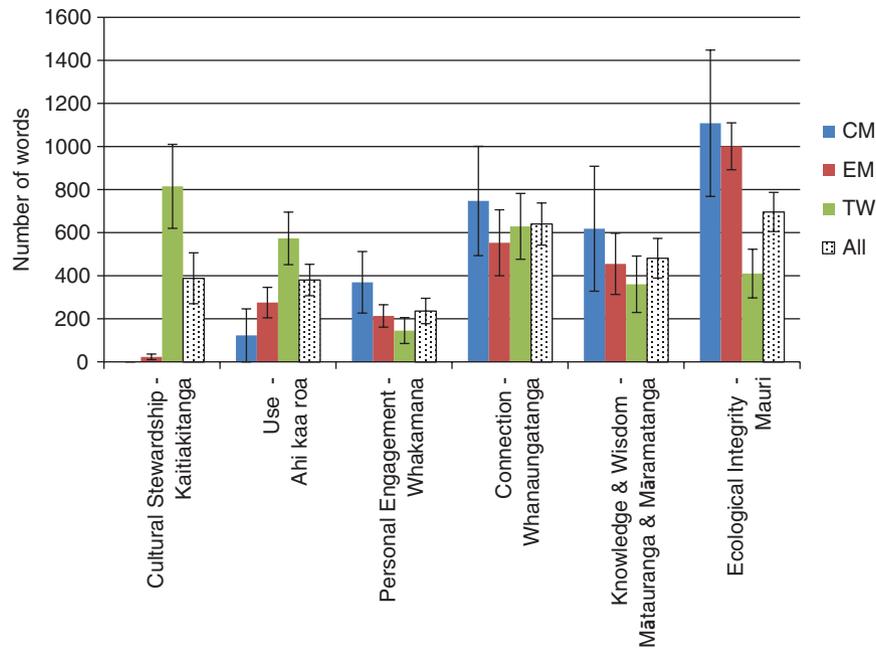


Figure 3. Mean number (\pm SE) of words spoken concerning each value set during interviews. One research participant was both TW and EM and another TW and CL. Both were excluded from the calculations for each study group, but they are included in the grand means for all groups combined. Differences between study groups were statistically significant for cultural stewardship ($p < 0.001$), use ($p < 0.05$), and ecological integrity ($p = 0.001$). There was no evidence for differences among groups for personal engagement ($p = 0.201$), knowledge and wisdom ($p = 0.737$), or connection ($p = 0.859$).

be New Zealand's founding document. The Treaty was created to protect the rights and property of Māori by giving chiefs and tribes "full exclusive and undisturbed possession of their Lands and Estates Forests, Fisheries, and other properties which they may collectively or individually possess," whereas requiring the British Crown to establish a civil government over all inhabitants of New Zealand (Orange 1987). Māori see their constitutional right to manage, restore, and use their natural resources and environments in accordance to their custom and practices as enshrined in the Treaty, but feel that these rights have been largely denied them under governments dominated by non-Māori (New Zealand Waitangi Tribunal 2011). In that regard interviewees acknowledged progress was still needed to develop truly bicultural partnerships that give Māori the opportunity to restore ecosystems reflective of their cultural worldview, values, and priorities. Despite the frustration evident among many of the TW interviewees, and the lack of recognition of the cultural stewardship value among most EM interviewees, some non-Māori interviewees expressed anticipation about the prospects of increased expression of cultural stewardship.

Discussion

Value Differences Between Stakeholder Groups

The most apparent result from both the qualitative and quantitative methods of our research was the separation in values, among individuals within the same stakeholder group, as well as between Māori community members and mostly European

environmental managers. No distinct value emerged as the primary one held by practitioners of ecological restoration and often there was not even a primary value within individuals. Several interviewees pinpointed the multilayered importance of biocultural restoration, listing multiple evenly weighted values as its *raison d'être*.

All participants valued ecological restoration because of its ability to build connections between people; in total, more words were spoken on average about this value than any other. However, the wider indigenous peoples' literature as well as some of our interviewees did not just refer to connections between people; they also personified plants and animals, as well as features of the environment, and emphasized the significance of relationships between people and these nonhuman entities (Willerslev 2007; Walker Painemilla et al. 2010). The perception that humans are directly linked to plants and animals by genealogy [whakapapa] reflects a central Māori belief that humans are part of nature as opposed to separate from it (Kawharu 2002; Selby et al. 2010; Dick et al. 2012). Such a view even questions whether there is a distinct and separate identity that others term "environment" European conservationists often misinterpret a lack of membership to conservation-based non-governmental organizations (NGOs) by indigenous people as a sign that they are not true conservationists (Bullard 1993). However, in reality, they may just actively participate in "conservation" in a more multifunctional and community-integrated way, through other outlets. We do not accept Smith and Wishe's (2000) fundamental assumption that any activity must be solely directed to conservation (as defined

by eurocentric conservation philosophers) before a culture could be considered to have a conservation orientation.

Cultural and professional differences in values, the tensions between individual and group priorities, and the relative emphases of tangible and intangible values are examples of dichotomies emerging from this study. Another key dichotomy that emerged was between process-oriented and outcome-oriented values. Although some of the values expressed clearly stated intended outcomes, such as the reintroduction of native species or food supply for the community, others did not weigh the outcome itself as significant. Instead, they focused on the process or act of restoration as the central value. Such examples include collaboration with community members and empowerment to make a difference. The importance of relationship and long-term partnership was a key theme throughout the interviews, and the act of participation in itself was considered valuable.

Achieving a Pluralistic and Cross-Cultural Approach

Even though all stakeholder groups discussed most value sets, each group assigned such values in different ways. In addition, the PCA and statistical modeling emphasized the variation between individual interviewees within each group. Māori accent on political agency and assertions of cultural stewardship are hardly surprising, considering the grief of colonization as well as the acculturation that came in its wake (Taiepa et al. 1997; Stephenson & Moller 2009) and the direct consequences of loss of natural resources and biodiversity (Dick et al. 2012).

The almost complete absence of acknowledgement of the cultural stewardship value in the discourse of the EM interviewees was a significant finding from the interviews. These process professionals, and their organizations, are key enablers or barriers to successful restoration in New Zealand. Thus, their lack of cognizance of an important value held by Māori stakeholders is, at best, a sign of lost opportunity for partnership and, at worst, a sign of conflict and resistance to upcoming coastal forest restoration, especially on land that is not in public ownership. Alternatively, interviewees from the EM and CL stakeholder groups may not have felt it was their role or within their scope of expertise to discuss the concept of cultural stewardship, so they refrained from mentioning it.

All the Māori interviewees saw cultural stewardship, which was often associated with use, as a means to maintain, reestablish and develop tribal traditions, practices and knowledge relating to coastal ecosystems. For example, the recovery of the grey-faced petrel (*Pterodroma macroptera gouldi*) populations, a burrowing seabird which is both an ecosystem engineer and cultural keystone species, was a restoration priority for many of the TW interviewees. The annual harvest of grey-faced petrel chicks by northern Māori tribes such as Ngāti Awa, Hauraki, Ngātiwai and Ngātīkahu ki Whangaroa provides those tribes with a valued food source, but also a sense of identity and place, and link to family and culture (see Lyver et al. 2008). Tangata whenua interviewees also recognized that the integrity and continued transfer of the indigenous knowledge that informs their

cultural stewardship relies heavily on being able to practice a harvest.

Many locals see and care most about changes in their neighborhoods over decades (McCarthy et al. 2013). They also often retain the political agency or land ownership to control what, if anything, is done to maintain or restore biodiversity and ecosystem services. They are immersed in the detail and nuances of a local place, community, culture, and language. Building feelings of trust and acceptance by local environmental guardians demands taking the time at the beginning of any restoration project to develop relationships and sharing governance of a mutually agreed process about how restoration is to be achieved (Moller et al. 2009).

Benefits to People are as Significant as Reparation of the Ecosystem

Restoration of coastal forests must be more than ecologically sustainable; it should also be socially and culturally acceptable, as well as economically feasible (Hull & Gobster 2000). Our work builds on increasing recognition of the importance of people and their different values in achieving restoration success (Woolley & McGinnis 2000). Just over 80% of participants expressed the value of personal engagement in restoration efforts. This value set varied the least on average between stakeholder groups, which confirms the widespread importance of personal engagement as a value driving ecological restoration across cultures and stakeholders that share interests in local ecosystems. These findings are echoed by the international literature, which recognizes that the interplay between individual agency and collective identity is fundamental for sustainable resource use and the building of an environmental ethic among actors (Agrawal 2005; Hobson Haggerty 2007; Clayton & Myers 2009). This important relationship with the land, nurtured through local participatory projects, is what Higgs refers to as “focal restoration” (Higgs 2003).

By coming together as a community for restoration, regardless of ethnicity or profession, individuals can see commonalities in their experience and goals. This reinforces feelings of being part of a community, by developing a shared history, shared experiences in a common place, and a sense of shared identity (Horwitz et al. 2001; Cheng et al. 2003). People thereby reaffirm social relationships in a way that demonstrates mutual caring and kinship (Stewart et al. 2004; Leigh 2005). An integral systems approach that recognizes the interrelatedness of human and environmental care is more likely to succeed (Esbjorn-Hargens & Zimmerman 2009).

Future Economic Assessment of Priorities in Ecological Restoration

Many of the values emphasized by our study participants are inseparable and intangible, with interrelated and complex dimensions based on cross-cultural and professional differences. New tools to understand values (and valuation) that are being developed to engage in ecological restoration need to be used with caution and should adequately consider which and

whose values are represented. Despite the challenges, our interviewees indicated an overwhelmingly positive opinion about the value of conducting ecological restoration. The insights obtained from the interviews demonstrate where values may differ between ethnic and professional groups. However the interviews also underscored a shared enthusiasm to restore coastal forests, so the prospects for collective cross-cultural partnerships are immense provided nuanced approaches and tools are used to guide restoration and account for some differences of emphasis. In a finite world where land and resources for ecological restoration need to be rationed, there is a looming need for economic valuation methods to properly account for many of the benefits, costs, and motivations for restoration described by our interviewees. Although these methods are at times relevant, especially when resources must be allocated and rationed, it would be prudent to cross-check them through a pluralist approach before decisions are finalized.

Understanding the power asymmetries over both the control of biocultural restoration initiatives and the resources needed to enable it is crucial to achieving cross-cultural restoration goals (Armitage et al. 2008). The comparatively limited research of Māori and other indigenous worldviews could risk exclusion of their perspectives in economic valuation, goal-setting, and decision-making. Limitations of economic valuation methods are likely to discount the full weight of Māori perspectives. This risk arises partly from the difficulty of measuring characteristics of complex ecological and social systems, but is also exacerbated by the predominantly intangible and interconnected nature of the underlying values. Current economic valuation tools struggle to reliably account for cultural values such as identity, kinship, or connection to place—none of which can be observed in market transactions. An indigenous worldview that emphasizes holism and interconnection is more likely to struggle to separate people and economy from the environment because the very importance of each one is entirely dependent on the presence and health of the others. This codependence makes it more difficult to weigh intangible values accurately against more tangible values that can be quantified by market-derived estimation techniques (Adamowicz et al. 1998; Venn & Quiggan 2007).

The assumption that people are economically rational individuals (i.e. self-interested consumers, seeking to maximize their personal wellbeing) is in contrast to the indigenous perspective which focuses on the individual that is part of the community (Niemeyer & Spash 2001). Economic tools usually assume individual rational choices, yet many of the values driving conservation in general concern group or collective choices for improved environmental care: conservation and restoration efforts require a “social contract” for collective action if they are to be effective and sustained (Craig et al. 2013). Any application of an economic valuation tool to guide biocultural restoration therefore must be directed to simultaneously maximize collective wellbeing and environmental health.

More fundamentally, some indigenous peoples (as well as many conservationists in various cultures) hold some places,

objects, resources, and ideologies as invaluable and nonnegotiable. Substitutability of goods and services, which are essential for most nonmarket valuation, may not be feasible or valid. The very presumption of estimating a monetary value for deeply held and spiritual values may undermine some cross-cultural partnerships. We therefore caution against imposition of economic valuation techniques to guide biocultural restoration investments, and emphasize that any such deployment is always safeguarded by a strong cross-cultural comanagement of the research and interpretation of results.

It will be particularly difficult to separate issues of restoration from other aspects of social and economic determination, especially in communities with histories of cross-cultural conflict, alienation, ecological loss, or denigrated cultural identity and its associated loss of political agency to drive biocultural restoration. The coastal forests considered in this study are greatly degraded and many of the cultural–ecological links that underpin peoples’ relationships to the forests have been severed. We are skeptical that current economic tools can adequately value the experiential and complex cultural values at stake before they are reinstated.

Despite their limitations, we do see potential value in economic valuation techniques to empower biocultural restoration decisions, and we urge research to develop more inclusive tools for adequately incorporating intangible and nonmarket values. Provided the tools are not applied on their own and that decision-makers remain aware of their limitations, the very act of applying economic tools within cross-cultural collaborative partnership may help clarify benefits and risks, as well as shared and divergent values. Certainly participatory applications of valuation tools can usefully test those tools and spur their improvement. Improved cross-cultural understanding for more effective restoration would be an enduring benefit for our shared environment and conservation cultures.

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