

Public and ecology – the role of volunteers on Tiritiri Matangi Island

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Abstract: Tiritiri Matangi Island has attained an international profile as a successful ecological restoration project, and is often cited as a model of environmental stewardship. Ecological restoration on the island has always involved, and been dependent on, voluntary public involvement. Public participation in the project not only reinforces existing links between the public and scientific communities, but also facilitates even greater understanding of ecological concepts outside the professional and academic worlds. This paper examines enhanced ecological advocacy, ecological research and biodiversity management as outcomes of the collaborative involvement among the island's stakeholders, with 'public ecology' as an ultimate outcome.

Keywords: Tiritiri Matangi Island; island restoration; advocacy; public participation; citizen science; participatory governance, citizen ecology

Introduction

The need for public to understand the application of ecological principles in environmental management is not an uncommon theme in ecological literature (Bennett 1995; Wills & Hobbs 1998; Sutherland 2000; Worboys et al. 2001; Ludwig et al. 2001), with conservation strategies generally advocating the support of the wider community as a necessary component for success (O'Brien 1995; Worboys et al. 2001; Simberloff 2008).

The process of increasing the awareness and involvement of the wider community in conservation activities is an objective of the New Zealand Biodiversity Strategy (DOC / MfE 2000), but has been identified (historically) as a key challenge to achieving ecological sustainability (Bennett 1995; Worboys et al. 2001). Over the last two decades, the public have been exposed to ecological concepts more than ever through media reporting on the sense of urgency about the global-scale degradation of natural habitats (Novacek 2008). However, despite the extensive range of agencies with roles in communicating ecological science globally, there is evidence that public understanding of the concepts of biodiversity, ecosystem structure and functioning is poor (Forgie et al. 2001; NZ Ecological Society 2007; Novacek 2008; Lindemann-Matthies & Bose 2008; Cullen 2010).

Soulé (1995) states that a key to changing public understanding and values towards ecological issues is to foster positive visions through participation. Public participation in ecological restoration projects is a growing phenomenon globally (Miles et al. 1998; Bramston et al. 2011), and is now common place in New Zealand (Hardie-Boys 2010), with volunteers often forming community collectives dedicated to local projects. This participation is an effective vehicle for communicating ecological principles to at least a portion of the interested public.

The principal benefit of public involvement has been through physical and financial assistance to under-resourced government agencies (Bennett 1995). Bennett also predicted future scope for the public to contribute to data collection through involvement in surveys and ongoing monitoring, with increased awareness and understanding of environmental issues by participants as a positive outcome. The encouragement

of conservation on private land was considered an additional benefit of public involvement in restoration projects.

Public participation in Tiritiri Matangi Island

The involvement of the public in the Tiritiri Matangi Island project (Hauraki Gulf, New Zealand; see Fig. 1) exemplifies the benefits of public participation in ecological restoration, and meets all the educational outcomes both desired and predicted by the above authors. The island is often promoted as a successful model of environmental stewardship (Hartley 1997; Sutherland 2000; Weihong & Clout 2006; Norton 2009), and has inspired other projects and the commitment of individuals to environmental stewardship (pers obs.; Cessford 1995; Rimmer 2004). The success of Tiritiri Matangi has international recognition, a status confirmed through the project's listing as one of the top 25 restoration projects in Australasia by the Global Restoration Network in 2009 (McDonald 2009).

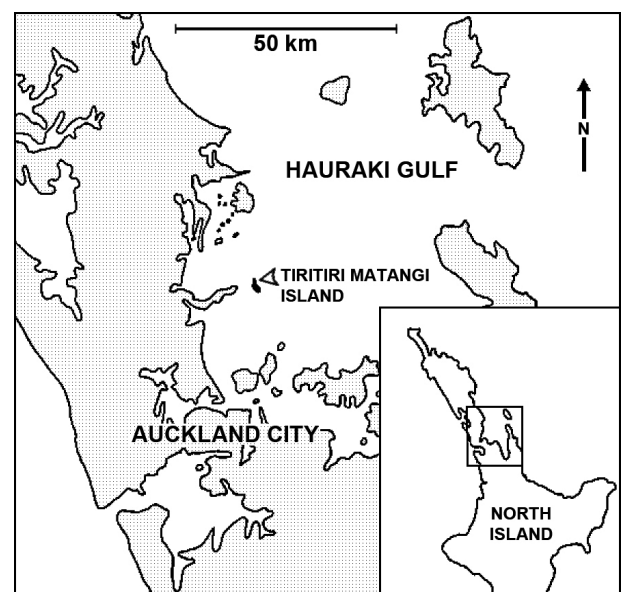


Figure 1. Location of Tiritiri Matangi Island, Hauraki Gulf (New Zealand).

Ecological restoration of the Tiritiri Matangi Open Sanctuary commenced in 1984. Although managed by a government agency, initially the Hauraki Maritime Park Board (1970–1987) and then by the New Zealand Department of Conservation (DOC; since 1987), the project has always been dependent on voluntary public contributions and involvement (Galbraith 1990; Galbraith & Hayson 1994; Craig et al. 1995; Galbraith 2009). Initially, public involvement in the Tiritiri Matangi project was controversial as this approach to a ‘scientific’ process of ecological restoration was at variance with the established views of governing authorities and traditional ecologists. Indeed, some tended to view public involvement with distrust and/or disdain (pers obs.; J. Battersby pers. comm.). However, despite successive restructuring of governing authorities, changes in policies and the recruitment of new volunteers, the consistency of the progression of the Tiritiri Matangi restoration project has been maintained by over-arching documents that have guided the project. These documents are the Conservation Management Strategy (DOC 1995, a regional management strategy for areas administered by the Department of Conservation) and working plans for the island (Department of Lands & Survey 1982; Hawley 1992).

Public contribution to the island was formalised in 1988 through the formation of an incorporated society, the Supporters of Tiritiri Matangi (SOTM), as outlined by Galbraith (1990) and Galbraith & Hayson (1994). The objectives of SOTM include the promotion and support of the restoration of Tiritiri Matangi as an open sanctuary for native fauna and flora, and the promotion of public awareness of the open sanctuary’s role. The constitution of the SOTM restricts the organisation’s expenditure to activities that support the island project as defined in the working plans. A Memorandum of Understanding between the Supporters of Tiritiri Matangi and the Department of Conservation was signed in November 2004. This document is a partnership agreement that acknowledges the statutory obligations and different roles of the parties, and serves to protect their respective interests.

The Department of Conservation has a statutory obligation to include the interests of Māori (iwi) in the management of natural resources (CRESA 1998). For SOTM, however, the relationship with local iwi who have traditional guardianship (*mana whenua*) over the island has been variable and sporadic, with iwi perspectives often sought and addressed only through formal consultation as part of permit or concession applications. There is, however, an increasing willingness and opportunity to develop more direct and regular communication between the groups.

Restoration projects gain many benefits from volunteer inputs (Forgie et al. 2001). The pool of skills available for management is increased, volunteers become advocates for the project and for environmental stewardship in general, and new knowledge can be applied to management decisions. Additional funding may also become accessible, e.g. from charitable organisations and donations. The motivation of individuals to contribute voluntarily to ecological restoration projects such as Tiritiri Matangi Island has been the subject of many investigations (Miles et al. 1998; Grese et al. 2001; Bramston et al. 2011; Hardie-Boys 2010), and can be summarised as helping the environment, learning more about the environment (ecological literacy), social belonging (social networks) and personal growth. These may be considered as ‘rewards’ that sustain the voluntary contributions.

From the initiation of the Tiritiri Matangi project, rewards provided motivation for ongoing public involvement.

Revegetation of the island started in 1984, with planting expeditions that included a 2 hour ferry trip each way from Auckland city, thus trips required a whole-day commitment by volunteers. The restoration managers at the time recognised the need to ensure that volunteers enjoyed the experience and were not overworked (R. Walter, pers. comm.). To achieve this, a standard pattern was established for the planting trips. Half the time was spent planting, while the other half was a reward of ‘sightseeing’.

At the same time as the replanting, a new population of the threatened North Island saddleback (*Philesturnus rufusater*) was established on the island. The range of this endemic bird contracted rapidly in the late 1800s, becoming extinct on the mainland by the 1950s (OSNZ 2010). The species remained extant on only one island, Taranga (Hen Island), off the north-eastern coast of the North Island. It was, therefore, a species that the public had little chance of seeing as Taranga is a closed sanctuary with difficult access. The establishment of a population on Tiritiri Matangi gave visitors an immediate opportunity to view this previously unfamiliar species. Saddleback observations were highly sought and valued, another reward for participating in the restoration project. The saddleback quickly became iconic for the island, and ultimately featured in the Supporters of Tiritiri Matangi logo.

As with the saddleback, the release of other species on Tiritiri Matangi has often been public (when timing and welfare considerations deemed such an event appropriate). Public releases have generally followed a pattern of visitors gathering for briefings about the species and the personnel involved, followed by close-up viewing of selected individuals of the species prior to their physical release on the island. For many of the visitors, the release may be the first, and perhaps the only, opportunity of viewing the species at close quarters. Public releases, therefore, have represented another form of reward for both visitors and volunteers (Galbraith & Hayson 1994; Parker 2008).

It is well recognised that, through sustained contribution to the Tiritiri Matangi restoration project and subsequent involvement in species management, volunteers have gained ecological understanding (Galbraith 1990; Galbraith & Hayson 1994; Cessford 1995; Parker 2008). This gain has strengthened the standing and credibility of volunteers involved with the island. That, in turn, has led to increased diversity of voluntary roles that now encompass advocacy, management and research. A conceptual model of this ‘evolution’ of public participation in the project, from a labour-only contribution to contribution to management, research and governance, is presented in Fig. 2.

Contribution of public to ecological advocacy

As an incorporated society, SOTM is a legal entity with the ability to manage funds and enter contracts under its own name (Ministry of Economic Development 2008). This status gives the society access to a range of funding sources inaccessible to a government body, and allows the group to engage in permitted activities on the island as a concessionaire. SOTM hold concessions from DOC for a souvenir shop and for operating guided tours on the island.

Optional guided tours provide a significant educational opportunity for day visitors (and a regular income for the organisation). Visitors tour the island in groups, with the volunteer guides presenting an overview of the restoration process, its rationale, and assisting in the identification of the island’s biodiversity. Tours are restricted to two well

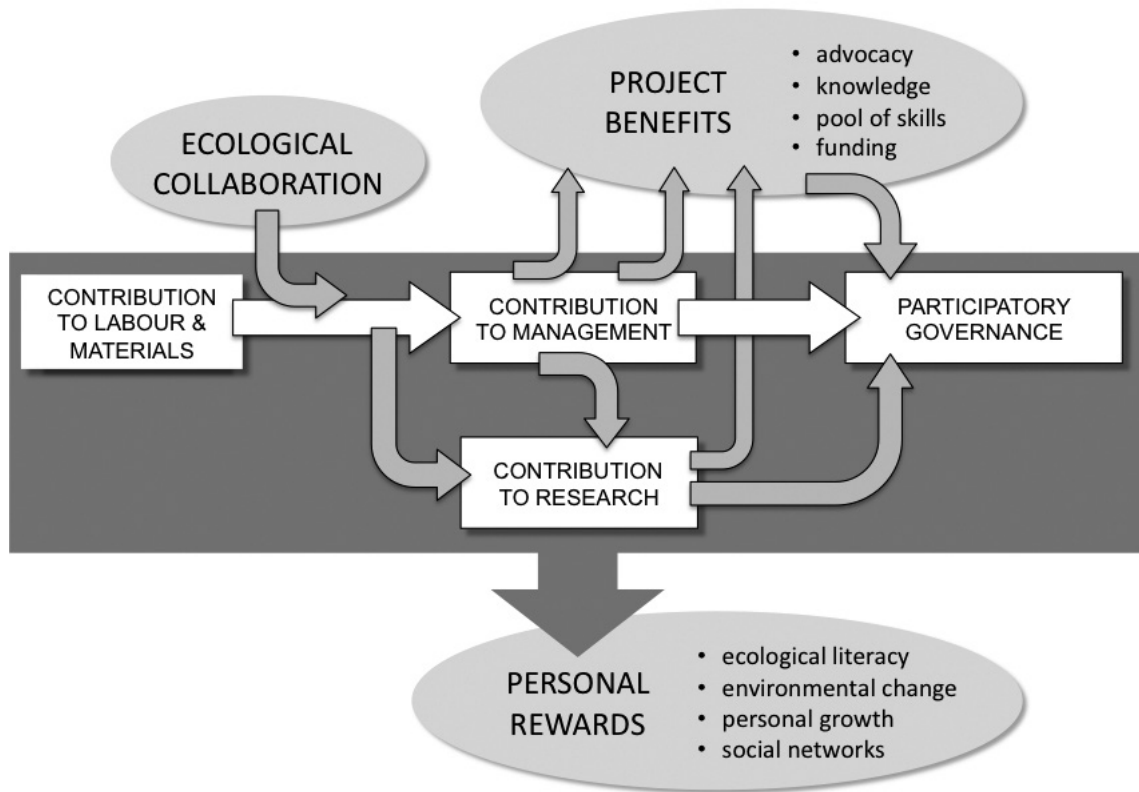


Figure 2. Conceptual model of the ‘evolution’ of public participation in the ecological restoration of Tiritiri Matangi project showing benefits to the project and to volunteer participants.

formed tracks, with sightings of birds a function of the natural movements of the species around these tracks, the conspicuousness of the species, and the behaviour of the group being guided (eg. noise level). To ensure visitors have a quality experience, group size is set at a maximum of ten people.

Guides are drawn from SOTM members and are trained in their role. Guide training begins with an induction course and tandem guiding with experienced guides. Annual workshops that cover ecological aspects of the island and practical aspects of the management of people are offered to all guides.

Using the level of observation of threatened passerines as an indicator of the experience, a survey of guided groups for the period 17 December 2005 to 26 December 2006 was carried out to assess the ‘quality’ of the guiding experience. During the survey period, 9290 visitors were guided in 1230 groups, a mean group size of 7.55 (SD = 3.23). Two of the threatened species on the island were observed regularly; North Island saddleback (*Philesturnus rufusater*) observed by 97.6% of groups, and hihi or stitchbird (*Notiomystis cincta*) by 96.2%. Another threatened species that many visitors aspire to observe is the North Island kokako (*Callaeas wilsoni*). This species was observed by 38.6% of the groups, an observation frequency still considered to be high given that the species predominantly inhabits the forest canopy and is in relatively small numbers on the island (nominally 15).

Being in small groups and having a high chance of observing iconic species is considered to constitute a quality experience for visitors. An outcome of this is that visitors are enthusiastic in their support for the project through donations and purchases from the shop on the island. The income

derived from the tours and shop results in a significant financial contribution to the project. This funding supports elements of biodiversity and infrastructure management and public education both on and off the island. Orams (2001) identified the Tiritiri Matangi experience as an example of ‘desireable’ ecotourism where there is a contribution to the environment with practical and positive outcomes.

Greater understanding of ecological principles is a significant outcome in situations where public (either as active participants or as ecotourists) have access to a project with high biodiversity value and where interpretation is available (Powell & Ham 2008). Van Oosterzee and Preece (1998, p.34) maintain that tourism should be harnessed as “a force for ecological research and conservation”. Ecotourism is undoubtedly delivering a force for conservation on Tiritiri Matangi through advocacy activities, but if ‘tourism’ is interpreted broadly to include those who participate in a project on a voluntary basis, then Tiritiri Matangi also provides a significant model of a ‘force’ harnessed to provide research outcomes.

Public contribution to ecological research

It is acknowledged globally (Weston et al. 2003; Greenwood 2007) that volunteers can fulfil significant roles in the collection of ecological data, often incorporating sophisticated operating procedures, including those associated with threatened species. Such participation, where a network of volunteers assists professional researchers using standard methodologies, is referred to as ‘citizen science’ (Cooper et al. 2007). Public involvement in the Tiritiri Matangi project, however, has expanded beyond mere citizen science. Volunteer roles now

encompass education, research and adaptive management, a pathway of participation advocated by Cooper et al. (2007).

Public participation in scientific research (PPSR) is considered to offer significant potential for increasing public scientific literacy through informal education (Cooper et al. 2007). Bonney et al. (2009a) identify three categories of PPSR models:

1. contributory projects – generally designed by scientists and for which members of the public primarily contribute data ('citizen science');
2. collaborative projects – generally designed by scientists and for which members of the public contribute data but also may help to refine project design, analyze data, or disseminate findings;
3. co-created projects – designed by scientists and members of the public working together and for which at least some of the public participants are actively involved in most or all steps of the scientific process.

All three categories are evident in the research carried out on Tiritiri Matangi. Contributory projects dominated the initial stages of the restoration process, and this is still the case, with monitoring of threatened or translocated species carried out by volunteers (usually SOTM members) where collected data is passed on to researchers. Recent strategic planning by SOTM, however, has resulted in the emergence of collaborative and co-created projects, enabled by the higher level of ecological literacy and field skills that the volunteers have gained, and the availability of funding managed by SOTM. The increasing involvement of professional scientists in voluntary roles within SOTM has also assisted the initiation and leadership of collaborative projects.

A significant component of research on Tiritiri Matangi consists of post-graduate studies that, by their very nature, have a limited tenure. Monitoring that may be a component, or a requirement, of such studies generally lapses after the completion of the qualification. Although post-graduate studies may provide valuable baseline data, or a discreet window of data, the value in monitoring populations over the course of the ecosystem change associated with ecological restoration (longitudinal study) is recognised as being an essential need for ongoing management (Greenwood 2007). In collaboration with the original researchers, SOTM volunteers have reinstated regular monitoring of a number of translocated species: little spotted kiwi (*Apteryx owenii*), tuatara (*Sphenodon punctatus*), Duvaucel's gecko (*Hoplodactylus duvauceli*) and shore skink (*Oligosoma smithi*), thus facilitating longitudinal research.

An example of a co-created project is the 'Pohutukawa Project'. Pohutukawa (*Metrosideros excelsa*) was planted on Tiritiri Matangi as a 'nursery crop' to give shelter to other, slower growing trees. Pohutukawa is unusual in that it is both a fast-growing nursery crop that provides shelter, and a canopy tree of coastal forest (Department of Lands & Survey 1982). The greater-than-expected survival and growth of pohutukawa in some areas of the island has led to these areas being dominated by a pohutukawa 'monoculture' perceived to be poor in diversity of other biota. In consultation with DOC and biodiversity professionals, SOTM co-created a project to selectively "thin" these areas of very dense pohutukawa forest with the aim of encouraging regeneration and diversification within the forest. Monitoring of the project is being undertaken by volunteers over an extended period of time (at least 10–15 years). It will follow the changes in vegetation, birds and ground invertebrates as indicators of ecosystem integrity (Galbraith et

al. 2010). Ongoing collaboration between SOTM volunteers, DOC personnel, ecological professionals and post-graduate researchers will be an integral part of the project.

SOTM now offer significant support for ecological research on the island, contributing financially to projects that meet the requirements set down in an internal policy, i.e. the projects must have the potential to contribute to the island's management or to the ecological understanding of the island. Up to \$25,000 may be allocated annually to student projects, projects undertaken by established researchers, and for special projects initiated by SOTM. A biodiversity sub-committee provides recommendations to the elected SOTM committee on the research allocation.

Research is encouraged to fulfil the following outcomes:

1. to complement studies already completed;
2. to fill gaps in areas which tend to be under-researched, but are seen by DOC and SOTM as important to the ongoing development and management of the island;
3. to develop and set up protocols for continuing data collection through longer term studies.

Public participation in research on Tiritiri Matangi is the result of increased ecological literacy and a willingness by managers and researchers to accept non-specialised contributions to research. Collaboration between experienced researchers and non-specialist volunteers is recognised as a mechanism to assure the accuracy and reliability of the field data collected (Cohn 2008), supported by specialist training implemented as necessary to increase the competence of volunteers (Greenwood 2007).

The SOTM advocacy network provides a mechanism for researchers to disseminate ecological findings about the island and the wider environment, and minimises misunderstandings between the scientific community and the general public. Iwi representatives have also expressed a desire to be included in the dissemination of research outcomes, and this is expected to facilitate better communication with SOTM in the future.

Thus greater public environmental literacy is achieved through scientific outreach (Brewer 2006). Tiritiri Matangi exemplifies the benefits of local communities participating in ecological research predicted by Saunders (1998), and the potential for the development of citizen science described by Bonney et al. (2009b).

Public contribution to ecological management

The success of the Tiritiri Matangi project has provided significant guidance to DOC during the development of the *Working with Communities* strategy (DOC 2003) (pers. obs.). This strategy aims to foster public engagement with conservation outcomes, with key goals of establishing and maintaining effective partnerships, providing opportunities for communities to contribute to conservation activities and decision-making, and supporting communities to develop the skills and capability they need to do conservation work (Forgie et al. 2001; DOC 2003). This is certainly evident on Tiritiri Matangi.

SOTM have expanded their contribution to the project to include strategic planning for biodiversity, the island's infrastructure and visitor experience on the island. The Memorandum of Understanding between SOTM and DOC has facilitated a move towards 'participatory governance', identified by Edwards (2001) as the sharing of policy decisions, albeit on a relatively small, local scale. The memorandum will guide future management of the island,

with volunteers continuing to work collaboratively with DOC and in consultation with other stakeholders.

The development and evolution of participatory governance for Tiritiri Matangi is the result of the growth in confidence and credibility of the public contribution throughout the restoration process, supported by the acquisition of ecological knowledge and skills pertinent to the environmental management. All of these elements of the participatory governance process are sustained by personal environmental or social rewards for the volunteers (see Fig. 2).

A contributory factor to the evolution was the formation of SOTM, through which many of the benefits and rewards have flowed and have been maximised. The network of links evident in the model represents the pool of skills that volunteers from across a social spectrum bring to a project. It is through these links that increased ecological understanding is made possible.

A management approach that integrates the diverse views of stakeholders into a common ground of environmental management is described as 'public ecology' by Robertson and Hull (2003). There are three components inherent to public ecology: the contribution of local communities, dialogue and collaboration across many disciplinary boundaries, and a shared vision aspiring to healthy and sustainable ecosystems. The shift towards participatory governance embodies an overlap of the disciplines of the natural and social sciences, and supports an outcome of public ecology where "... *professionals share with a wider community of stakeholders the responsibility and the privilege of defining the problems, the research needs, the decision process, and the content of deliberation surrounding environmental issues.*" (Robertson & Hull 2003, p.406). With public participation in the project, Tiritiri Matangi exhibits all of the elements of public ecology.

Conclusion

The Tiritiri Matangi Open Sanctuary project has emerged as an internationally recognised ecological restoration project where public participation has played a critical role to achieve success. Both public and organisational stakeholders involved in the restoration project have developed mutual respect and trust, with tangible benefits to the island from a wider resource base and shared rewards. Tiritiri Matangi can be considered an example of 'public ecology' that models sustained environmental stewardship, and where interdisciplinary and collaborative management has enhanced ecological understanding and research outcomes.

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