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Action on the ground: A review of community environmental groups' restoration objectives, activities and partnerships in New Zealand

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Abstract: More than 600 community environmental groups across New Zealand are engaged in restoring degraded sites and improving and protecting habitat for native species. In the face of ongoing biodiversity declines, resource management agencies are increasing their reliance on these groups to enhance conservation outcomes nationally. However, little is known about community groups and their activities beyond local or regional studies. Our aim was to develop a profile of community groups and their projects through examining group and project characteristics, objectives, activities and the support provided by project partners. A total of 296 community groups from all mainland regions of New Zealand responded to an online questionnaire. Nearly 80% of these groups were established for ≥6 years and 72% operated with ≤20 participants (e.g. staff, members, and unpaid volunteers). For over half (54%) of groups, participants were mostly aged 51–65 years. Small group-sizes, combined with ageing participants, may threaten groups' longevity. More than 20% of groups' projects covered areas > 501 ha. Ecosystems represented within groups' project areas included forests (64.0%), streams (42.0%) and freshwater wetlands (33.2%). Over one-third (37.2%) of freshwater wetland restoration projects occurred on private or Maori-owned land. Nearly 70% of groups carried out weed/pest control, native tree planting and advocacy/educational activities, underscoring the combination of social and ecological dimensions shaping most groups' projects. Over 90% of groups were supported by project partners (e.g. resource management agencies for site visits, funding and technical support), highlighting the interdependence between groups and their partners. Developing a more complete profile of New Zealand community groups and their projects will assist with improving the delivery of support to groups by project partners and developing an inclusive and cohesive sector based on meaningful partnerships. These two factors combined will ultimately enhance groups' environmental outcomes at the local level, while contributing to national biodiversity conservation goals.

Keywords: biodiversity; conservation; habitat enhancement; habitat protection; natural resource management; public engagement; volunteer

Introduction

There are more than 600 community environmental groups in New Zealand (Ross 2009) with an estimated combined total of between 25 000 and 45 000 participants (Handford 2011). These groups form the backbone of the largely volunteer effort to restore biodiversity, and to protect and enhance habitat for native species. Under the New Zealand Biodiversity Strategy (DOC & MfE 2000), resource management agencies were tasked with supporting coordinated community actions to conserve biodiversity. With the overarching priority of maintaining and restoring the diversity of the country's natural heritage, the Department of Conservation (DOC) and regional councils now aim to enhance engagement in collaborative conservation by strengthening relationships with community members, including with iwi (tribal groups) (Auckland Regional Council 2007; Bay of Plenty Regional Council 2011; DOC 2013).

Environmental restoration can be defined as a range of activities designed to accelerate the recovery of damaged or degraded ecosystems (Reid et al. 2011). For the purposes of this study, the term environmental restoration is used in its broadest sense, as many community groups frame their restoration activities as conservation by also including biodiversity protection and enhancement (see Nature Space n.d.). Community groups carrying out restoration projects in New Zealand typically comprise volunteers, some or all of whom may be subscribed members, though full- or part-time staff may also be employed (Hardie-Boys 2010). Group participants are often over 65 years in age (Cowie 2010; Callister 2013), but changes to the age-group structure of the New Zealand population (Bascand 2012) lend considerable uncertainty to the future make-up of community groups. Numbers of participants per group can vary widely, from less than 20 (Cursey 2010) to well over 100 (Hardie-Boys 2010), depending on how participants are defined.

Descriptors such as 'stewards of', 'friends of' or 'care' (e.g. beachcare, bushcare and streamcare), combined with a place name, often serve to identify groups. These names simultaneously connect groups' activities to a specific location while underscoring their ethic of environmental protection. Other groups may use 'trust' or 'society' as part of their name, reflecting their legal structure. A defining feature of community groups is that, in most cases, group participants lead the projects and contribute to project management decisions (Murphree 1994).

Participation and collaboration, both within the group and between project partners, are central tenets of effective group operation (Murphree 1994). Inter-group collaboration may

also occur, as, for example, where there are complementary restoration objectives, in order to increase efficiencies in resourcing and achieve greater restoration outcomes (Whangarei Heads Landcare Forum 2010; NZ Landcare Trust 2013). Partnerships with external bodies such as resource management agencies are common (Curtis & Van Nouhuys 1999; Hardie-Boys 2010) and these agencies generally provide groups with goods and services such as training and technical advice (Handford 2011).

Community environmental restoration projects are shaped by the intersection of the physical environment, social and economic factors (Clewel & Aronson 2013). In New Zealand, groups' projects are situated in a landscape dramatically modified by human-induced fire, logging and land drainage (McGlone 1989; Ewers et al. 2006). Forest cover nationally since AD 1314 ± 12 has been reduced to one-quarter of its original extent (Hogg et al. 2003; Ewers et al. 2006), and wetland extent was reduced by 90% in only 150 years (McGlone 2009). Water quality is poor in nearly one-third of monitored lakes (Verburg et al. 2010) and is declining across all major rivers (Ballantine & Davies-Colley 2009). Non-point-source pollution from agriculture is degrading lowland freshwater resources (PCE 2013). While the value attributed to the flora, fauna and landscape features by New Zealanders is evidenced by descriptors such as 'iconic' and 'taonga' (Māori language for treasured), habitat loss, fragmentation and predation by introduced fauna remain major drivers of ongoing declines in indigenous biodiversity (Walker et al. 2006). It is against this background that early groups such as the Guardians of Lake Manapouri (established 1973) (Mark et al. 2001) helped crystallise what Young (2004) described as a 'conservation conscience' among the general public. This environmental awakening by wider society underpins restoration in New Zealand by highlighting the importance of human relationships with nature. At the same time, economic factors cannot be decoupled from community environmental restoration. Groups' largely voluntary efforts, for example, represent significant cost savings for work that would otherwise need to be carried out by paid professionals (Hardie-Boys 2010).

The global trend in the growth of collective action for natural resource management resulted in up to 478 000 community-led groups reportedly emerging in the decade before 2001 (Pretty & Ward 2001). In Australia, for example, the number of community Landcare groups addressing land and water degradation issues has more than tripled, from 2000 in 1996 (Farley 1996) to over 6000 in recent years (DAFF 2009). In the United States, more than 6000 watershed groups currently carry out projects to reduce non-point source pollution (US EPA 2012). In New Zealand, the number of community environmental groups has grown in tandem with increased public awareness of the limitations of Resource Management Act (New Zealand Government 2014) provisions for protecting the environment, underfunding of resource management agencies, and policies that have not adequately protected the social, economic, and ecological values of the New Zealand landscape (Ross 2009). A net population gain to rural areas (Statistics New Zealand 2013), combined with an annual average development of 5800 new lifestyle blocks (peri-urban or rural smallholdings) since 1998 (Andrew & Dymond 2013), may also have encouraged the formation of new groups connected to local ecosystems.

Examples of community environmental groups' contributions to the New Zealand environment and society are diverse. Groups have reforested an offshore island with native species (Galbraith 2013), for example, and increased populations and ranges of wētā species (Orthoptera) (Watts et al. 2011). In the course of protecting brown kiwi (*Apteryx mantelli)* and enhancing their habitat in Northland, groups have developed integrated models for conservation across private and public land (Blue & Blunden 2010). Community-led pest control has proved effective, and has led to innovative approaches for trapping black rats (*Rattus rattus*) by using ping-pong balls in conjunction with a scent lure instead of hens' eggs (King & Scurr 2013). Weeds targeted by community groups, such as Japanese walnut (*Juglans ailantifolia*) (Cursey 2010), also appear on councils' regional pest management plans (Waikato Regional Council 2014). Groups have also carried out environmental education programmes to raise awareness of their project activities and outcomes, as well as to highlight issues such as pest impacts on native biota (Moehau Environment Group 2013). Knowledge sharing is therefore an important component of groups' contributions to society, along with strengthening peoples' connection to place, and ultimately, promoting a stronger sense of community (Phipps 2011).

Currently no national-level review of community environmental groups in New Zealand or their restoration activities exists. Reports to date provide overviews of individual community group projects (Robertson 2012), projects occurring across a region (Shaw 2003; Cursey 2010; Ritchie 2011; Harrison 2012), and descriptions of community groups' activities affiliated to specific resource management agencies, NGOs or trusts (Buchan 2007; Hardie-Boys 2010; Dune Restoration Trust of New Zealand 2012). A national-level review of groups and their projects will enable project partners to design systems that better support groups, strengthen their own relationships with groups, as well as enhance networking and collaboration opportunities among groups. The ultimate outcome would be enhanced efficacy and efficiency of groups' collective restoration efforts.

We aimed, therefore, to develop a detailed profile of community environmental groups and their projects in New Zealand, through examining group and project characteristics, restoration objectives, group activities, and the support provided by project partners. To this end, we sought answers to four main questions: What are the characteristics of community environmental groups and their projects? What are groups' objectives and what activities are carried out? What type of support is provided by which project partners? What further support is required by groups to meet their project objectives?

Methods

Online questionnaire

In order to reduce costs and the time associated with mailing and transcribing handwritten data, we used an online questionnaire (SurveyMonkey®; see Online Appendix S1) as the primary instrument for data collection in lieu of a paper-based mail-out questionnaire. An invitation to complete the online questionnaire was emailed to 540 community environmental groups throughout New Zealand in August 2013.

The questionnaire comprised mostly closed questions for which a set of fixed answers was provided, but also some open-ended questions, such as 'What are your group's main objectives…?', requiring descriptive responses. Open-ended

questions such as 'Please list other support received…' were added to selected closed questions to enable elaboration on fixed answers.

A list of email addresses was aggregated from websites housing publicly accessible databases of community environmental groups engaged in biodiversity conservation and/or environmental restoration. Websites accessed comprised the Department of Conservation (DOC n.d.), The Royal Forest and Bird Protection Society of NZ (Forest & Bird 2011), Sanctuaries of New Zealand (n.d.), Nature Space (n.d.), and funding trusts (Trustpower and the Waikato River Clean-up Trust). Access was also granted to internal community group databases at the NZ Landcare Trust, WWF-New Zealand (Habitat Protection Fund recipients) and the Waikato Biodiversity Forum. The Chatham Islands were excluded, owing to a lack of information on community environmental groups present. Groups not included in the aforementioned databases were most likely to be small, informal entities, operating mostly independently (e.g. of resource management agencies); non-computer users; or featured restoration objectives as very minor concerns within larger social/economic projects.

A single email address per group was used, where possible addressed to the lead coordinator. All individual emails containing a link to the questionnaire were personalised unless sent via a third party (e.g. to funding recipients held in internal databases), or where only generic email addresses were available (e.g. 'info@'). In cases where the primary contact nominated another, more knowledgeable group participant to complete the questionnaire, the questionnaire was resent to the new email address supplied. A feature of SurveyMonkey® is the ability to link individual questionnaires to individual emails, thus enabling responses from each group-contact emailed to be tracked, and reminders to be sent to non-responders. In this study, three-point contact (Dillman et al. 2009) was undertaken where the initial email to the primary group-contact was followed by two reminders to non-responders, 2 weeks apart.

Notice of the online questionnaire was widely publicised – through NZ Landcare Trust's regional newsletters and e-bulletin (Landcare Action), the Nature Space website and Waikato Biodiversity Forum e-newsletter – before emailing the online questionnaire to groups' primary contacts. In addition a research blog (www.monicalogues.com) was developed to share findings with questionnaire respondents and other interested parties, as well as to provide transparency to the research process. To maintain questionnaire respondent confidentiality, names identifying groups and locations were deleted from quotes included below.

The terminology used is as follows: 'active' participants were defined as those taking part in at least 30% of all activities of the community environmental group (i.e. predator trapping, committee meetings or planting) – a figure judged realistic from authors' (MP and CE) experience with community groups. 'Project partners' were defined as those who support groups to achieve their aims by providing goods and services; either paid for or in kind. A distinction was made between DOC-administered land and other Crown land (i.e. administered or owned by agencies other than DOC), the rationale being that groups identify the management agencies, as in, for example, 'working on DOC land' or 'working on council land'.

Analyses

Results from closed questions were summarised numerically and are presented as percentages of total responses received. Open-ended responses were analysed using qualitative data analysis software (NVivo 10; www.qsrinternational.com/products_nvivo.aspx). The software enables passages of text to be manually tagged and indexed into one or more categories drawn from passage content (Bazely & Jackson 2013). Category generation is an inductive process whereby recurring key words and/or themes are grouped together to facilitate the interpretation of large bodies of text. For example, when all 1091 responses for group objectives were aggregated from questionnaire respondents (n = 296; groups could list up to five objectives each), content was tagged and indexed into the three main categories that emerged as a result of the analyses, namely environmental, social, and economic. Additional reviewing of keywords (e.g. rat, pest) and themes (e.g. building relationships) in the main categories resulted in further partitioning into subcategories (e.g. exotic fauna and community building, respectively). Once all objectives were tagged and indexed, a matrix ordering responses from each group (n = 296) across all the categories and subcategories was generated. Categorised objectives then were reduced from text to binary numbers to enable percentages of categories and subcategories per community group to be calculated.

NVivo 10 was also used to determine the frequency of specific words occurring in open-ended responses. Results were generated as numeric frequency counts, but in preference we used visualisation by means of a word cloud. Word clouds link font size to word frequency; i.e. the more frequently a word is used, the larger it appears relative to other words. To determine the most frequently used words while avoiding repetition, settings were chosen to find the top 100 words; to aggregate words with a similar root (e.g. restoration = restore, restoration, restored, restoring); to exclude common words (e.g. and, the); and only include words >3 characters long.

Results

Questionnaire response rates

Over half the total questionnaire responses (56.8%; n=269) were received within the first 2 weeks following the initial emailing of the questionnaire. A further 22.3% and 20.9% of responses were received following the first and second reminders respectively.

Numbers of community environmental groups included in the email address database (n = 540) for the questionnaire were compared with questionnaire respondents (n = 296). Responses were spread across all mainland regions of New Zealand (with Stewart Island included in Southland) (see Fig. 1). Seven groups with projects spread over more than one region were also included in Fig. 1. The greatest numbers of no-responses were for the Waikato and Auckland regions (Fig. 1).

Characteristics of community environmental groups

Two-thirds of the community environmental groups (66.9%) reported their status as formal entities, i.e. trusts or incorporated societies. Nearly 80% of groups reported being established for ≥ 6 years including time prior to formalisation (see Table 1). However, groups were generally small, with nearly three-quarters (72.3%) operating with 20 or fewer active participants. When asked what age most group participants were, over half (53.7%) were reportedly in the 51–65 year age bracket, with those in the 31–50 year age bracket (25.7%) being nearly double that of the post-retirement age bracket, i.e. 65 years or over (12.5%). Open-ended responses highlighted the relationship

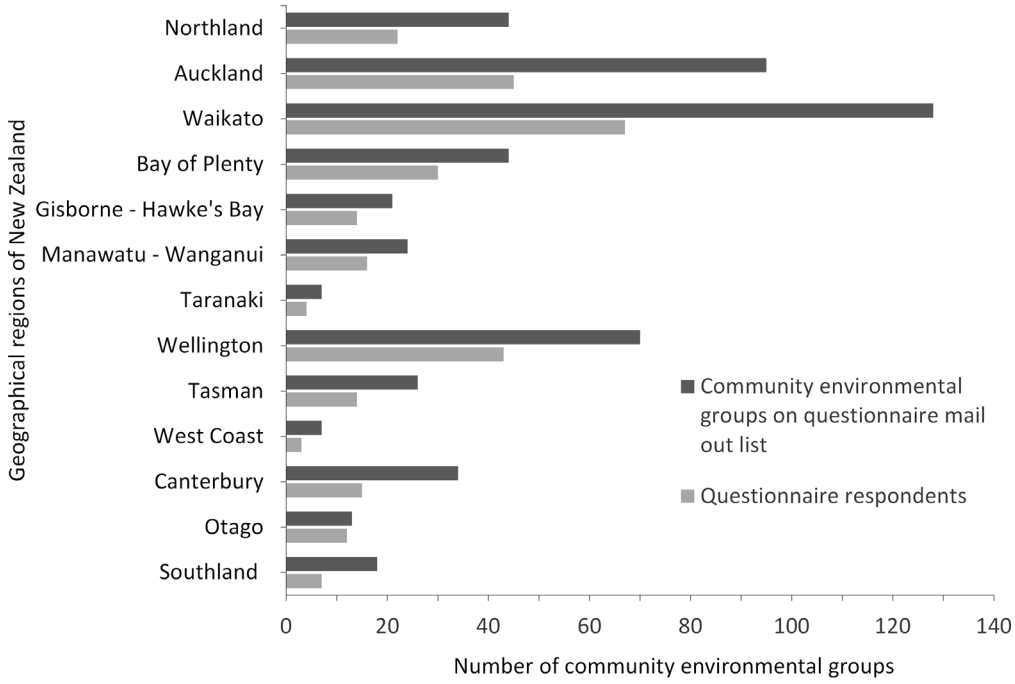

Figure 1. Total number of community groups included in environmental restoration from questionnaire database per region compared with numbers of questionnaire respondents per region.

Table 1. Number of years community groups were established both as formal and informal entities (n = 296), number of members/volunteers participating in at least 30% of community group activities (n = 296), and age of most community group members/volunteers (n = 296).

Metric	Category	% of groups
Years established	>1	1.4
	1–2	5.4
	3–5	13.9
	6–10	27.7
	11+	51.7
Participation	1–5	16.2
	6–12	31.8
	13–20	24.3
	21–50	16.2
	51–100	5.4
	101+	6.1
Age (years)	≤18	3.4
	19–30	4.7
	31–50	25.7
	51–65	53.7
	66+	12.5

between age and activities, e.g. '"Regular" volunteers are aged between 40 and 65 years; "casual" volunteers are family groups and corporate groups'.

Project characteristics

Forests (64.0%), streams (42.0%) and wetlands (33.2%) formed the three most commonly restored ecosystems reported by community groups (see Table 2). Other ecosystems (1.4%) restored included a limestone bluff, shingle pit, subalpine karst cave and lowland dryland (descriptions provided by questionnaire respondents). Over two-thirds (67.9%) of groups' projects took place on Crown land (DOC and other), and just over one-quarter on privately owned land (27.9%). Over one-third of projects restoring lakes (40.6%), freshwater wetlands (37.2%), coastal areas (36.8%), streams (36.7%) and forests (35.0%) took place on land in private ownership (including Māori-owned land) (see Table 2).

Groups' projects were spread across small (0.8–4 ha) to large (101–500 ha) sites, and just over one-fifth (20.6%) of groups reported projects covering > 501 ha (see Table 3). Additional open-ended responses included six projects

Table 2. Land tenure of project sites (n = 290 responses) and types of ecosystem restored: by community groups on public land (n = 286) and on privately owned and Māori-owned land (n = 280). Groups were able to specify more than one ecosystem type. *Crown land excluding DOC-administered land.

Metric	Category	% of groups
Land tenure	Other Crown land*	43.8
	Private	27.9
	DOC	24.1
	Māori	4.1
Ecosystem type	Forest	64.0
	Stream	42.0
	Freshwater wetland	33.2
	Coast	23.7
	River	20.6
	Estuary	16.8
	Lake	10.8
	High country	3.8
	Other	1.4
Private & Māori-owned land ecosystem type	Lake	40.6
	Freshwater wetland	37.2
	Coast	36.8
	Stream	36.7
	Forest	35.0
	River	27.1
	Estuary	22.9
	High country	9.1
	Other	4.1

reportedly covering between 3000 and 6000 ha, with a further two projects reportedly covering >18 000 ha. Over half (54.2%) of groups' projects were in a rural location and nearly one-fifth (18.1%) of groups reported their projects taking place in urban sites.

Project objectives

Groups were asked to list up to five main immediate and long-term project aims/objectives. A total of 1091 responses were received from all groups (n = 296; groups could list up to five objectives each). Each objective was grouped thematically following qualitative analysis into one of three categories: environmental, social and economic, each with further subcategories (e.g. native flora, advocacy and funding) (see Table 4). Indicative responses to each category and subcategory are included in Table 4 and range from broad visions to specific activities.

Table 3. Project location (n = 288) and project size in hectares (n = 286). Peri-urban projects occurred within a 10-km radius of a town or city centre.

Metric	Category	% of groups
Project location	Rural	54.2
	Peri-urban	27.8
	Urban	18.1
Project size (ha)	<0.8	4.2
	0.8–4	16.8
	4.1–8	12.9
	8.1–40.5	17.8
	41–100	12.6
	101–500	15.0
	≥501	20.6

Table 4. Percentage of groups (n = 296) with objectives (n = 1091) categorised as environmental, social or economic, and further sub-categorised. More than one main category and subcategory per group objective was possible. Indicative examples of objectives were drawn from questionnaire respondents.

Group objectives: Main categories	% of groups	Group objectives: Subcategories	% of groups	Indicative questionnaire responses
Environmental objectives, e.g. 'To preserve and protect indigenous flora and fauna'	95.6	Exotic flora	13.9	'Organise contractors and volunteers to kill wilding pines'
		Native flora	19.0	'Restoration of canopy trees which once would have been prolific in our valley (rimu, miro, mangeo, matai, kauri, puriri, kahikatea)'
		Exotic fauna	18.6	'To achieve and maintain a RTC of less than 3% (for possums)'
		Native fauna	17.6	'Protection of native coastal bird life'
		Water quality	6.8	'Create a storm water cleansing nature preserve to raise awareness of the dangers of storm water pollution'
		Planning	8.5	'…to support hapū and iwi to develop respective environmental plans'
		Other environmental objectives	6.1	'Remove inorganic rubbish'
Social objectives, e.g. 'Gain community support for long-term project management'	72.9	Advocacy	19.7	'Act as a conduit and liaison for various community meetings and interactions with … other community groups'
		Amenity and recreation	24.4	'Create walkways to aid pest program and open public esplanade reserve for public'
		Community-building	27.5	'To increase local community pride, cohesion and environmental literacy'
		Cultural and historical	11.2	'To protect and preserve waahi tapu of the tangata whenua'
		Education and awareness	44.7	'Promoting education, awareness and appreciation of natural ecosystems within …'
		Advocacy	19.7	'Act as a conduit and liaison for various community meetings and interactions with … other community groups'
Economic objectives, e.g. 'To create employment opportunities for, e.g. the hapū (tribe or subtribe) of …'	9.8	Funding	2.4	'Secure funding for bio-control trial'

As would be expected, almost all groups (95.6%) reported environmental objectives. Despite the social and/or cultural focus of remaining groups' objectives, e.g. '[The] retention of traditional practice', their activities all included an environmental component such as weed control or riparian planting. More than two-thirds of groups (72.9%) reported social objectives, though considerably fewer groups (9.8%) reported economic objectives. Within the main environmental category, groups reported specific objectives focused on flora and fauna. Exotic-flora-focused objectives were reported by 13.9% of groups, and native flora by 19% of groups. Exotic-fauna-focused objectives were reported by 18.6% of groups, and native fauna by 17.6% of groups. Nearly one-half of groups (44.7%) reported education and awareness-focused objectives, with community building, and amenity and recreation-focused objectives reported by 27.5% and 24.4% of groups, respectively.

When main categories were combined, over two-thirds of groups (69.2%) reported a combination of social and environmental objectives, e.g. 'To have … Creek established as a green belt that includes multiple environs and uses, e.g. native forest, wetland, open space and walkway'. Substantially fewer groups (9.8%) reported a combination of environmental and economic objectives. A combination of all objectives, i.e. social, environmental, and economic, was reported by 8.1% of groups.

Objectives describing site-led projects (determined by the inclusion of place names or ecosystem type) were more common (53.2%) than species-led projects (7.1%). For the latter category, key fauna targeted for enhancement included kiwi (*Apteryx* spp.) (2.4%), other native fauna including kōkako (*Callaeas wilsoni*) (1.4%) and native fish (0.7%), and pest flora for control included wilding pines (*Pinus* spp.) and old man's beard (*Clematis vitalba*) (1.0%). Kauri (*Agathis australis*) and mistletoe (*Tupeia antarctica*) feature as other species-led projects (0.7%). The remaining 39.7% of objectives were very general, e.g. 'Protection of native fauna and flora'.

Word frequency analysis of groups' project objectives (n = 1091) provided an overview of the values, concerns and priorities that have shaped their projects (Fig. 2). Though objectives with specific restoration end-points, e.g. 'Restoration of valley to pre-human condition…', were only reported by 2.7% of groups; the use of 'native' emphasised the general objective of returning project sites to systems dominated by indigenous flora and fauna. The word 'plant' reinforced the two most prominent activities, namely weed control and planting of natives (Fig. 3). 'Protect' was the fourth most commonly used word and the term 'community' was almost exclusively used by groups in a social as opposed to ecological context. 'Education' followed by 'pest' and 'controlling' were all within the 10 most used words and underscore the congruence between groups' objectives (see Table 4) and their activities (Fig. 3).

Figure 2. Visualisation of the 100 most frequently used words used by community groups (n = 296) to describe their restoration objectives (n = 1091). Word size reflects frequency of use.

Project activities

Weed control and planting of natives were reportedly undertaken by most groups (86.1% and 85.4% respectively; Fig. 3). Three-quarters of groups carried out pest animal control (75.3%), with slightly fewer (70.8%) engaged in advocacy and educational activities. Over one-half of groups (56.9%) reported writing submissions to government agencies

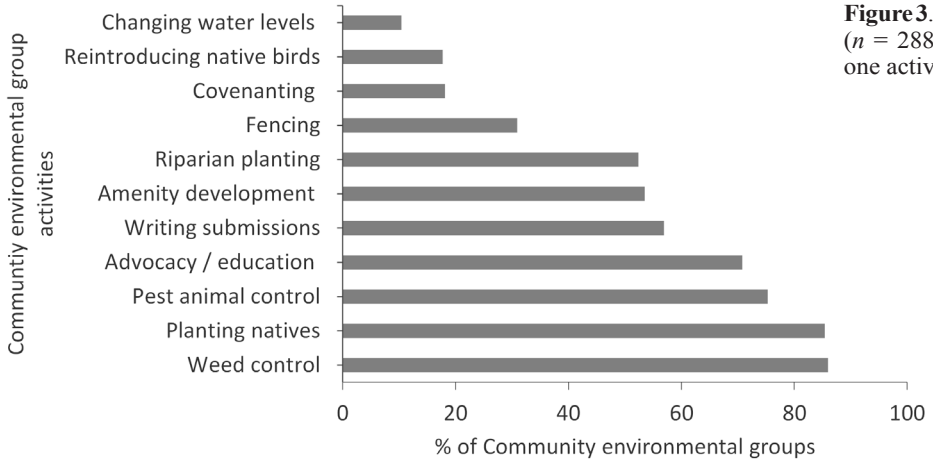

Figure 3. Community environmental groups' activities (n = 288). Groups were able to specify more than one activity.

on environmental matters. Nearly one-half of groups (48.6%, n = 282) carried out their own environmental monitoring while an additional 3.5% of groups used a contractor for this activity. When asked about other activities, open-ended responses (n = 57) included rubbish removal (2.9%), plant propagation (1.5%), and attending Environment Court hearings (1.1%).

Community group support

Current support provided by project partners

A total of 92.9% of groups (n = 295) reported receiving some form of support from project partners. Overall, nearly one-third of the support received by community groups was reportedly provided by councils (31.3%), followed by DOC (21.2%) (Table 5) in line with the largest percentage of projects reportedly occurring on Crown land (43.8%) followed by DOC-administered land (24.1%; Table 2). Though nearly 80% of groups were reportedly established for ≥ 6 years (Table 1), support was still received from project partners for site visits (e.g. to discuss restoration options), technical support (e.g. assistance with species identification), on-ground works (e.g. pest and/or weed control), cultural advice and funding (Table 5). Councils reportedly supported groups by site visits (64.9%), technical support (46.1%), on-ground works (58.3%), and funding (62.4%). DOC reportedly provided groups with site visits (46.5%) and technical support (46.9%). Iwi were reported as providing 41.0% of groups with cultural advice.

Open-ended responses (n = 151) elucidated reasons for the prevalence of groups reporting 'Not Applicable'. Key themes included (1) an adequate skills base, described by one group: 'Our volunteers help with admin, data collection (monitoring), species ID [identification], pest control, advice, storage', (2) under-resourcing and therefore being unable to carry out desired activities, and (3) activities being no longer relevant, due (as one group described) to the completion of the monitoring contract.

Further support needs

Nearly three-quarters (73.9%) of groups (n = 291) reported a need for some form of further support from project partners in order to meet their project objectives. One-quarter of groups (25.4%) reported the need for further support from councils for funding. Support from councils was also reported as needed for on-ground works (23.0%), site visits (18.2%), and technical support (10.0%) (Table 5). Further assistance was reportedly required from DOC in the form of site visits (18.2%) and technical support (16.2%). More cultural advice from iwi was requested by 22.3% of groups. When asked to describe other types of support needed to meet project objectives, open-ended responses (n = 75) showed that funding was a key future concern for just over one-third (36.0%) of groups. Responses predominantly described the activities funding were required for, as well as the challenge of sourcing funding for administrative costs such as travel, stationery, and group meetings. Just 8.0% of groups reported their support needs were currently adequate or declining.

Included among the open-ended responses (n = 49) providing details of groups' further support were the need to build groups' capacity by providing administrative support (34.7%), such as staff, website development, marketing, financial administration, and legal advice. Operational support required (22.4%) included weed control, pest bait, plants, and track development, and technical support required (8.2%) included geographic information system expertise, auditors for monitoring funded works, and remote sensing equipment.

Possible future support providers were reported as community volunteers (30.6%), adjoining landowners and churches (26.5%), charitable trusts, resource management agencies such as regional councils and DOC (18.4%), foundations and non-government organisations (14.3%), and schools or other education providers (4.1%).

Discussion

Community group characteristics

Community environmental groups are present in every mainland region of New Zealand including Stewart Island. These groups carry out vital work on habitats and species that otherwise would not be restored, protected or enhanced to the same extent by resource management agencies, or at all, as much of community groups' work carried out is on a voluntary basis (Ritchie 2011). Three main features characterise the community groups in this study, namely extended periods of

Table 5. Current support provided to community environmental groups by project partners. Percentages of groups per category are recorded (n = 271), with groups able to specify more than one support partner per support type. In categories where >100 (>36.9%) groups currently received support, bracketed, italicised numbers comprise percentages of groups (n = 291) that needed further support in order to meet their project objectives. A 'Not Applicable' category (N/A) was also included.

	Project partners supporting community environmental groups							
Support types	N/A	DOC	Councils	Iwi	Scientists	Businesses	Contractors	Response % (excl N/A)
Site visits	6.3	46.5 (*18.6*)	64.9 (*18.2*)	19.6	20.7	12.5	22.1	22.2
Technical support	10.3	46.9 (*16.2*)	46.1 (*10.0*)	4.8	25.8	3.3	13.7	16.7
Data management	32.1	14.4	16.6	1.1	8.5	3.7	10.3	6.5
On-ground works	8.5	30.6	58.3 (*23.0*)	4.4	4.4	9.2	24.4	15.6
Cultural advice	24.7	10.7	8.5	41.0 (*22.3*)	0.7	0.7	0.7	7.4
Funding	11.1	28.4	62.4 (*25.4*)	4.8	2.6	36.2	7.4	16.9
Administration	34.3	8.5	18.5	2.2	1.5	5.9	5.2	5.0
Equipment loans	21.0	23.6	34.3	2.6	3.7	10.3	6.3	9.6
Response %	15	21.2	31.3	8.1	6.8	8.3	9.1	

group operation (≥ 6 years), small group size (≤ 20 participants), and the ages of most groups' participants (51–65 years). Group longevity is reinforced by Hardie-Boys' study (2010), which reveals that half of the community environmental groups linked to DOC (n = 198) have been active for more than a decade. This signals groups' ability to adapt to diverse circumstances such as changes to funding availability and fluctuating participant numbers. Furthermore, the ability to build relationships with external groups and organisations, negotiate project support from a range of sources over time (Allen et al. 2002), and develop effective strategies for recruiting skilled participants (Gooch & Warburton 2009) all underpin group longevity. Despite the established nature of most groups in this study, needs still included additional support from project partners (in particular agencies), greater numbers of group participants, and funding both for on ground works and project administration. According to Forgie et al. (2001), sourcing project funding is an ongoing task, though covering administrative costs remains a challenge (Ritchie 2011).

The age of most groups' participants varies between studies. In the current study, as well as those by Taylor (1997) and Phipps (2011), participants were mostly aged 51–65 years. Other studies show a higher percentage of retirement-age participants (Cowie 2010; Callister 2013). Group longevity may be threatened by the combination of small group sizes and ageing cohorts of participants. Demographic changes over the next 50 years may further alter community group composition. The percentage of retirees in New Zealand is projected to nearly double and individuals are expected to live longer (Bascand 2012). While this represents a larger pool of potential community group participants, their availability must be offset against factors such as the steady increase in post-retirement-age paid employment (Bascand 2012). By March 2014, for example, 27.0% of men and 15.3% of women remained in the workforce past the age of sixty-five (Statistics New Zealand 2014).

Objectives and activities

Community groups in this study and others in New Zealand typically carry out an extensive range of activities spanning pest and weed control, education, advocacy, and administrative tasks (Cowie 2010; Hardie-Boys 2010; Ritchie 2011; Harrison 2012). This is reflected in groups' objectives, nearly three-quarters of which incorporated a social dimension despite most groups' affiliations to organisations with conservation and/or restoration as a primary focus (e.g. DOC). The synergy between groups' social and environmental dimensions can be explained by examining motivations for participation in community groups. These include the ability to contribute to the community, enhanced social interaction, opportunities for personal development, learning about the environment, being an environmental steward, and developing an attachment to a place (Measham & Barnett 2008).

For some groups, social objectives may be on a par with their environmental restoration objectives, as Campbell-Hunt et al. (2010) found in a study of groups managing fenced sanctuaries. In cases where groups' social objectives predominated, the study groups' focus on ground restoration activities (e.g. planting and pest control) provided the vehicle for environmental learning or for reviving a cultural connection to the project area. A key role for groups was to generate and disseminate environmental information, evidenced by the predominance of groups' educational, advocacy-related and submission-writing activities. While positive project publicity, for example through groups' newsletters, assists in recruiting new members (Forgie et al. 2001), a further outcome is knowledge-building among project partners and the wider community (Phipps 2011).

Community environmental groups' practical, task-oriented approach to restoration supports both regional- and national-level conservation priorities. In this study, groups' focus on restoring forests, streams and wetlands acknowledged declines in the extent, condition and quality of these ecosystems (Ewers et al. 2006; McGlone 2009; Verburg et al. 2010). Wetland restoration (freshwater and estuarine), carried out on private and Māori-owned land, helps to mitigate further losses to an ecosystem that remains vulnerable given the lack of effective national policies and poor implemenation of regulation (Myers et al. 2013). At the same time, at-risk species associated with wetlands, such as pāteke (*Anas chlorotis*), have also benefited greatly from community groups' pest control and habitat enhancement activities, leading to increases both in population range and size (DOC 2012).

Weed and pest control carried out by most groups in this study is a direct response to the extent of exotic species invasion, as well as the significant threat the pests pose to New Zealand's threatened native species, remaining habitats and ecosystems (DOC & MfE 2000). Although the majority of groups used a multiple-species approach for project area restoration, a small number centred on iconic, threatened or at-risk species such as mistletoe, kiwi, and kōkako. These examples represent a small portion of species actively targeted by community groups within their projects, with the Department of Conservation acknowledging the vital role played by community groups in supporting species recovery efforts (DOC 2011).

Project partner support

Almost all groups in this study relied on one or more project partners such as councils, DOC, iwi, science providers and business for financial and practical support, including site visits and assistance with on-ground works, despite most groups being established for six or more years. According to Callister (2013), respect for groups' local knowledge accrued over time functions as a cornerstone for successful partnerships. The diverse skills of older group participants, however, are often unacknowledged: 'We have witnessed examples of older volunteers being viewed as useful mainly for manual work, with outside consultants turned to for planning or scientific advice. This overlooks the professional backgrounds of many older volunteers as well as their often long practical experience in eco-restoration' (Callister 2013).

Handford (2011) challenges partners to extend their understanding of their function to include roles as community group mentors, facilitators and general supporters. This broader range of partner functions is pertinent given the proposed collaborative models for conservation put forward by the Department of Conservation (2013), enhanced community biosecurity management roles envisaged for communities (Waikato Regional Council 2014), and the need for greater levels of engagement between scientists and communities (MBIEet al. 2014).

Future support

Most groups in this study required technical, administrative and operational support in order to build group capacity and achieve their project objectives. Effective partnerships are therefore critical for sustaining groups' activities in the long term. The need for training (e.g. pest and weed control,

outcome monitoring, group and volunteer management) forms a common thread through studies of community environmental groups in New Zealand, highlighting groups' aspirations to grow their projects while empowering their own communities (Sporle 2007; Cursey 2010; Handford 2011; Ritchie 2011; Harrison 2012; Coates 2013). Similarly, groups in this study with socio-economic objectives viewed training as a pathway to paid employment in local communities.

New Zealand follows worldwide trends that have seen a continual rise in the reliance on volunteer input into the conservation and natural resource management sector (Bramston et al. 2011; Lee & Hancock 2011). The increased expectation from resource management agencies for greater community input to biodiversity conservation (DOC 2013) recognises the strong social and economic benefits that groups of volunteers can provide (Buchan 2007). As a large number of groups in this study carried out environmental monitoring, an expanded role for community volunteers may involve collecting and sharing environmental data with science providers and resource management agencies. Known as citizen science (Bonney et al. 2009), community involvement enables data to be collected at larger scales and at frequencies not feasible for many resource management agencies, representing further cost savings (Carr 2004), as well as opportunities to strengthen links between the community and scientists (Galbraith 2013).

Recommendations and further research

Agency partners face a challenge to develop models of engagement and support that are sensitive to the diversity of community environmental groups' objectives, activities and projects. A simultaneous challenge for groups is to develop new partnerships as their existing partners' ability to provide resources changes. For project partners, a flexible yet strategic approach would see targeted support for groups, while seeking opportunities to align groups' objectives with both regional and national biodiversity conservation objectives. To achieve greater efficiencies in resourcing, agency partners could, for example, assist groups where practical to form networks (see Sobels et al. 2001; Whangarei Heads Landcare Forum 2010). In addition, access to larger funds for restoration and related works (e.g. environmental education) would encourage greater collaboration between groups and lessen competition for limited resources.

Overall, the social dimensions of community-based restoration have been well explored, though gaps remain in the New Zealand literature. Internationally, environmental dimensions of community groups have been under-theorised and patchily investigated. Areas identified for future research therefore include (1) community environmental group governance and partnership models, (2) factors contributing to groups' longevity, and (3) groups' environmental outcomes. Little is also known about groups' monitoring and evaluation activities (Sporle 2007; Handford 2011), for example how monitoring data generated by community groups are used. Addressing these critical gaps will ensure that groups are adequately supported and their restoration efforts appropriately valued.

Conclusion

There are more than 600 community environmental restoration groups throughout New Zealand, with numbers likely to be far higher if groups currently operating independently of agencies, organisations or web-based sites are included. Increasing demands are being placed on groups by resource management agencies to contribute more to conservation and biodiversity restoration. When considering factors such as group longevity, the diversity of activities carried out, participant numbers and project scale, a broad sphere of influence is suggested both environmentally and in society, though this remains largely unquantified. While the combination of small group numbers and ageing participants challenges group longevity, high numbers of groups operating for six or more years attest to their adaptability in the face of resourcing challenges. Ongoing financial and practical support is needed to ensure that community groups remain sufficiently resourced to carry out their mostly voluntary contribution to biodiversity restoration, protection and enhancement. The diverse nature of the groups and their environmental restoration objectives highlights the need for a pluralistic approach that acknowledges this diversity as well as the social and environmental contexts groups operate within. With citizen science entering the national vocabulary and wider opportunities for community involvement in scientific research evolving (MBIE et al. 2014), there is a need for better understanding of how groups measure restoration success. An in-depth understanding of community groups and their projects will assist with improving support delivery by project partners, and in developing an inclusive and cohesive sector based on meaningful partnerships. Ultimately, a strategic approach to supporting community groups will enhance groups' environmental outcomes at the local level while also contributing to national goals for biodiversity conservation.

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Supplementary Material

Additional supporting information may be found in the online version of this article.

Table S1. Percentages of responses from community groups (n = 291) for further support needed from project partners in order to meet project objectives.

Appendix S1. Online questionnaire emailed to 540 community environmental groups.

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