Benefits of community stream care:

Insights from a case study of the Cashmere Stream Care Group in Ōtautahi Christchurch

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Executive Summary

Community-based restoration efforts are often initiated to address localised issues that are identified as community priorities. There is also increasing interest on the part of government – especially local councils – and NGOs, in how local community-based restoration efforts can be supported. This partly relates to recognition that community buy-in is essential to environmental restoration and protection policies but also (and perhaps even more importantly) because in many places community-based initiatives have been leading the way in realising outcomes. There is considerable scope to learn from the experiences of existing groups and projects, particularly those that have endured over time and developed strong connections within their catchments. Understanding how these groups have evolved and adapted, confronted challenges and leveraged successes, can be particularly informative for new or aspiring groups, and for those organisations looking to enable and support such groups.

This report presents a case study of the Cashmere Stream Care Group (CSCG) as an example of a relatively long-standing and widely recognised community-based restoration group in Ōtautahi Christchurch. The group has partnered with councils and the community to realise a range of benefits for the Cashmere Stream and its catchment, as well as the group's members and the local community. This case study used a semi-structured interview and workshop process with CSCG members past and present, and others from city and regional councils and the private sector who have worked closely with the group in its projects. The key research themes and interview questions were designed in the initial phases of the project and explore factors important to participation in the group, benefits of the group's work for its members and the wider community, key factors in those successes, and potential learnings for other community stream care groups in Aotearoa.

After forming in 2006, the CSCG had an initial focus on collecting water clarity data to evidence the issue of fine suspended sediment, which was identified as the key pressure in the catchment. Over several years the group collected a nearly continuous daily dataset of water clarity measurements, which it has used to draw attention to the erosion

and sedimentation issues in the catchment, and to advocate for action to restore and enhance the stream environment. The group has also been instrumental in practical restoration work in the catchment, partnering with private landowners to enable substantial riparian fencing and planting in the stream's upper reaches. This includes working closely with Christchurch City Council (CCC) and contractors to support a major stream re-alignment and staged riparian planting and in-stream habitat enhancement project funded by CCC and central government (Cashmere Stream Enhancement Project) over the period 2022-2024.

In addition to working relationships with CCC and the regional council (Environment Canterbury), CSCG has placed great importance on building strong relationships with the community. The group has a close partnership with local environmental consultancy EOS Ecology who support its monitoring activities and the communication of its work to the public. This has been a powerful means to engage with the wider community within the catchment and beyond.

The insights gathered through this research suggest that a combination of factors have underpinned the successes of the group, but it is perhaps the way that these factors have complemented each other that is most notable. Some of the key contributions have included a commitment to understanding aquatic science and collecting and using scientific data – especially the water clarity data that the group's members have dutifully collected; forming and nurturing constructive relationships with key partners; developing collaborative action plans (with those partners) to define the group's purpose and guide its activities; creating and maintaining a positive group culture so that members enjoy being involved and working together; having a competent, charismatic, respected and enabling leader who helps the group to maintain focus; extensive engagement with the community through practical community restoration (such as planting days) and outwards communications (newsletters, flyers and social media); and perseverance in the face of complex and seemingly intractable catchment-scale issues like erosion and sedimentation. The study identifies and traces these various factors and highlights insights that may be valuable to other community stream care groups, and also the organisations who could support such groups through collaborations, partnerships or funding.

Acknowledgements

The authors gratefully acknowledge the Christchurch City Council staff who made this project possible alongside the larger Cashmere Stream Enhancement Project. Thanks also to Miria Goodwin and Shelley McMurtrie for permission to use images and figures (including the cover image by Miria Goodwin). Most importantly, we warmly thank the Cashmere Stream Care Group members and supporters interviewed for this project, for whose insights and perspectives we are most grateful.

Dedicated to the memory of Gordon Rudd, guardian of Cashmere Stream.

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1 Introduction

1.1 Context: Community-based stream care

Waterways in Aotearoa New Zealand are highly impacted by development activities and land use change in their catchments. However, the underlying drivers of degradation differ from catchment to catchment. In rural areas, these tend to stem from primary production (e.g. farming, forestry), whereas in urban areas they are related to multiple aspects of urban development. The pressures facing urban streams typically encompass pollution through contaminated stormwater inputs and runoff, sedimentation, physical modification through straightening or piping, habitat degradation (both in-stream and riparian) and the impacts of invasive species. These multiple compounding pressures have been described as an 'urban stream syndrome' (Walsh et al. 2005). At the same time rural waterways are suffering from stressors such as sediment and nutrient pollution, channelisation and water abstraction (Larned et al. 2018).

Despite the challenges facing waterways across Aotearoa New Zealand, there is a huge amount of interest among communities in helping to care for and restore them. Increasingly, community groups are engaged at neighbourhood and catchment scales in a range of stream-care and restoration projects, as has been documented in several case studies and surveys of community-based efforts (Campbell et al. 2010; Jones & Kirk 2018; Peters et al. 2015; Sinner et al. 2022). In the urban context, this phenomenon has been part of a wider expansion of urban ecological restoration work in Aotearoa New Zealand (Clarkson & Kirby 2016), that has mirrored similar trends elsewhere internationally (Campbell et al. 2021, Scoggins et al. 2022).

Recent trends also include increasing interest on the part of government – especially local councils – and NGOs, in how local community-based restoration efforts can be supported. This is in part due to a recognition that community buy-in is essential to policies and programmes aimed at restoring the health of waterways, but also (and perhaps even more importantly) because in many places community-based initiatives have been leading the way in realising outcomes – both for local waterways, and for local

communities. In international research, Smith et al. (2016) showed how community-based approaches to urban stream restoration can, through incremental social and ecological gains, generate public support and build the momentum necessary to address larger and more systemic catchment-scale issues. In this sense, local-level, community-based stream-care or restoration can deliver tangible environmental benefits at the local scale and lay vital foundations for longer-term and larger-scale progress.

Apart from contributing to the restoration of degraded environments, involvement in community-based environmental groups has been found to bring numerous physical and mental health and social benefits associated with (re)connection to the environment, social connection, practical learning, and a sense of contributing to a greater good or common cause (e.g., De Bell et al. 2020; O'Brien et al. 2010). Community-based monitoring (e.g., of stream health), has in many cases proven to be an effective means to actively engage community members in environmental guardianship and action. It can be a powerful way to raise awareness and build skills and understanding in the community, in addition to generating valuable environmental data (Orchard 2019; Peters et al. 2016; Tolbert et al. 2024).

By their nature, community-based restoration efforts are locally-embedded and 'ground-up', and this is highly appropriate as they are often addressing localised issues that are identified as community priorities. There is also scope to learn from the experiences of groups and projects that have endured over time to support upscaling or new restoration efforts. Understanding how such groups have evolved and adapted, confronted challenges and leveraged successes can be particularly informative for new or aspiring groups, and for those organisations looking to enable and support such groups. It is in this spirit that this report offers a case study of the Cashmere Stream Care Group (CSCG) in Ōtautahi Christchurch, Aotearoa New Zealand.

1.2 Project aims and focus

The purpose of the research was to carry out a qualitative case study of the Cashmere Stream Care Group as an example of a relatively long-standing and widely recognised

community-based restoration group in Ōtautahi Christchurch. The research was designed in consultation with the CSCG and the Christchurch City Council (CCC), and comprised a small part of the much larger Cashmere Stream Enhancement Project co-funded by the CCC and the Ministry for the Environment via the Freshwater Improvement Fund (FIF). This larger project sought to work with community groups, including the CSCG, to restore the mauri (life force) of the highly modified and degraded Cashmere Stream and its catchment. It included major physical works along 2.4 km of the stream, including re-meandering, habitat reconstruction, and planting. These interventions complemented the construction of a large (>100 ha) multi-functional flood storage and stormwater treatment basin[1].

The aim of this project was to work with the CSCG to document the activities, successes and benefits of the group over the years, with a focus on enabling other stream care groups and interested stakeholders to learn from their experiences. Three key research questions guided the project, as follows:

- How has the group's work benefitted its members and the wider community?
- What have been the key factors in the success of the CSCG over the last 15 years?
- What can other community stream care groups in Ōtautahi (and beyond) learn from the experience of the CSCG?

[1] See: https://ccc.govt.nz/services/water-and-drainage/stormwater-and-drainage/stormwater-projects/hoonhaybasin

2 Research methods

2.1 Research design

The philosophy behind this project was to work with the CSCG to frame and design the research in a way that would deliver on its overarching aims, but also – and equally importantly – be of value or use to the group itself. Therefore, prior to commencing interviews, the parameters of the study and proposed process were explored with the CSCG at two meetings held in February and May 2022. Building on these discussions, key themes were workshopped with the group in August 2022 to inform the development of an interview-based approach with key informants who were defined as people with significant relationships to the group and group members. Interview questions and potential interviewees were also identified in this process (Appendix A). The project was reviewed and approved by the University of Canterbury Human Research Ethics Committee in June 2022 (Approval number: HREC 2022/16/LR-PS).

2.2 Interview process

Nine in-depth semi-structured interviews (Brinkmann 2014) were conducted between November 2022 and March 2024 with members of the CSCG past and present, and with others from city and regional councils and the private sector, who have worked closely with the group over the years. Interviews were conducted in-person or by zoom according to the preference of the interviewee (or practical necessity where the interviewee was no longer based in Christchurch), and averaged 57 minutes in duration. The interviews covered the interviewee's involvement in the group over time, their perspectives on key factors in the success of the group (including key challenges and opportunities the group has faced, and key relationships), how the group's work has benefitted its members and the community, and potential learnings for other community stream care groups in Ōtautahi Christchurch and beyond. Interviews were audio recorded with the consent of the interviewee and transcribed for subsequent analysis.

2.3 Data Analysis

The typed interview transcripts were the basis for a content and thematic analysis using standard social science coding techniques following Boyatzis (1998) and Miles & Huberman (1994). In this approach, the researchers identify discrete concepts in the transcripts and summarise these in a short phrase that encapsulates the point being made which is known as a 'code'. In some cases, different interviewees may make the same points, in which case the same code is applied. However, the analysis is also looking to capture all of the unique points being made which requires that the researchers are alert to subtle nuances in the information sources. This typically requires consideration of the context in which certain remarks are made. In this study, two rounds of coding were conducted to complete this analytical approach (as is recommended). A key objective of the second round of coding is to review all of the codes assigned in the first round to refine aspects such as the difference or potential to combine closely related codes, and where necessary, amend the wording of a code (i.e., the short phrase that summarises the point being made) (Boyatzis, 1998). The resulting set of primary codes provides a summation of the dataset. These codes are then subjected to a thematic analysis which has the objective of examining linkages between codes, which are referred to as 'themes' (Silverman, 2006). This thematic analysis is also best performed as an iterative process to identify commonalities while also recognising differences in the key perspectives that have been shared by the research participants. In this sense, the generation of themes is a form of categorisation that further summarises the research results. However, it is also a form of interpretation that facilitates the key insights to be identified and communicated (Silverman, 1989).

In this study we identified themes that account for, and provide additional interpretation of, all of the primary codes that were identified. The major themes we identified include three *a priori* topics that largely reflect the research questions (benefits of the group's work, key factors in success, and challenges) and also new 'emergent' themes that were identified during the thematic analysis. Results from the analysis are presented in Section 4 following a discursive framework (Burr, 2015) that describes each of the major themes and their contributing elements.

3 Research setting

3.1 Cashmere Stream and catchment

Cashmere Stream is 4.9 km long, spring-fed peri-urban stream and tributary of the Ōpāwaho Heathcote River in southwest Ōtautahi, Christchurch. Despite the relatively short length of its main stem, the stream is fed by almost 50 km of drains and tributaries that are spread across its 2,822-hectare catchment (See Figure 1), taking in urban residential and rural areas that include relatively steep hill country as well as flat land (McMurtrie & James 2013). The catchment has experienced rapid land use change, driven by new greenfield residential development in particular.

The stream supports a diversity of aquatic life, including important indigenous species such as koura (freshwater crayfish), kākāhi (freshwater mussels), tuna (longfin eel), īnanga (whitebait), bluegill bullies and a range of invertebrates[2]. Although the ecological health of the stream is degraded, it is relatively biodiverse compared to many other streams in urban Ōtautahi Christchurch. However, legacy effects of historic land use and ongoing impacts of development in the catchment, continue to put the ecological health of the stream at risk. It is this context that is being addressed by CSCG, CCC and other partners in the Cashmere Stream Enhancement Project and related earlier initiatives.

[2] For details on the ecology of the stream see: InStream Consulting (2016), McMurtrie and James (2013).

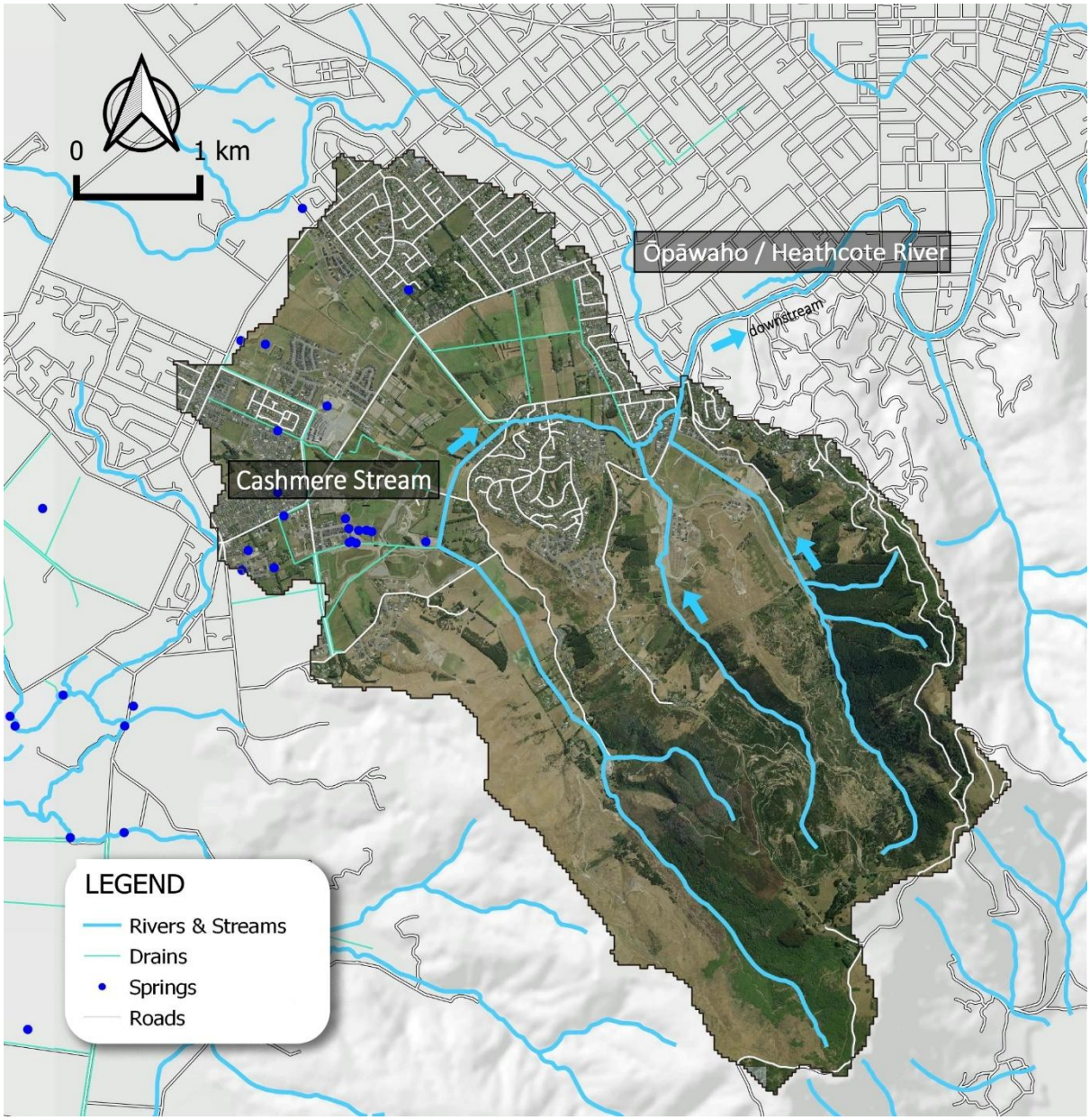

Figure 1. Map of the Cashmere Stream catchment

The current state of the stream and its tributaries is in part due to a legacy of historic land clearance and drainage – with much of its length having been diverted and straightened to function as drains. There is very little canopy cover along the riparian margins of the stream, and therefore limited shading. The overriding challenge for the stream, however, is sediment (CCC 2023). Deep layers of soft sediment in the stream bed are a legacy of historic land use change that has exacerbated erosion – particularly of the loess soils that are characteristic of this catchment (Adamson 2016). Urban development on the

surrounding hills has also caused huge fluxes of sediment into the stream – most significantly in the 1970s with the development of the Westmorland subdivision (McMurtrie & James 2013).

More recently, specific hill sites and land uses have also proved challenging, including some forestry harvest sites and an adventure park that has struggled to manage erosion in the wake of major vegetation loss from fires in 2017. Fine suspended sediment continues to enter the waterway from surface runoff – particularly via the ephemeral tributaries draining the hills in the southeastern half of the catchment. This history underscores the extent of issues associated with fine loess soil from the Port Hills which can be mobilised by a wide range of disturbance activities, including urban subdivision and development activity, earthworks, rural land-use and forestry.

During and following rainfall events, the Cashmere Stream becomes a major source of sediment into the Ōpāwaho Heathcote River with further deleterious consequences. The stream also faces issues with nutrient contaminants (nitrogen and phosphorus), and bacteria (*E. coli*). A more detailed account of the Cashmere Stream and its catchment, as well as the key pressures facing the stream may be found in McMurtrie and James (2013). Between 2022 and 2024 major stream enhancement works were carried out along the stream in the area of Hendersons Basin/Te Kuru Wetlands.[3] These works are designed in part to detain flood waters to help mitigate flooding in the Ōpāwaho Heathcote catchment, but do not address the underlying sources of sediment in hill tributaries of the Cashmere Stream.

3.2 Cashmere Stream Care Group

The CSCG is a small community stream care group made up of residents who live in the catchment or have a connection to the stream. It has a committee of approximately 8-10 members – fluctuating occasionally – and has the stated mission **to protect and**

[3] See: https://ccc.govt.nz/services/water-and-drainage/stormwater-and-drainage/stormwater-projects/cashmerestream

enhance the health of the Cashmere Stream and its catchment. To this end, the group pursues the following three goals:

1. Protect and enhance Cashmere Stream and its catchment
2. Maintain a credible, representative, and active community group that results in improved management of Cashmere Stream and its catchment
3. The natural and cultural values of Cashmere Stream are recognised and embraced by the community.

The group was first formed in 2006 as part of Environment Canterbury's (ECan) Living Streams Programme – an initiative by the regional council to build working partnerships with the community to improve waterway health across Canterbury. With support from ECan staff and a local consultancy (EOS Ecology), the group began to collect water clarity data and also had some early success in securing controls on a proposed subdivision development in the catchment. However, the activities of the group were disrupted by the 2010-2011 Christchurch earthquakes as some of the members of the group moved away out of the catchment, and the group languished for a period as a result. Despite this, one member, Gordon Rudd, continued to take water clarity measurements through this period, contributing to what would eventually become a hugely significant water clarity dataset.

After the Christchurch earthquakes, the group had a resurgence with the arrival of some key new members, and continued the water clarity monitoring project with a view to documenting the problem of sediment inputs into the stream network.

The programme built to include up to 27 monitoring sites throughout the catchment over a period of several years. The frequency of recordings ranged from daily (at the aforementioned site monitored by Gordon Rudd in the lower reaches of the Cashmere Stream) to weekly or event-related monitoring on various tributaries and other sites on the main stem throughout the catchment. Data from 19 of these sites (totalling 3,558 water samples recorded between November 2010 and February 2018) were analysed by

EOS Ecology and formed the basis of a scientific report demonstrating the declining clarity of the stream (see McMurtrie & James 2019).

Over the years the group canvassed many issues affecting the stream, and numerous potential actions but, as one interviewee noted, the group "became more and more focused on getting the data and being a source of data" [P1].

The group produced an action plan in 2014 (Field et al. 2014), which laid out a range of objectives to guide the group's efforts from year to year. The action plan defined the three aforementioned overarching goals of the group, and specified objectives and actions around each of them (Table 1)[4].

[4] To view the action plan, see: https://api.ecan.govt.nz/TrimPublicAPI/documents/download/2423878

Table 1. Cashmere Stream Care Group Action Plan Goals and Objectives (2014)

Goal 1. Protect and enhance Cashmere Stream and its catchment
• Maintain and improve the diversity and abundance of native instream fauna • The diversity and abundance of native instream flora is maintained and improved • Wetlands, springs and riparian vegetation are maintained and improved • Reduce sediment inputs and improve water clarity of the stream • Keep Cashmere Stream riparian zone free of plant pests • Keep Cashmere Stream free of aquatic pests
Goal 2. Maintain a credible, representative and active community group that results in improved management of Cashmere Stream and its catchment
• The CSCG works with community, iwi and Statutory Authorities to achieve our mission statement • Be recognised as a lead group for co-ordination of catchment enhancement • The CSCG is active in the management of the Cashmere Stream and its catchment • Maintain a structure that allows group members to contribute their individual perspectives and knowledge to ensure a sustainable group
Goal 3. The natural and cultural values of Cashmere Stream and catchment are recognised and embraced by the community
• Improve the level and quality of people's interaction with the Cashmere Stream • Opportunities and richness of mahinga kai are improved • People are more aware and informed of the Cashmere Stream's natural values • Educate the community that flooding is a natural & essential part of a healthy stream and that development should not encroach on the natural flood area

Apart from a focus on data and science, the CSCG has been instrumental in practical, hands-on restoration work within the catchment. The restoration work of the group has fallen into two broad phases: Initially the group defined and led the restoration of a large area of the upper catchment through four project stages with the collaboration of private landowners. More recently, through the government-funded Cashmere Stream Enhancement Project (2022-2024) the group has worked alongside the CCC to restore several reaches of the stream in the Eastman-Sutherlands Basin.

Some members in particular are highly motivated by hands-on involvement and have contributed widely to restoration work throughout the catchment. In many cases this occurs as part of community 'planting days' that are initiated and promoted jointly by the CSCG and the CCC. Opportunities for this kind of work, which lends itself to broad

involvement from the community, increased markedly over the post-earthquake period. The group was involved in the aforementioned restoration projects as resourcing from different sources, including central government and the city council, enabled considerable areas of the catchment to be planted. Planting days (Figure 2) during this period often engaged the local community and other supporters of the CSCG, with advertising and promotion supported by CCC (e.g. via a letterbox drop and social media posts), and coordination on the day provided by council staff and/or contractors alongside CSCG.

Figure 2 (A & B). CSCG community planting day, 2023 (images: Miria Goodwin)

The period over which this research was carried out coincided with the implementation of the Cashmere Stream Enhancement Project as it was coming to its completion. It was a period where the CSCG was engaged in regular discussions with CCC staff over design components of the various stages of the enhancement work, numerous public engagement activities (such as guided visits/walking tours to parts of the project site at Hendersons Basin), and community planting days as various stages were completed. This period, as several interviewees remarked, was a culmination of much of the earlier work of the group, and marks a highlight in the group's activities. With the completion of this project, the group has an opportunity to consider what level of intensity, and what focus its work might take in the future.

4 Results

4.1 Overview

The rich body of interview data was analysed as described in Section 2. The coding process identified a total of 155 discrete concepts (i.e., primary codes) from the nine interviews. Some of the key ideas that were represented are visualized in the word cloud shown in Figure 3.

The thematic analysis identified 18 groups of ideas ('subthemes') that together accounted for all the primary codes and were contained within five major themes as shown in Table 2. The five major themes included the three abovementioned *a priori* themes derived from the research questions (benefits of the group's activities, key factors in success, challenges) and two additional major themes that emerged from the analysis ('group objectives' and 'insights for other stream care groups'). During the interviews we noted that the topic of 'insights for other community stream care groups' had a considerable overlap with the key factors in the group's successes. However, we also found that some interviewees had offered suggestions for other groups and contexts that in some cases was not directly related to a success story but instead to an insight into how success might be achieved given the group's experiences.

In response to the research questions and associated interview prompts (Appendix A), there was a rich set of ideas shared on the topics of 'key factors in success' which accounted for around 50% of the primary concepts identified in the data (Figure 4). The most prevalent sub-themes involved information about the group's structure or processes and the nature of external relationships, while other important contributors to success included community and stakeholder engagement activities and the development of citizen science initiatives (Figure 4). Similar sub-themes were also found in connection to 'insights for other stream care groups', particularly around group process or structure, and the importance of external relationships.

In the following sections we begin by describing interviewees' perspectives and insights on the three *a priori* themes ('benefits of the group's activities', 'key factors in success'

and ‘challenges’) before moving to discuss the ‘insights for other groups’ and wider ‘transferable learning’ that was identified in this study.

Table 2. Major themes and subthemes identified in this study

Major themes	Subthemes
Group objectives	Specific objectives
Benefits of the group’s work	Community guardianship role to reduce damaging activities
	Education and awareness raising about stream and catchment management
	Environmental observations and data collection
	Personal / group wellbeing benefits
	Sharing learnings and experiences between catchment groups
Key factors in success	Citizen science initiatives
	Engagement with wider community and stakeholders
	External relationships
	Geographic context
	Group process and structure
	Restoration strategies
Challenges and their resolution	External relationships
	Group process and structure
	Scope and complexity of resource management issues
Insights for other community stream care groups	External relationships and partnering
	Geographic context
	Group process and structure
	Restoration strategies and planning

Figure 3. Keywords from the analysis of interview transcripts with each word weighted according to its frequency in the combined dataset

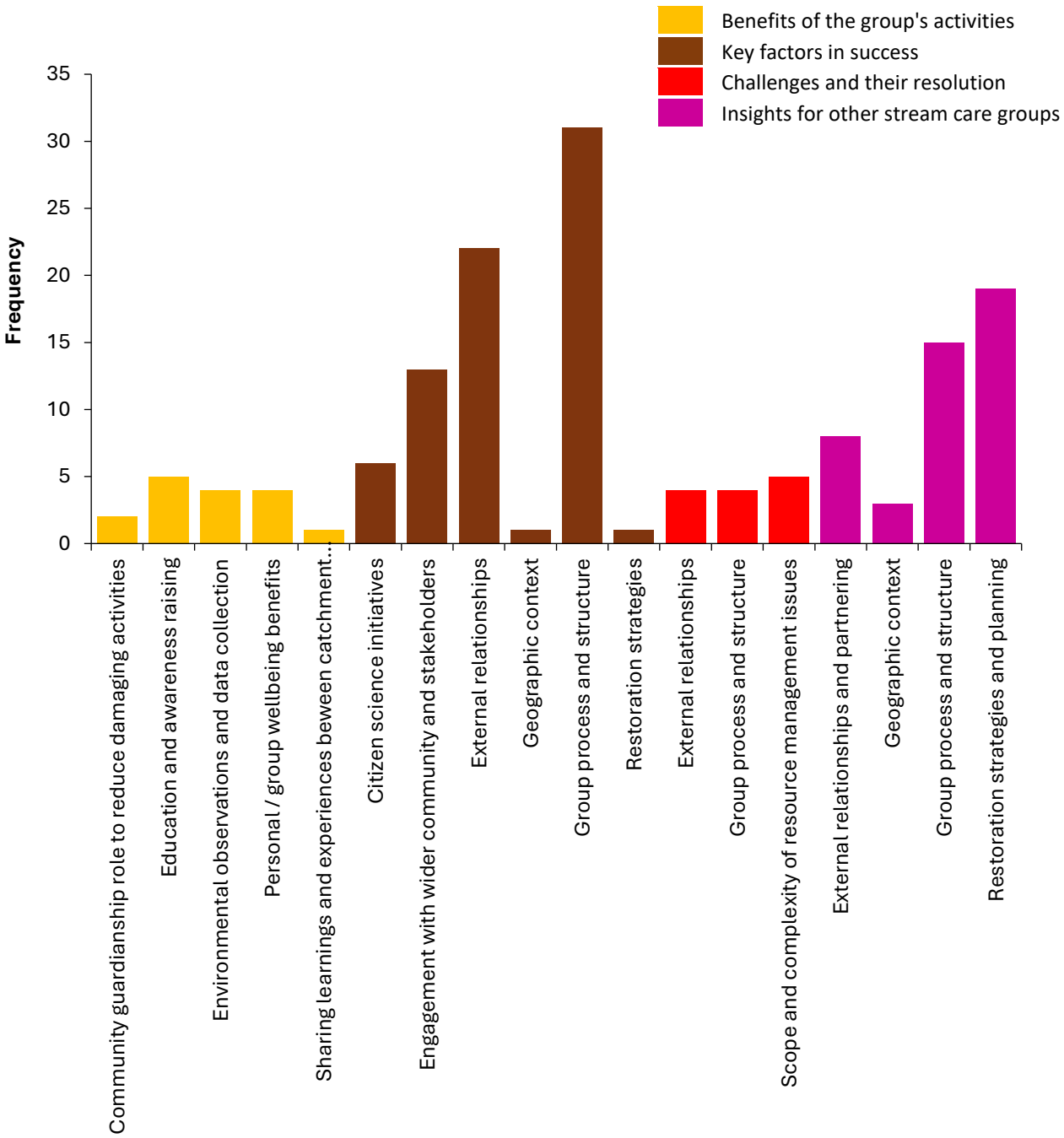

Figure 4. Elements contributing to the group's success and their frequency in the coded dataset (across all interviews)

4.2 Benefits of the group's activities

Interviewees identified a relatively wide range of benefits that they associated with either direct outcomes of the group's work on stream care activities, or ways in which the group has been able to share their learnings and experiences with the community and other catchment groups (to which this study also contributes). In relation to stream restoration work, many interviewee statements suggest that the group's activities have helped to make a difference to the health of the stream in tangible ways. For example, one respondent, reflecting on the benefits of recent riparian planting, considered:

> *[We] have provided shade and therefore water temperature stability, particularly during these hot summer days … We've dealt to at least one of the major impediments to healthy life in the stream and furthermore, cut down the macrophytes and the amount of drain cleaning that's required.* [P1]

A focus on engagement with local authorities such as Christchurch City Council, but also with private landowners in the catchment, was mentioned by several participants as an important factor contributing to the group's ability to achieve improvements in stream management. The relationship with councils was seen as particularly constructive:

> *Their approach was that they knew what they wanted to do, they knew how to go about it pretty well […] and they weren't looking for the council to hold their hand. They were just looking to the council to help them to make it happen. There's only been a couple of groups like that in my 35 years at the council that came through as strong as that.* [P6]

These activities exemplify a community guardianship or stewardship function that forms a prominent theme and strategy that is expressed in several ways. For example, it is supported by other group initiatives to discourage harmful or damaging behaviour by the public through the placement of signage and communication of a sense of community ownership and interest in the health of the stream and catchment. As one respondent noted:

… things like people dropping rubbish, people vandalising the area, people hauling eels out and just beating them to death because they're eels …the locals will take ownership of that. I hope that the area can be treated as a bit of an educational opportunity to put up signage and photographs of the species that are in there and explanations of their lifecycle. [P1]

In a related sense, CSCG also acts as a community watchdog that effectively provides additional capacity to Council staff who may be thin on the ground: For example:

I think it makes a big difference when you've got a community that are around the facility that care for it and will notice and tell council when something is not right … [P8]

… there will always be maintenance and always be monitoring that needs to be done and councils will never be able to do all of that, they just don't have the capacity or the money to do it. So catchment groups become the watchdogs to let council know when there's a problem out there. [P4]

The community guardianship functions of CSCG have also been supported by many awareness raising activities over the years and several respondents commented on how the group has been successful in this regard. For example, in reference to raising awareness of the issue of sediment from the Port Hills:

I was just thinking what probably the group did do … because Ken is a very good speaker and they did have good data and good presentation slides and good photos and all those things … [the CSCG] probably has influenced people's understanding of the whole topic I suspect. Enough people have heard that or it's been shared … a lot of those audiences will have been a mixture of council staff and councillors and community group people. [P7]

Contributing to this, the group has convened many educational activities or events such as talks, field visits or workshops. Several respondents commented on the learning that they had experienced from these initiatives. Examples include the acquisition of skills in

techniques such as water quality measurements, plant identification, fish trapping and electro-fishing, as well as more general knowledge about stream ecology and catchment management:

> *I've learnt so much [...] we actually did fish catching and counting and we had eels and we had the wee bullies [...] we had scales and we were weighing them. That was amazing. People like me don't get a chance to do things like that very often. Not people from the general public that aren't involved in the scientific side of things.* [P2]

> *I've learned a bit about freshwater ecology actually [...] and just the catchment itself I guess, and even sedimentation through the water clarity monitoring [...] which I didn't really know much about [...] And just getting to know people in the area, I always like that,* [P3]

A further component of the group's initiatives has involved a programme of participatory citizen science activities in which volunteers have collected scientific information of interest to them (and in some cases, other parties as well). For CSCG these activities initially centred on the acquisition of a long-term water clarity dataset (as described in Section 3.2). One of the key outcomes of this initiative was the collection of a mostly unbroken daily water clarity dataset for the period November 2010 to February 2018 (Figure 5). Since their initiation these data collection activities have been shared among several group members and expanded to other sites within the catchment as well (McMurtrie & James, 2019), although the regularity of data collection has fluctuated. This is a good example of how community-led participatory science can evolve and be coordinated – especially with the assistance of scientists and experts – to achieve notable outcomes that may be beyond the scope of council monitoring programmes or even science/research projects (e.g., where funding, staff availability or other resourcing constraints may present barriers to the collection of long-term datasets).

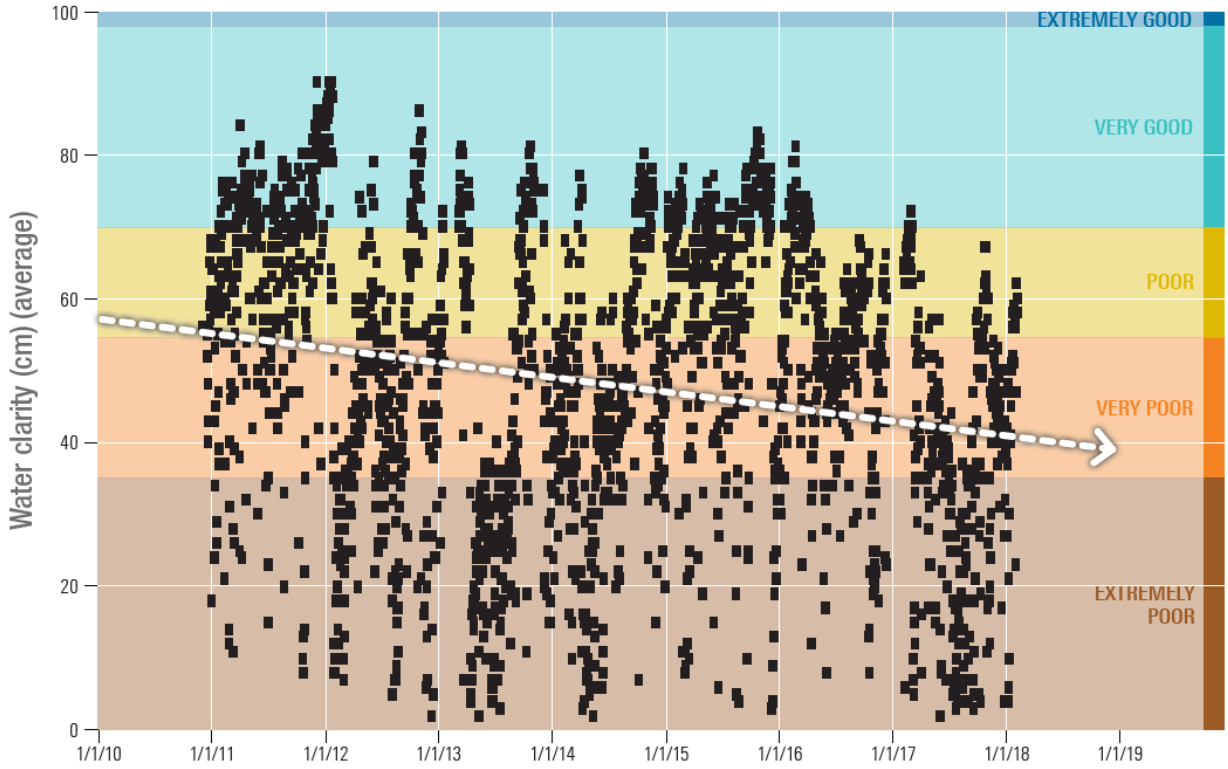

Figure 5. Water clarity measurements (n=2429) collected by Cashmere Stream Care Group over the period November 2010 to February 2018 showing a decreasing water clarity trend in Cashmere Stream. Plot obtained with permission from McMurtrie & James (2019: 4).

In this study we identified a range of benefits that are derived from this citizen science initiative. These include the value of the dataset for establishing trends in water quality that can help to frame and guide the identification of catchment restoration needs. In this case, water clarity is a highly relevant indicator of stream health and catchment management due to well-documented issues with land erosion, sedimentation and downstream turbidity issues that are exacerbated by the fine loess soils that are typical of the catchment (Adamson 2016; James & McMurtrie 2009), and addressing these same issues is a key management objective (CCC 2023; McMurtrie & James, 2013). Although the trends evident in the dataset have certainly helped the group establish its own objectives, it is perhaps the sharing of this dataset with others that has had the most impact on catchment management. The power of the data is considerable:

> *The group is said to have the largest single dataset for clarity of any stream in the country … and the council, who may wish from time to time to ignore us around*

the issue of sediment, they can't ignore the data which has been collected over such a long period of time. [P1]

This suggests that a combination of activities that centre around the collection and subsequent communication of this dataset are responsible for its primary benefits. The science communication aspects are explored further in the following section. A notable additional benefit associated with the citizen science initiative has been its role in raising the group's profile and credibility as a catchment management stakeholder and contributor, particularly in the eyes of authorities. This aspect came through strongly in the perspectives shared by all of the interviewees in this study and suggests that it has indeed been a very influential factor:

Yeah it totally does [demonstrate the commitment of the group]. I mean being able to say that Gordon in particular had collected data every single day for about ten years [...] is kind of phenomenal and I think [...] it's the best set of community collected clarity data in the whole country and so that is pretty amazing. *[P7]*

So actually having that data... Saying that something is going on, and sending an email, is not the same as having the data; 'this is what it is showing, you need to do something about it'. It gives validity to the cry, it's not a cry wolf scenario, there's actually proof of it. [P4]

Lastly, several respondents shared information on personal wellbeing benefits that they derived from participation in the group. These included psychological benefits associated with a sense of satisfaction from contributing to the group's initiatives. These positive experiences were also associated with a sense of community-building that is likely to have contributed to the appeal of the group for its members (most of whom reside near the stream), as well as contributing to wider community buy-in for the group's activities and specific objectives for the stream and catchment. For example:

There are people who ... have found a cause to get behind and work in, which has given them a sense of satisfaction. [P1]

[A]ctually going and doing the mahi … standing in the middle of the stream with no shoes on is my happy place … I thoroughly enjoyed that, summer and winter and going out there and doing planting and clearing and weeding and all those kinds of things. [P2]

The planting days felt like a community building event. People came from further afield and in larger numbers than I expected. It was great to be a part of it. [P8]

In turn these reflections suggest that the group's processes and culture are conducive to positive social experiences as a key factor that has contributed to success, and this is explored further in the following sections.

4.3 Key factors in success

An understanding of the factors that have contributed to success formed a central focus in this study given the considerable evidence for benefits that have been associated with the group's activities. Although a wealth of information was collected during the interviews, the thematic analysis identified six main contributing factors. These included the abovementioned citizen science or community-based monitoring initiative and other forms of engagement with the wider community and stakeholders, along with specific restoration activities that have been pursued by the group. In addition, the interviewees identified many aspects of the group's external relationships and other elements of internal group process and structure that were thought to be pivotal in supporting the practical tasks and activities. Overall, these results suggest that a combination of strategic direction, innovative projects, outward engagement and internal group culture have all played a key role, and that the complementary aspects of these areas of focus are perhaps the most important overriding factor that has kept the group together and underpinned its successes over the years. In the following sections we unpack some of the apparent synergies between these areas of focus, before describing some of the important aspects of the group's leadership, external relationships and internal processes that were identified as key factors in success.

4.3.1 Citizen science initiatives

The group's citizen science activities have undoubtedly proven to be a key factor in success and nearly all respondents reflected on their merits. One of the prevailing themes was the perception that this had provided a point of engagement with local authorities, and moreover, that this function might be more important than the specific information that had been collected. For example:

> *I've learnt, or well we've learnt, just how important it is to have data if you hope to have any impact on engaging with councils.* [P1]

> *Yes absolutely, we keep hammering that with the council. Long term they can't ignore that … but it does need the support of councillors so that we end up with a budget that's there and defined goals of what we're going to achieve and some good monitoring of that.* [P1]

In this sense, the citizen science project is an example of 'taking the initiative' to do something positive for the stream in a true community-led spirit, and in partnership with scientists and council staff.

As shown in Figure 5, the water clarity data also showed a declining trend in the catchment that is statistically significant over the time period (McMurtrie & James, 2019). Therefore, the group was able to both robustly illustrate the presence of an issue and demonstrate that it was unresolved – and indeed had worsened over time. In this sense, the data was of central importance to the objective of raising awareness of, and encouraging action on, stream degradation:

> *… use information wisely and cleverly because your voice isn't going to be heard if you're just yelling about something. You need to have proof, you need to show what's going on and so being able to show that helps your voice be heard, I think, amongst all the other voices that are out there.* [P4]

4.3.2 Science communication

Community engagement and outwards communication have been at the heart of many of the beneficial outcomes associated with the group's work. These activities include the active communication and sharing of the citizen science data that was collected:

> *… to have that continuous dataset made it a really powerful scientific tool as well as a community monitoring tool. It meant that they could show this was actually valid data that's valuable and should be used to ascertain what's going on in a catchment. They've got their data up on the Streamed website so they can see that.* [P4]

> *Yeah, about the health of the stream … like crunching the numbers and actually putting it out in a really good way that the community could digest, yeah and that was really clear, the story was clear.* [P3]

In this case these science communication elements were greatly supported by forging a partnership with a local business (EOS Ecology), which itself has been a key ally of the group, and has helped the group hugely to make a difference. For example:

> *… EOS Ecology were also able to create a public friendly report but also just like a one-page poster that explained the findings in an infographic. That kind of thing is invaluable and other people can use it in presentations later.* [P7]

Aside from the communication of results from the water clarity monitoring, the partnership was also leveraged to produce professional branding, a logo, and layouts to promote group activities such as educational events and planting days (Figure 6). Several respondents specifically commented on the value of these public-facing materials for helping the group achieve its objectives, and particularly those involving engagement with the wider community. For example:

> *… we worked on the brand and the logo and stuff like that … she* [EOS Ecology's senior graphic designer] *gave us all the templates to make it all look professional.* [P5]

Setting up a look and a feel, a shop frontage for the group in a sense, gives the group that credibility in a digital space. I think those are really important factors. [P4]

But I think the other key thing was EOS Ecology... helped us capture it visually as well, and did the action plan with nice pictures and was really good at sort of crunching down the words to succinct meaningful visions and stuff like that. So I think EOS's production ability and comms ability... was really good. [P5]

Figure 6. Examples of CSCG branding and engagement materials: (A) 2014 Action Plan; (B) 2015 edition of newsletter 'The Stream'; (C) 2023 planting day flyer.

4.3.3 Stakeholder and community engagement

As alluded to in the above sections, engagement with stakeholders and the wider community has been a key factor that has contributed to the success of CSCG activities. Alongside the notable focus on engaging with council, another key group of stakeholders has been private landowners in the catchment. Building constructive and mutually respectful relationships with landowners has been of critical importance due to the pivotal role of land management in controlling sediment run-off issues. In an effort to tackle sediment issues at 'source' there has been a particular focus on engaging with landowners in the headwaters and along the riparian corridor:

> *Once we started, we met the landowners up the top … worked out we could help them restore their stream and the neighbour's as well, then it got quite hands on.* [P5]

Here again, the group has successfully leveraged its external relationships to achieve its engagement objectives. In this case, the group essentially identified the need and then played a coordination role to assist council with that engagement:

> *In terms of getting the restorations done upstream … they've engaged with the landowners, they've got the landowners on board. They've gone to the council and said right, this is what we want to do, and we'd like you to help us do it and the council has gone, okay, we will.* [P4]

In terms of wider community engagement, the group has used a wide range of strategies and activities (Table 3a). Importantly, they traverse a wide spectrum of modalities from digital online initiatives to face-to-face gatherings and social events. They have also utilized a wide range of media and formats including websites, print materials, public speaking, personal correspondence and social events. The group, together with the Rotary Club of Cashmere, has made an informal approach to CCC representatives about the possibility of setting up a permanent education centre within the Te Kuru wetland. It would serve the significant school student population within the wider Cashmere Stream catchment. Together these activities have contributed to the forging of external relationships that have been pivotal to the group's success (Table 3b).

Table 3. Stakeholder and community engagement activities and external relationships that have been key to the success of the Cashmere Stream Care Group.

Key factor	Contributing elements
a. Engagement with community and stakeholders	Science communication of community-based monitoring results from the catchment
	Presentation of monitoring data to council
	Public facing website to share information
	Professional branding and outreach material
	Building of personal relationships with key individuals (e.g., council staff)
	Door knocking to engage with wider community Door knocking to engage with wider community
	Outreach using email updates to contact list
	Outreach using field tours
	Outreach using letter drops
	Outreach using social media
	Preparing comprehensive restoration plans before engaging with authorities
	Willingness to show initiative assisted engagement with local authorities
b. Key external relationships and strategies	Forged relationships with Council staff
	Formed relationships with landowners throughout catchment
	Formed relationships with developers
	Coordinating activities with other environmental NGOs with interests in the Cashmere Stream catchment and its downstream connections (i.e., Ōpāwaho Heathcote River catchment and Avon Heathcote Estuary / Ihutai)
	Pursued networking initiatives with other catchment groups (nationwide)
	Made connections with local schools
	Group participation in formal management processes
	Took a pro-active position on perceived issues
	Prepare to challenge existing norms (e.g., whether council drain clearing reduces flooding)
	Formed a partnership with Council as fund-holder
	Attracted funded to extend the scope of partnership activities with Council
	Leveraged businesses to produce professional branding and outreach
	Group activities designed to build relationships between people in the community
	Group welcomes and expects public scrutiny

4.3.4 Group process and culture

Information on internal group processes, administrative aspects and structure formed a rich dataset containing over 30 unique ideas. Unsurprisingly, many of these contributed to the establishment of external relationships as key factors in success. Prominent topics included the inclusive style of group leadership and presence of a core of active group members who were responsible for leading many of the key initiatives. Leadership within the group came through very strongly as a key factor in the group's successes. Some of the important contributing elements included the knowledge and motivation of the Chairperson which contributed greatly to effectiveness in a manner that was supportive and non-threatening:

> *You need someone who has got the time to give to the programme that I give for example, just to provide some leadership.* [P1]

> *it's got to be a special person because it's got to be someone that people listen to. Yeah and I think people recognise that …* [P2]

> *[the leader] is such a key part of that because he's so good at relationship building but also being quite direct like if he wants something. He's just one of those people that has … a manner that engages people while still being really effective in terms of getting stuff actually happening. Like he's not confrontational at all but persuasive.* [P3]

> *It's really just having a small group of people, and there might be only three or four or five, I think probably half a dozen is a good number because then you've always got someone who will turn up. It's all about the people, just get a small group and keep your fingers crossed that you find a group of people that's prepared to put a little bit of time and effort … and just care about it.* [P2]

The core group of key individuals were also instrumental in brokering the engagement with stakeholders, and in some cases this included the formation of long-term relationships with key individuals in other organisations. As a long-running community group, many of these aspects have had considerable longevity and, in combination with the relatively low turnover of key group members, have likely assisted the group to

develop a consistent culture and working style. In turn, these attributes may have contributed to the perception of CSCG as a reliable partner in collaborative projects as shown in the following comment on the group's relationship with council around mobilising the community to participate in a community planting day:

> *knowing that the group were able to help with a large chunk of the leg work to make that happen just made it so easy to say, yes let's do this. And seeing how much engagement we did get from the community, if we hadn't partnered with the stream care group on that, I suspect we might have had different outcome.* [P8]

With respect to the nature of the working relationship between the group and council staff generally, one interviewee noted:

> *The group was very welcoming to us to come into their meetings and present and discuss, and provided us with feedback. So that was really helpful [...] I think it would have been less successful if we were kept at arm's length the whole time [...] Actually being able to engage with the group means that you can talk to them about what their needs and thoughts and so on are.* [P9]

Other comments reflecting the group's sound ethos around partnerships show an awareness around helping their partners in other organisations achieve their own work-related objectives. This way of working implies taking a genuine interest in the context and constraints that the other party is working within:

> *we've got engineers and some of the others in the council who recognise that the group aren't just grizzlers and criticisers, we're actually out there doing something and trying in a way to do their job for them ... understanding what's going on and pointing out or at least making suggestions...* [P1]

Related to this, there was considerable evidence of the group being aware of the limitations of council investments and processes. This standpoint was further reflected in the internal group culture through the management of expectations:

> *I think it's also about managing aspirations a little bit, that you know council is kind of a big juggernaut, you can't completely shift it one way. Just understanding the kind of constraints that councils are under in terms of lack of resources to fully*

engage with things, and there might be a whole lot of reasons why things don't get done, but maybe just being willing to compromise a bit and get what you can get done. [P9]

4.3.5 Technical skills and local knowledge

Another very important factor that was mentioned by many respondents was the group's ability to attract people with technical expertise that was relevant to key objectives (e.g., stream ecology, resource management, community engagement). This was further supported by the perception of local knowledge of the catchment (which was also present within the group) playing an important role in activities such as restoration planning. For example:

From there we began to work with the science. We attracted some pretty good people … we had yeah just a number of people who were able to provide good sound ecological and scientific basis.

There's quite a bit of expertise within the group. So they're not dealing with a lot of emotion, fired-up kind of rhetoric. It's usually focused on the practical stuff that's based in science, based in good practice, based in experience … if we challenge them on issues, well we've always got good grounds for doing so. [P1]

Sometimes I do feel that out of the group members, I'm the one that is the least familiar … because they've been out a lot more and yeah … know every drain and spring and everything. [P3]

4.3.6 Group structure and strategies

A considerable level of detail on the inner workings of the group was shared during the interviews. In this section we summarise some of the key elements that have contributed to the group's activity and working style with a focus on unique aspects that have contributed to its success (Table 4).

Interviewees generally considered that the group's structure had served it well, particularly in aspects such as the membership profile and administrative functions. One of the key strategies from the outset involved keeping the group relatively informal to reduce administrative burden. For this reason, the group has never adopted a formal legal structure (e.g., Incorporated Society or Trust). CSCG has instead relied on its external relationships and partnership strengths that include strategies such as establishing MOU with key stakeholders, and developing a funding relationship with CCC where the council acts as their fund-holder.

> *That's something that the group has done really well. They've struck a good balance between having the group viable and look really professional, but they haven't gone legally to that next level … you go to that next level and you've got that next level of paperwork that you have to do and that requires a lot more time commitment from people, purely to drive the documentation.* [P4]

> *[the group's meeting process] wasn't too overly bogged down with needing every meeting [to have a] quorum and religiously taking notes. They had to do a certain amount… but the other side of making things happen wasn't fixed too much, it was kind of fairly loose and people didn't feel pressured to attend.* [P6]

Other aspects that have contributed to the appeal of the group for participants include developing an inclusive group culture through adopting a flexible work programme that can be tailored to suit individual interests, and the strategy of finding tasks people are good at. For example:

> *She just wanted to get in and pull weeds out … pull the macrophytes out of the stream. So I gave her a pair of old waders from work and she was in there and so every chance she'd get she'd go in and you know, seeing that enthusiasm is actually really quite empowering and sort of nourishing.* [P5]

Participation has been enhanced by strategies such as using hands-on activities as a community engagement and recruitment tool, and providing learning experiences for group members and the wider community. These were identified as some of the benefits of group activities from the perspective of group members (see section 4.2), indicating that they have played a tangible role in group satisfaction and membership. Similarly, the

group regularly convenes social events that are either incorporated within other activities or additional to them. Nearly all respondents commented on the value of these interactions, which often involve sharing a meal or drinks in the neighbourhood:

> *I've learned a bit about freshwater ecology actually … and just getting to know people in the area, I always like that, yeah, just the relationships*. [P3]

> *I've always loved that about going to the Cashmere Stream Care Group meetings … we have dinner, have a glass of wine or a cup of tea, and it's actually a really nice social event and a social catch up*. [P4]

Table 4. Aspects of group structure and process that have contributed to the success of the Cashmere Stream Care Group.

Group structure and processes	Contributing elements
Activity planning	Developed defined goals and targets
	Action plan broken into stages
	Group activities broken down into discrete tasks
	Aligned group activities with Council strategies
	Plan activities that assist council staff with their work-related objectives
	Collaboration with professional scientists in restoration planning
	Group activities had local focus
	Sharing of data collection tasks around ground members
	Maintaining positive productive focus despite wider more overwhelming challenges
	Successful initial work attracts further investment
Administration	Group structure sought a balance between professionalism and avoiding onerous administration
	Value in keeping group relatively informal to avoid unnecessary bureaucracy
	Developed MOU with key partners
Group membership and culture	Compatibility among group members was key to productive effort
	Participation in group was supported by social experiences
	Flexibility in volunteer activities to suit different motivations
	Key strategy of finding tasks people are good at
	Using hands-on activities as recruitment tool
	Increased capacity by leveraging personal networks of group members
	Provided learning opportunities to member
	Attracted members with local knowledge or interests in making observations
	Attracted people with technical knowledge
	Value of retired people for continuity

4.4 Insights for other stream care groups

In this section we identify four highly relevant insights that are likely to be valuable for other community stream care groups.

Avoiding burn-out in key individuals

Wherever passionate and energetic individuals are engaged in community environmental group work, there is a tendency for people to take on a lot of responsibility. It is a challenge for groups to keep their capacity and that of key individuals in perspective. Interviewees expressed an awareness of this challenge for the CSCG, but also acknowledged that it is difficult to achieve in practice.

> *You need to share the load and the responsibility and that's really hard for groups because … stuff gets done by the busy people – you've always got that one or two people that kind of do everything because they're driven and that's what they do and everyone relies on them – and when they go or they burn out, then the group flounders until they find another. So whilst it's easy enough to say share the load, you know, it is a hard thing to achieve in reality.* [P4]

> *I think there has been a conscious thing not to spread ourselves too far because we're just a little group and I think we would quickly burn out if we took on too much. So it's been quite nice to have that actual quite discrete parcel to work on.* [P3]

Succession planning

Planning for continuity, and succession around key roles is important. For the CSCG, as reflected in the above quotes, there is an awareness of the need to share the load, and to take care with how much individuals take on. However, rather than expressing a steadfast desire to continue as a group indefinitely, several interviewees raised the question of whether the groups should be looking to continue at its recent rate of intensity, or whether the group may have earned the right to pause and reassess its purpose and direction. With a deserved sense of accomplishment at the completion of the Cashmere Stream enhancement works, some suggested the group might consider its format and approach,

and re-think what future form it might take. It is clearly important for groups to think about, and actively provide for succession where continuity is the goal, but it is also important to remember that continuing may entail pausing, re-assessing, changing direction or even scaling back.

Importance of retirees for continuity

Interviewees noted the crucial role played by retirees in sustaining the group, and a parallel challenge in getting young people to remain involved. In many ways this comports with dynamics across the voluntary and community environmental sector in Aotearoa New Zealand (Heimann & Medvecky 2022). This is true both of the group itself, wherein several of its key members – though not all – are retired, and for the group's community planting days, which attract people from all walks of life, but are also particularly well-attended by retirees.

> *Community groups always have a lot of older people involved in them because they're the ones that have the time to be involved and so you often see a few younger people coming in and they'll drift in and drift out as their life journey changes. But your continuity is in the retirees … they can be there and they can keep the engine running.* [P4]

Role of geographical context

Several group members shared insights on the importance of keeping a local focus. On reflection, the geographical context of the relatively small stream catchment and its peri-urban community was identified as a key factor that had likely helped the group form, and had certainly helped the group stay together as longer-term relationships developed:

> *I think it probably is helpful to kind of coalesce around the project as a catalyst for a particular geographical area … knowing you're kind of being clear about your purpose or your geographical area is helpful.* [P9]

Some respondents also commented on the differences between urban and peri-urban contexts, and more rural situations in which the formation of groups similar to CSCG was perceived as less likely. A key perception around this was the potential size of the community of interest:

> *When you look at a map of New Zealand with dots for catchment groups, they are clustered in the urban areas… They start to thin out when you get out into the big wide expanse of the rural area … naturally there's less people and so it's harder to bring people together to form those groups.* [P4]

5 Discussion

This report has drawn upon interviews with CSCG members and collaborators to gain an insight into how the group has been successful over the years, and how its work has benefitted the Cashmere Stream and catchment, as well as the group's members and the wider community. The study has yielded several key findings that should be of interest to similar groups or aspiring groups elsewhere, and to those working with or supporting community stream care groups. While it is acknowledged that "success" is a complicated concept in connection to assessing progress in ecological restoration (Zedler 2007), it was not the purpose of this study to judge the success of the CSCG solely in this sense. Rather, the aim was to document participants' perspectives on success and what has enabled the group to succeed in achieving its own objectives.

All of the participants in this research identified tangible successes of the CSCG, and also recognised that huge challenges remain to address the drivers of degradation in the catchment – particularly from erosion and sedimentation. Despite this, the CSCG has had a positive impact on the state of the Cashmere Stream via at least two avenues. It has directly carried out, supported and prompted restoration in the catchment – first in the upper reaches upstream of Sutherlands Road in partnership with key landowners, and then in the Hendersons Basin reaches in the context of the larger Cashmere Stream Enhancement Project together with CCC. This has largely involved riparian planting and post-planting maintenance, but has also involved some in-stream habitat enhancement and re-meandering of reaches of the stream. The group has also taken on a guardianship or stewardship role in relation to the stream, informed by its monitoring initiatives, and actively projects a sense of community ownership and interest in the health of the stream and catchment. This is supported by efforts to engage and educate the public about the importance of caring for the stream and to create opportunities for participation in monitoring. More generally, the group is a tireless advocate for the Cashmere Stream, and has been committed to making sure the stream is front-of-mind for Council staff and politicians. This has seen the group successfully elevate the profile of the Cashmere Stream, such that it is widely known and recognised as a valued urban waterway in Ōtautahi Christchurch.

The study also shows that the CSCG has created benefits for the community in the catchment. In particular, the group's members and supporters reported many gains from working together. Interviewees mentioned diverse benefits, ranging from learning about the stream and its ecology, to forging new friendships, developing new skills in environmental monitoring, connecting with the stream, and 'de-compressing', having fun or relaxing through hands-on planting and weeding activities. The group has also placed a high priority on engaging with the community in the catchment – including residents of new subdivisions.

While this research has identified several factors that have contributed to the group's successes, we suggest here that a primary factor has been the partnership ethos that the group has developed and followed in forging connections with key allies in local councils and the scientific community. This partnership approach has in turn been underpinned by at least two secondary factors, namely a strong commitment to showing initiative through its citizen science data collection and outreach activities, and effective group leadership that has facilitated a positive group culture.

Partnership approach

A defining feature of the CSCG's trajectory has been its strong relationships with key partners, and particularly its partnership with local government (the city and regional councils). As for many other community environmental and catchment groups in New Zealand (Peters et al. 2015; Sinner et al. 2022), local councils have been a key source of support. By forming strategic partnerships, underpinned by strong and enduring personal relationships, the group has led and helped to drive significant restoration throughout the catchment. Research in other contexts has also concluded that community-based environmental groups can be more effective through constructive partnerships with the right government agencies (Chaffin et al. 2015; Seixas & Berkes 2009).

Alongside partnership with local councils, the CSCG has deliberately built trust-based partnerships with private landowners in the catchment. The experiences of the group in this regard resonate with insights from the literature, where buy-in from landowners has proven crucial to achieving catchment-scale restoration outcomes (e.g. Hardy & Koontz 2010; Higgins et al. 2007). The wider community of residents across the catchment has

also increasingly supported CSCG initiatives such as planting days and working bees, and the group's efforts to engage the community have helped to grow capacity for restoration work in the catchment. As research in other contexts has shown, relationships with the wider community depend on awareness raising, the establishment of trust, and the availability of resourcing to support community-engaging restoration activities (Adams et al. 2016). The CSCG has been able to marshal these elements at the scale of the Cashmere Stream catchment, which is potentially a manageable scale at which build trust and to inspire effective collaboration (Metcalf et al. 2015).

Citizen science and data initiatives

The CSCG recognised a need, and opportunity, to master the science and data around water clarity and sedimentation issues in the Cashmere Stream. Through its own initiatives it was able to build a robust dataset to document the problem and prompt action by local authorities. The group drew on key relationships to identify appropriate monitoring techniques and developed a workable programme for data collection activities that were both sustainable and enjoyable for group members. Results from this study highlight the CSCG strategies that have leveraged these community-led data collection activities to both drive momentum within the group and mobilise support and resources for stream restoration. The group used the data to build new partnerships (e.g. with the City Council) and found that the acquisition and sharing of data increased their legitimacy and relevance as stakeholders.

Research on citizen science and community-based monitoring shows that the process of learning how to monitor stream health can be empowering for local groups and communities (Warner et al. 2024). This may be especially so where the resulting data is successfully used to achieve improvements in stream health (Walker et al. 2021). The CSCG provides an example of both processes in action, and illustrates some of the powerful benefits of citizen science initiatives in the community.

Effective leadership

An important factor that has helped the group to form productive strategic relationships with key partners has been the effective leadership of the group. Research on community environment groups has highlighted how strong leadership is essential in establishing

relationships and thereby building capacity for local environmental stewardship and restoration actions (Bennett et al. 2018). In particular, highly *engaged leadership* has been found to be an essential factor in the success of community environment groups (Crona et al. 2017). Where leaders are themselves highly motivated by, and engaged in, the work of the group, they are far more likely to enable the individual and collective capabilities of the group towards achieving environmental goals, and to build and maintain effective working relationships (Bodin 2017). Interviewees generally agreed that having a committed and capable Chairperson to lead the group was one of the defining characteristics of the CSCG, and a decisive factor in its successes.

One of the ways that effective and engaged leadership has built key relationships and enabled restoration action for the CSCG has been through fostering a positive group culture. The group itself is diverse in terms of the interests, strengths and motivations of its members, but the way that the group is organised and run provides for contributions by all. Research on leadership in the voluntary and community sectors has stressed the importance of individual agency in enabling groups (Ardoin et al. 2015; Lough 2021; Westley et al. 2013). Effective leaders operate in an enabling, catalysing way (rather than a top-down, managerial way) to activate the capacity of the group and wider partners (Westley et al. 2013). This form of leadership has been important for the CSCG, where the drive and passion of the Chairperson has helped to sustain the group over time through enabling progress towards group goals and making involvement enjoyable and rewarding for group members.

6 Key conclusions and future directions

Explaining the success of the CSCG in any definitive way is not possible. Participants related a wide range of factors that they believed have contributed to the successes of the group. It is possible, therefore, to identify several of these factors, which – while not providing a 'recipe for success' – can be instructive for other stream care groups in a similar context and those working with such groups. Key elements of the CSCG's success are:

A science and data focus: The group recognised the strategic need to master the science and data around sediment issues – the key driver of degradation in the stream. It drew on key relationships to identify appropriate monitoring techniques and established a citizen science programme that was focused on documenting the problem.

Relationships with expert partners: From the outset, the group built solid relationships with competent and supportive partners in councils and a local environmental consultancy. These supporters provided invaluable expertise and skill-sets that helped the group to understand and break down the challenges facing the stream and its catchment, and to present and communicate these succinctly (e.g. in an action plan, newsletters, submissions) to the community and external stakeholders.

Development of an action plan: With facilitation from supporters, the group developed its action plan in 2014. This process helped the group to see its way to taking meaningful steps towards addressing the poor health of the stream. Given the complexity inherent in untangling multiple inter-connected problems and drivers, the action plan was very valuable for the group. The action plan was also an important device for signalling outwardly that the group was organised and guided by a workable and feasible plan. This was important in bolstering the credibility of the group.

Cultivating a positive group culture: All participants in the research mentioned that they simply enjoyed working with the group on account of the culture of the group and the way it operates. Many commented that the CSCG is as much a group of friends as it is anything else, and they just have a nice time when they meet and work together. In one sense the group takes a deliberate approach to this, as reflected in the fact that one of

the three key goals laid out in the action plan relates to nurturing the group, and maintaining "a structure that allows group members to contribute their individual perspectives and knowledge to ensure a sustainable group". In another sense it is also a function of the particular combination of people who comprise the group, and the attitudes and respect they bring to the group.

Leadership: Many interviewees commented that the CSCG has been wonderfully led by its Chairperson, and that this quality of leadership has been decisive in the success of the group. Effective leadership has allowed the group to forge strong relationships of mutual respect with council staff, landowners and the community. The drive, commitment and passion of the Chairperson has been a source of motivation for other group members, and has in many ways been part of what holds the group together. Several interviewees recognised the risk inherent in this as well, observing that the group has not really addressed the question of what might happen when the Chairperson is no longer willing or able to carry on in the role.

Engaging the community in the catchment: The CSCG has remained committed to engaging the wider catchment community – even when this is a challenging task. The group early on produced annual newsletters, and engaged local community members in its water clarity monitoring programme. Later, the group has maintained a social media presence on Facebook, and then also engaged local residents in new neighbourhoods in large planting days in the Hendersons Basin enhancement work. Increasingly, the community is on-board with caring for Cashmere Stream, and now for Te Kuru, the new constructed wetlands across Hendersons Basin.

Perseverance: The group has been active for some 18 years, which is relatively long for neighbourhood environmental groups. Many of the members of the group have been involved for a long time, and most of those who have left, have done so on account of having moved away. The CSCG members are highly committed to the Cashmere Stream and prepared to work away for the long haul. In part, this is attributed to the strong, positive group culture and supportive leadership mentioned above.

Overall, the insights gathered here should give encouragement to stream care groups and local councils elsewhere by showing that incredibly constructive and positive

partnerships are possible. These can be mutually beneficial and mutually rewarding for those involved and can enable significant gains for stream restoration. As community-based restoration continues to grow across Aotearoa New Zealand, government (central and local) agencies might recognise it as an avenue worth actively engaging with and supporting. Examples from CSCG and other successful community groups can help guide and inform these opportunities to deliver both ecological and social outcomes.

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Appendix A. Semi-structured interview topics, questions and prompts

1. **Involvement in the group**
   - How did you become involved in the CSCG and why?
   - What has been your role and the nature of your involvement?
   - How has your involvement changed over time?
   - Why have you stayed involved with the group?
   - What do you enjoy about your involvement in the group, and what have you personally got out of it?

2. **Key factors in the success of the CSCG over the last 15 years**
   - What challenges has the group had to overcome, and how was this managed?
   - What opportunities has the group been able to seize or realise?
   - What relationships have been most important to sustaining the group's activities?
     - Relationships within the group
     - Relationships with other community groups
     - Relationships with key agencies and organisations
     - Relationships with the local community

3. **How the group's work has benefitted its members and the wider community**
   - How have [you/group members] learned about the stream/catchment through [your/their] involvement in the group?
   - What relationships have been established or built through participation in the group?
   - How has the group engaged the wider community and stakeholders in its work?

4. **Potential learnings for other community stream care groups in Ōtautahi (and beyond)**
   - What are/have been unique or important characteristics of group structure, organisation, process?
   - Which have been the essential external relationships and partnerships?
   - Where (in what fora) do you think groups like the CSCG can effectively share knowledge of 'what works' and learn from other groups?

5. **Concluding reflections**
   - What do you think is the biggest single barrier to groups like the CSCG achieving their goals?
   - What do you think is the main success of the CSCG? What has been most rewarding for you?