



Nature conservation work in climate change

Case study of Nature Network
Bendigo Region

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We acknowledge the Djaara and Taungurung people as the Traditional Owners of the Country on which this project was conducted. We recognise their continuing connection to land, waters and culture and pay our respects to their Elders past, present, and emerging. Moreover, we express gratitude for the knowledge and insight that Traditional Owner and other Aboriginal and Torres Strait Islander people contribute to our shared work. We recognise the importance of caring for Country and support the aspirations of Traditional Owners as outlined in Dhelkunya Dja Country Plan, and the Taungurung Country Plan. (Nature Network, 2023)

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Contents

1	SUMMARY	2
2	RESEARCH DESIGN	4
2.1	Purpose and approach	4
2.2	Analysis and findings	4
3	VALUES AND MOTIVATIONS	5
3.1	Place-based values involving experiences in nature and local regional culture	5
3.2	Family cultures shaping values and motivations to volunteer	5
3.3	Personal values including interests, knowledge, sustainability, and action on climate change	5
3.4	Social values in being part of a group	6
3.5	Distinct values shape different types of action	6
4	THE MAGNITUDE OF THE WORK AND UNDERLYING CAPABILITIES	7
4.1	The magnitude of the work	7
4.2	Capabilities of the volunteers and Landcare groups	8
4.3	Risk to the region of this work not being undertaken	8
5	FIRST NATIONS PEOPLES AND COUNTRY	9
5.1	Engaging with DJAARA through formal requirements and group activities	9
5.2	Interest in further engagement to support knowledge building and mutual goals	9
5.3	Developing ways to engage that support recognition and self-determination	9
6	BARRIERS AND ENABLERS TO NATURE CONSERVATION WORK	10
6.1	A range of resource, socio-political, and environmental barriers are experienced	10
6.2	Enablers demonstrate the capabilities of the Groups and address some barriers	12
7	LOCAL CHALLENGES AND CLIMATE CHANGE	15
7.1	Local challenges are at the forefront of concerns for Groups and participants	15
7.2	Impacts of climate change on work – disruption, loss and damage, demands, distress, risk, and uncertainty	16
8	FUTURE NEEDS AND PLANS	18
8.1	Recognising the value of local knowledge	18
8.2	Attracting more volunteers and particularly young people	18
8.3	Increasing collective capacity and capability through networks and coordinating tasks	19
8.4	Supporting Groups in responding to climate change	19
8.5	Institutional support through policies, plans, funding, and engagement	19
9	REFERENCES	20

1 SUMMARY

Climate change adaptation involves adjusting to a changing climate, which includes extreme weather events such as storms, floods, and fire, and slow ongoing processes such as rising average temperatures and sea level rise (IPCC, 2023). There is no end point to adaptation, such that it is a process of continuing adjustment to change (Barnett et al., 2015). Therefore, the process of adaptation is of central importance including how we make decisions, what we do, and our underlying values and relationships. Natural Resource Management (NRM) is fundamental work of adaptation such that it contributes to social and ecological resilience through protecting, enhancing, and caring for ecosystems and species (Bardsley, 2015). This work is fundamentally social, enacted within institutions, through work (paid and unpaid), within, and by, communities (Mollinga, 2010). The need to support NRM work is clear such that Australia's federal and state governments have identified climate change as a risk to the natural environment (Australian Climate Service, 2025) and the *State of the Environment* report details severe impacts including increased occurrence and severity of water scarcity, animal deaths, and damage to crops (Cresswell et al., 2021).

While state and territory governments are responsible for NRM, NRM work is reliant on volunteers. In 2020 more than 250,000 people were estimated to volunteer their time in animal welfare and environmental activities in Australia (Australian Bureau of Statistics, 2021). Local communities contribute their time, energy, skills, knowledge, experience, and other resources to essential social and environment work such as waterway restoration, species protection, community events, and knowledge building, that would otherwise not be achieved. Importantly, communities also have in-depth, and sometimes long-term local knowledge and relationships that are fundamental to perceiving and effectively responding to local issues and cannot be replicated. However, local communities experience challenges in NRM including building resources, knowledge, and skills, recruiting volunteers, and particularly young people, and community leaders often experience burnout (Robins & Dovers, 2007). The purpose of this research is to consider how NRM is being practiced by conservation volunteers in the context of climate change, understanding volunteers as an essential workforce that needs institutional support for its longevity, sustainability, and effectiveness.

This research was initiated in conversation with Nature Network and Climate Change Adaptation Lab, La Trobe University, in 2024. Together, they developed a project, funded by Lord Mayor's Charitable Foundation, that would engage Nature Network's 10 Landcare groups. Approved by La Trobe University's Human Research Ethics Committee in 2025, the research team engaged with the Groups through a multi-method, iterative approach, including a survey, interviews, a workshop, and ongoing conversations through field visits and a Nature Network forum. The research was undertaken over nine months from August 2025 to April 2026 and the approach was collaborative whereby the groups and participants contributed and provided feedback throughout. These methods were also designed to centre the Groups in data collection and analysis, for detailed descriptions and understanding of their experiences of their work and climate change. This report is a summary of the key findings from the qualitative research being the interviews, workshop, and ongoing engagement.

Key findings include:

- The participants were motivated by diverse values that have origins in their connection to the local environment, rural and regional culture, and family history; are reflective of their interests such as gardening, learning, spending time in the community, and sharing their skills and knowledge; and align with their principles such as sustainability, action on climate change, and multispecies justice. The different values bring different types of goals, approaches, and actions into volunteer work, leading to diverse nature conservation Groups, in terms of their goals, focus, and approach. This finding recognises the distinct motivations within the Groups, the diversity of the Groups as a benefit in the ways that they contribute to breadth and depth of action and engagement in the region, and how values might be considered in engaging with the Groups, and into the community, for the longevity of NRM work in the region.
- The magnitude of the work done by the Groups is immense and involves a range of capacities and capabilities that are donated. The Groups are managing public land, advocating for forests, creating connections within the community, working with Dja Dja Wurrung Clans Aboriginal Corporation (DJAARA), providing education, restoring landscapes and waterways, working as a conduit between local residents and government, caring for animals, working with landholders, holding community events, and managing their administration and governance. During interviews, the achievements and outcomes of the Groups' work was often understated and the researchers strongly benefited from seeing their achievements through joining working bees, visiting sites, and attending meetings. It is apparent that the work needs to be valued in a range of ways, to recognise the work, and develop effective support for the Groups. Given volunteer work underpins social and environmental resilience in climate change, there are significant benefits to be gained for the region, and therefore, a responsibility, for institutions to foster Groups and their volunteer conservation work.
- Dja Dja Wurrung are recognised as the Traditional Owners of the region. The position of this research is that engagement with land, is also engagement with its people, as a matter of justice. The Groups engage with DJAARA

formally as required through land management arrangements, which is often mediated by the relevant authority, and as part of activities initiated by the Groups through direct relationships or an organisation such as Trust for Nature. There is a strong interest in engaging with DJAARA including sharing knowledge and aligning work with DJAARA's strategies and plans, and a few participants are undertaking cultural training as part of their interest and sense of responsibility. Participants expressed that engagement involves recognition of DJAARA's right to self-determine, shared values and goals, and capacity needs of both DJAARA and the Groups. There is an opportunity for a co-ordinated approach for Nature Network and the Groups to engage with DJAARA for mutual benefits.

- Each Group experiences barriers and enablers to their work based on their circumstances, values, goals, capabilities, and needs. Research discusses a range of barriers and enablers to conservation volunteering and climate change adaptation, and in this report, we have analysed the interviews and grouped the barriers in a table under categories of resource, socio-political, and physical systems and processes. Therefore, the table represents a collective view of the Groups. The barriers are extensive, including 35 distinct barriers, and demonstrate the challenge of conservation volunteering. The enablers are discussed thematically, and illustrate positive, capable participants and Groups, and the enablers address some of the barriers. Importantly, the barriers demonstrate underlying vulnerabilities and needs, which are compounded by local challenges and climate change.
- The primary concerns expressed in interviews, were often immediate and significant local challenges of urban planning and development, forest fire management, the ongoing impacts of mining, and unsustainable behaviours in the community (e.g. illegal logging, and littering) and community perceptions (e.g. misconceptions of bats - *Pteropus poliocephalus* Grey-headed Flying-fox in central Bendigo). While climate change was not at the forefront of many participants' concerns, when discussed in relation to their work, impacts of climate change were identified in the interviews. Examples show that climate change disrupts work, causes loss and damage to species and sites, increases demands and the costs of the work, contributes to concerns and at times, distress for participants, and increases risk and uncertainty. These impacts cross all aspects of conservation volunteering work, thereby challenging the work, and compounding local issues, and need to be addressed to adapt nature conservation work.
- The research identifies opportunities to support the Groups so that they are sustainable and effective in the long-term. Importantly, the approach to this research is not to discuss ways that individual volunteers or groups could change their behaviour, rather, the focus is on how systems might change to support the Groups, thereby focussing on wider opportunities associated with knowledge, relationships, co-ordination, overall competencies, and institutional support. The key themes are as follows:
 - Recognising the value of local knowledge
 - Attracting more volunteers and particularly young people
 - Increasing collective capacity and capability through networks and coordinating tasks
 - Supporting Groups in responding to climate change
 - Institutional support through policies, plans, funding, and engagement.

While considering these opportunities, the Groups are working in a complex context of rapid change in the region including population change, development, socio-economic challenges, and political instability in relation to environment policy and national and international events. The work of local volunteer Groups is essential for socio-ecological resilience and opportunities to deepen and extend social relationships with diverse communities, and understand how to care for the environment, are necessary in the context of climate change. As deeply connected, situated work, it is important to find ways to recognise the work, and support long-term, resilient, sustainable nature conservation work.

Thank you to Nature Network, the Groups, and participants

Nature Network supports its 10 Member Landcare Groups:

- | | |
|--|---|
| 1. Axe Creek Landcare | 6. Ironbark Gully Friends Landcare Group |
| 2. Central Victorian Bat Alliance | 7. Junortuon Community Action Group |
| 3. Friends of Riley Street Natural Reserve | 8. Longlea and District Landcare |
| 4. Friends of Strathfieldsaye Streams and Land | 9. Northern Bendigo Landcare Group |
| 5. Friends of the Whipstick | 10. Wellsford Forest Friends and Landcare Group |

The researchers would like to share their appreciation of Nature Network, each Group, and all participants. Firstly, we are impressed by the immense work that you all do for the land, waters, species, and local communities in the region. Such work is invaluable in fostering healthy environments and healthy people, and resilience through strong and ongoing relationships. You have unique local knowledge that can only be developed through sustained and careful attention. Everyone welcomed us to events, and meetings, made themselves available to participate in the project in different ways, and generously shared experiences, perceptions, ideas, and knowledge. This project is rich due to your input. We hope this report begins to acknowledge your immense work and look forward to continuing the conversation.

2 RESEARCH DESIGN

2.1 Purpose and approach

The purpose of this project was to research how climate change impacts Natural Resource Management (NRM) work, with a focus on conservation volunteers, to identify opportunities for NRM work to adapt and achieve social and environmental outcomes that are fundamental to resilience within climate change. The aims were to understand conservation volunteers' values, motivations, and volunteering activities; how volunteering is challenged by climate change; and opportunities for adaptation of NRM work so that it is sustainable and effective.

The research was initiated in conversation between the Nature Network, and Climate Change Adaptation Lab in 2024. The research team was grateful to receive competitive funding from Lord Mayor's Charitable Foundation, and the project commenced after receiving ethics approval from La Trobe University in May 2025. The research involved Nature Network Bendigo Region's 10 Landcare groups and included multiple methods - a survey, interviews, a workshop, and fieldtrips to uncover the detail of people's daily experiences and answer the following research questions.

What are the impacts of climate change on Natural Resource Management work, and what opportunities might shape resilient, adaptive and sustainable NRM in the context of climate change?

1. How is NRM work undertaken by Nature Network Bendigo Region's local Landcare groups?
2. How does climate change affect NRM work including the groups, work, workers, and outcomes?
3. What is needed to shape resilient, adaptive, and sustainable NRM volunteer work?

The research approach was iterative and collaborative, involving the participants in multiple ways including taking part in the different methods (Table 1), reviewing documents including interview summaries, and engaging in ongoing conversations often during site visits and presentations at Nature Network forums. The purpose was to create the space of the participants to shape the research to deepen its potential relevance and usefulness, as an applied project.

Through this process, the research focus shifted to include not only the exposure of volunteering work to climate change, but also the extensive and complex nature of the work and its multiple benefits; and to foreground the local challenges volunteers faced, that include, and are compounded by climate change. While the research questions remained the same, the analysis and conceptual thinking developed in these ways with participants.

Table 1. Methods and their purpose, delivery and response

Method	Purpose	Delivery	Response
Survey: open to Groups' volunteer lists	Exploratory survey on volunteering patterns; activities with Nature Network Groups; motivations, barriers, and enablers to volunteering; perceptions and experiences of climate change; and demographic information.	Online survey open from August to October, distributed via Nature Network to Groups' key organisers, then to the Groups' volunteer lists.	49 completed responses. All ten Groups represented.
Interviews: targeted to Groups' key organisers	In-depth, semi-structured interviews to understand people's values and motivations, roles in their organisation/s, volunteering work, experiences of climate change, engagement with First Nations peoples, and needs and opportunities to support their volunteer work.	Interviews in September (in-person during a field trip) to October 2025 (online). Participants received an Australia Post voucher of \$125 to compensate them for their time throughout the project.	23 interviews. All ten Groups represented.
Workshop: targeted to Groups' key organisers	In-person workshop to provide receive feedback on the early findings, and explore key questions arising from analysis.	Workshop in November 2025 at La Trobe University Bendigo campus with Groups' key organisers and Nature Network.	11 attendees. Nine groups represented.
Ongoing engagement: field trips and forums	Ongoing engagement through field trips, Group meetings, and the Nature Network Forum to ensure saturation point was reached.	Field trip in March 2026 to attend working bees, committee meetings, and a Nature Network forum.	All ten groups represented.

2.2 Analysis and findings

The research team undertook thematic analysis of the interview transcripts, including preparing an interview synthesis for each participant to review. This was followed by a workshop to seek feedback on the findings and clarification on emerging issues. An additional field trip ensured that data saturation was reached, and a draft of this report was sent to participants to review. This report is the first output, and aims to bring research and practice as an applied approach.

3 VALUES AND MOTIVATIONS

I've been trying to look after the bush all my life, basically. (Interviewee_02)

The participants expressed a range of values that motivated them to act – from having cared for the environment their whole lives, to contributing to the community, being committed to sustainability and making change, and a pragmatic sense of sharing their skills and knowledge and making social connections. Many people expressed that they wanted to spend their time well, that volunteering was a part of their identity, and they volunteered for several organisations in different roles.

3.1 Place-based values involving experiences in nature and local regional culture

3.1.1 Growing up in a regional area as the foundation of environmental and social values

The majority of participants grew up in rural or regional Victoria and stated that this was the foundation for their environmental values. Valuing the environment derived from the experience of spending time in the environment for recreation, learning about the environment through personal or family interest, and caring for the environment and animals growing up on a farm. Valuing and contributing to the community were also discussed as fundamental to rural and regional culture and daily life. These values became part of people's identities and were carried throughout their lives.

I'm very community oriented, and I think that's just something that you grow up in, that family background. [...] I grew up on a farm. I've got that natural love of being out and running around the paddocks and hand-rearing calves and doing all this sort of stuff. (Interviewee_07)

3.1.2 Place-based connections were experienced and sought by people who moved to the region later in life

Participants who moved to the region later in life were motivated by their growing connection to the local environment and their ability to make social connections through volunteer groups. Their initial experience was often through their garden, or walking their dog in the local area, whereby they got to know the local environment. This connection extended into volunteering as they either sought to contribute to a group as a way of connecting with people, or they came across groups through seeing the results of the work and decided to get involved. Their involvement was consolidated over time as they noticed changes in the environment, had positive experiences with the groups, and saw their collective achievements.

I'd become interested just at that base level of my own garden and then it sort of expanded out of that to the environment more generally. (Interviewee_05).

About 12 years ago I got myself a Border Collie and we started walking along the Gully in the mornings, ... I came to like the Gully and eventually, because of that, I got involved with the people in the Ironbark Gully. I didn't come to the Gully with any sense of interest in nature conservation, it comes from a different angle. (Interviewee_06)

3.2 Family cultures shaping values and motivations to volunteer

Values and motivations for volunteering also came from participants' families, and then participants continued the tradition. For one participant, their experiences growing up on a farm, caring for animals, and volunteering as a young person, paved the way for their continued motivation into adulthood including tree planting, living sustainably, sharing food from their organic garden, and encouraging their children to contribute, including through scouts (Interviewee_07). For another, it was examples set by their parents being on committees and showing compassion to animals that set their foundation for action:

My parents were my prime role models I guess, and they had very much a community support ethos. Mum was always on a committee [...] I can remember Mum sitting at the kitchen table doing the books of a nighttime. I'd say, 'what are you doing Mum?' She'd say, 'I'm on this – blah blah blah committee now'. I thought, 'that's great. Maybe that's something I can do later'. I was going through high school, but it triggered something that she got so much joy out of volunteering and giving back to groups [...] Dad wasn't a committee person, but he was a very kind, gentle person who loved animals. He would stop the car, rescue an animal. He was just one of those people ... he had a compassion that was unbelievable and that stayed with me. I guess combining those two perspectives enabled me to think, 'what can I do?', and it stayed in my mind. (Interviewee_12)

3.3 Personal values including interests, knowledge, sustainability, and action on climate change

A couple of participants referred to their personal interest in gardening that motivated their involvement in conservation while others referred to their keen interest in the outdoors. For many participants, it was an interest in continuing to practice skills and share knowledge that they had gained throughout their careers, and this brought a sense of satisfaction and purpose. For some participants, it was their curiosity, pursuit of knowledge, that contributed to their motivation. The

enjoyment of learning by doing was a clear theme – ‘*the more you do, the more you learn*’ (Interviewee_11). Several participants discussed how their knowledge had changed over time, and how this change had shaped their current perceptions and behaviours. For example, one participant discussed their interest in the history of mining, and how they had come to see it as destructive (Interviewee_06).

For many participants, their motivation for environmental volunteering stemmed from a commitment to conservation, social justice, sustainability, action on climate change, and/or care for animals. For some, this was a matter of justice in protecting the environment and animals and acting with accountability. Love for nature and animals also compelled action.

My main reason for volunteering is that I'm a critical thinker. I realised that ... human beings are destroying their natural environment at a rapidly increasing rate ... if we don't rein it in, it's going to be calamitous climate change. Climate change being one of the greatest drivers of the destruction of the natural world because it's enforcing these relatively quick changes in evolutionary processes. (Interviewee_09).

You see those remnant patches of vegetation and bird life - animals and bushland, and you think, 'oh, this is so special'. I get that real feeling of wonderment about the world. That is one thing that makes me feel curious about the world and it feels magical when you're out in the bush and you see a bird or you see a beautiful flowering plant ... you just see remnant patches that you know are special, irreplaceable and a window into the past of that land and what's there and you just want to protect them and conserve it. (Interviewee_13)

Values were not isolated and instead interacted and reinforced participants' motivation. For example, for one participant, their interest in nature evolved over time, and they came to value the aesthetics of nature, and possibility to regenerate damaged places, which then interacted with valuing good relationships, and having a purposeful life (e.g. Interviewee_20).

3.4 Social values in being part of a group

Many participants also referred to social values that came from being part of their group which were not directly related to conservation work (Interviewees_06_07_14_15 and _20). As one participant described, volunteering created opportunities for older people to socialise where they otherwise might be isolated:

The good thing with the garden group and the book club, a lot of people are inclined to stay at home when they get older, and it gets me out as well, gets me out actually mixing with people because I can get out there and get stuck in my garden. (Interviewee_07)

Similarly, other participants discussed the how their connections to the community were strengthened as they were able to meet and interact with like-minded people, and this theme of 'like-minded' people, was strong throughout the interviews:

I value the natural environment, of course, but I like to work with like-minded people in the environment. I like to support the community on any projects that are going on, and doing things that encourage family values, like the family being able to work with you and come along ...bushwalking, visiting national parks, we used to camp in those areas. (Interviewee_08)

3.5 Distinct values shape different types of action

Values motivate action, and different types of values, motivate distinct actions. A range of values could be discerned in the interviews including justice, accountability, inclusiveness, care, community, connection, responsibility, sustainability, equity, contribution, competence, friendship, knowledge, usefulness, and making a difference. Considering values provides insight into the focus, actions, and cultures of the Groups. For example, values associated with justice were strongly associated with holding organisations to account, pragmatic values of knowledge and usefulness contributed to people wanting to spend their time well. Further, given that participants were driven by their values, arguably, this led them to see experience in nature, and connecting to community values, as ways to encourage nature-connection, and connection-to-place in others. As such, many of their activities, as discussed throughout this report, focussed on creating opportunities for connection. When participants were discussing the future of their Groups, recruitment was key. Bringing values into conversation with the longevity of their organisations, participants acknowledged regional change including the socio-economic situation for young families, changing values for young people, commitment to working with DJAARA, and commitment to being inviting and inclusive of participation throughout the community. Further, from a climate change perspective, community connections are a foundation of resilience; supporting people exposed and vulnerable to climate change is central to climate justice; and values and motivations may change as experiences, knowledge, and norms associated with climate change shift. Values take different forms including being cultural, evaluative, and reflective of interests and principles, and they can be dynamic in shifting contexts. Considerations about the future of the Groups brings values into conversation with the changing context of the region and each Group's goals and plans.

4 THE MAGNITUDE OF THE WORK AND UNDERLYING CAPABILITIES

4.1 The magnitude of the work

An immense amount of work was being undertaken by the Groups, involving a range of capabilities, and capacities, all donated, to achieve socio-ecological outcomes. Figure 1 shows tasks that were mentioned and discussed by participants during the interviews and these have been grouped into categories. The tasks ranged from on-ground activities, and engaging with communities, to administering the groups, managing risks, engaging in strategic planning, working with stakeholders, developing knowledge, and undertaking advocacy, education, communication, and promotion. Many of these tasks and activities were routine and professionally delivered, aligned with governing structures required of Landcare groups and traditional management of organisations. Therefore, much of the work was replicated across the groups. Work is also situated in distinct sites, and with communities, particularly through on-ground and community events.

<p style="text-align: center;">Administration</p> <ul style="list-style-type: none"> • Formal roles e.g. President, Vice-President, Chair, Treasurer, Secretary • Formal Group roles e.g. sub-groups, group development • Regular meetings • Meeting agendas, documents, minutes • Reports • Financial management • Landcare registration • Insurance • Funding applications • Mailing list • Plant list • Purchasing • Auspice arrangements • Engaging contractors 	<p style="text-align: center;">Strategy, planning, management</p> <ul style="list-style-type: none"> • Group • Statement of Purpose • Committee structure • Succession plan • Communication plan • Strategic plan • Prioritisation process • Membership strategy • Work continuity plan • Advocacy policy • Site management plans • Risk assessment • Site management • Weed management 	<p style="text-align: center;">Work collaborations, partnerships</p> <ul style="list-style-type: none"> • Government and agencies e.g. state government, local government, Parks VIC, NC CMA, VICSES • DJAARA • Local environment and community organisations e.g. men's shed • Non-government organisations e.g. environment groups • Membership of Nature Network • Collaborating with schools, and businesses • Working with property owners 	
<p style="text-align: center;">On-site work</p> <ul style="list-style-type: none"> • Planting • Weed management • Watering • Putting up nest boxes • Animal rescue • Fencing • Walking tracks • Repair works (e.g. tracks) • Site clean-up • Site construction (e.g. reshaping former quarry) • Monitoring • Co-ordination and social roles • Hiring equipment • Delivery of materials • Catering • Clean-up • Group cohesion • Storing materials 	<p style="text-align: center;">Event types</p> <ul style="list-style-type: none"> • On-site working bees for members and public • Targeted on-site events for students (all levels) • Targeted on-site events for communities • On-site events on National Days • Citizen science as part of programs, or with organisations e.g. National Bird Count • Field trips - knowledge building e.g. heritage walks, bird walks • Monitoring nest boxes • Educational events e.g. with guest speakers • Workshops e.g. propagation • Stalls at festivals e.g. Bendigo Sustainability Festival 	<p style="text-align: center;">Communication, promotion, engagement</p> <ul style="list-style-type: none"> • Communication (outgoing, multiple purposes) • Regular newsletter • Email correspondence • Media and publicity • Running a radio program for a local radio station • Promotion (events, organisation) • Materials e.g. flyers • Letter box drops • Engagement (public presence and dialogue) • Social media e.g. Facebook • Stalls in public e.g. local supermarket • Informal engagement with the community 	<p style="text-align: center;">Education, advocacy, knowledge development</p> <ul style="list-style-type: none"> • Public education • Raising awareness • Developing educational materials and forums • Advocacy • Meetings and communication with gov • Letter writing • Bearing witness • Knowledge development • Commissioning research • Victorian Biodiversity Atlas contributions • Citizen science • Undertaking training • Attending conferences and forums • Other • Publishing a book

Figure 1. Types of work and tasks undertaken by the Groups

4.2 Capabilities of the volunteers and Landcare groups

Underlying the tasks and activities were skills, knowledge, relationships, and time. The interviews revealed that participants are highly capable, in part due to their professional backgrounds, education, skills, networks, and experiences. Local knowledge is fundamental to effective nature conservation work such that it informs what needs to be done, where, and when, and facilitates action through local relationships. The participants provided many examples of knowing where particular plants species were located, where animals lived and their movements, where litter accumulated, how local residents were responding to extreme events such as flood, local history, how waterflow changed over time with development, shifts in the weather and climate, and who to talk to for information, or who could provide necessary resources. Such information can be seen as an early warning system where communities report changes that they perceive, insight into long-term changes and local needs, and necessary connection to places and people in the present day to facilitate inclusive processes and action. Such knowledge is built over time, through attention in place, and cannot be replaced.

As volunteers, participants often took on roles that expressed their preferred capabilities including:

- specific expertise (knowledge, skills, and experience) developed through education and professional backgrounds, such as strategy and management, economics, ecology and biodiversity, environmental management, teaching including early childhood teaching, working with Traditional Owners and First Nations peoples, agriculture, horticulture, nursing, history, law, outdoor education, quality improvement, and evaluation,
- long-standing experience volunteering and advocating for the environment including through scouting, orienteering, conservation, refugee integration, climate and political movements, and wildlife (e.g. threatened species, birds),
- established community connections that facilitate support and action including with local government, a retirement village, faith-based institutions, and service organisations e.g. fire brigade, and
- local environmental knowledge developed through time, and attention in a place, including as citizen scientists.

Decades of experience and knowledge were expressed in the groups' capabilities. Volunteer work is dependent on the capabilities of the Group, and the capabilities were the foundation of the Groups' functioning.

4.3 Risk to the region of this work not being undertaken

The work done, and the capabilities of the Groups, need to be acknowledged to understand how to effectively support the Groups, and particularly to reduce administration and duplication of costs and tasks (discussed further in Section 6 Barriers and enablers to nature conservation work), and the contribution that the groups make to the region so that it is valued as advocacy for the Groups' collective work. Importantly, the magnitude of the work, including the amount of work and underlying skills, knowledge, and relationships, demonstrate the exposure of this work to challenges such as climate change, and those of specific concern to the Groups (as discussed in Section 7 Local challenges and climate change).

5 FIRST NATIONS PEOPLES AND COUNTRY

All participants recognised Dja Dja Wurrung as the Traditional Owners of the lands and waters on which they worked and expressed respect for their cultural knowledge and connection to Country. The majority of Groups had engaged with Dja Dja Wurrung Clans Aboriginal Corporation (DJAARA) either through formal requirements or their own activities and discussed their interest in working with DJAARA through principles of self-determination for DJAARA, working on shared interests, and acknowledging and supporting organisational capacities.

5.1 Engaging with DJAARA through formal requirements and group activities

Some groups were required to engage with DJAARA for approval for certain activities through shared management arrangements attached to land tenure. In such circumstances, approvals were managed through a third-party being DEECA, Parks Victoria, or local government (Interviewee_20). For example, JCAG is the appointed Committee of Management for the Honeyeater Bushland Reserve (HBR) (Junortoun Community Action Group, 2021). JCAG submits an annual HBR work plan to DEECA under the terms of management, and DEECA is responsible for consulting with DJARRA, and particularly for activities on undisturbed land (Interviewee_1). Another example is that Northern Bendigo Landcare Group submits a Land Use Activity Agreement to Parks Victoria, and Parks Victoria liaises with DJARRA on behalf of the group (Interviewee_15).

Groups also engage with DJAARA for specific Group projects including to conduct educational programs, identify and verify aspects of cultural significance, hold a Welcome to Country, weed control and ground preparation, and develop interpretive signage with cultural content (Interviewees_15_16). Engagement is sometimes through direct relationships, and sometimes facilitated by an organisation such as Trust for Nature. Examples include Central Victorian Bat Alliance working with DJAARA on habitat creation for microbats and raising awareness that bats are the Dja Dja Wurrung totem in the region, and JCAG holding an event in 2018 on Knul Durung Bushland Reserve that involved Parks Victoria who consulted with Dja Dja Wurrung.

5.2 Interest in further engagement to support knowledge building and mutual goals

Participants were interested in greater collaboration with DJAARA to support mutual goals. Participants recognised temporal dimensions in cultural knowledge including knowledge developed over millennia, the importance of aligning with land practices in the present and considering actions for the future.

I'd love to. I think that's really, really an important part of ... that we need more Indigenous knowledge and ecological knowledge and more collaboration and all that. (Interviewee_18)

There's an opportunity to be doing it in a way that is also meeting Traditional Owner aspirations. We don't know whether what we're doing is the way that DJAARA would recommend it be done in terms of plant species or placement ... we want to be doing it the right way if we can. [...] We'd like to have that ability to connect more with DJAARA so that we are informed a little bit more about what we do because there's real power in collaborating. They can't do everything. We can't do everything. But if we just work together a little bit more in the planning so that our grant activities are more aligned with their Country plans and that sort of thing, then we could be helping them reach their goals as well. I think that will be a big area of to aim for I think in the future. (Interviewee_15)

5.3 Developing ways to engage that support recognition and self-determination

While participants expressed their desire for greater engagement with DJAARA, they acknowledged the high demand and capacity constraints of some Traditional Owner groups, including DJAARA, and that, as small Groups themselves, they were also constrained in their resources, thereby limiting engagement. Justice and self-determination were implicit in participants' approaches. There were statements of the impacts of colonisation on First Nations peoples, that taking time to develop relationships is part of respectful engagement, and that engagement needs to benefit Traditional Owners. Some participants were undertaking cultural training as part of their interest and sense of responsibility in working with First Nations peoples.

I think their resources are limited and they have to see some benefit for them and that's fair enough. (Interviewee_17)

First Nations people have been here for 60,000 years, so us expecting it to happen in 12 months, we have to learn to be patient in working with the First Nations. I don't say that as a negative. That's the reality. That's just how it is. (Interviewee_04)

There appears to be an opportunity for Nature Network, the Groups, and DJAARA to consider how they might be able to engage with each other as a collective and with individual Groups that respect cultural values and knowledge, seek shared goals, and build shared capacity.

6 BARRIERS AND ENABLERS TO NATURE CONSERVATION WORK

All groups experience barriers and enablers to their work based on their circumstances, values, goals, capabilities, and needs. Research into barriers and enablers takes different approaches, for example, systematic literature reviews identify categories of barriers and enablers by reviewing articles encompassing a range of cases, situations and contexts, in contrast, empirical research identifies specific barriers and enablers experienced by a group or groups, often with corresponding recommendations to facilitate change. In this section, we have grouped the barriers under three headings of 1) socio-political, 2) resource, and 3) physical systems and processes - based on a framework developed by Piggott-McKellar et al. (2019) and provided specific examples and quotes from the research (Section 6.1). We have then described the enablers through themes and quotes (Section 6.2).

6.1 A range of resource, socio-political, and environmental barriers are experienced

In climate change adaptation literature, barriers and limits are defined such that, theoretically, barriers can be overcome with concerted effort, however this can also be highly challenging given the ways that path dependencies entrench certain actions including through power relations e.g. decision-making that favours new development; and limits occur when a threshold has been passed and we can no longer protect something that we value, for example, species loss and ecosystem collapse (Barnett et al., 2015). The following table includes a comprehensive list of barriers mentioned in interviews thereby representing the Groups as a collective. Importantly, not all barriers are experienced by all groups, and where they are experienced by more than one Group, the barriers are more significant for some Groups compared to others.

Table 2. Barriers experienced across the Groups

Category	Specific barriers	Related quotes
Resource		
Human resources (includes the category of Time as part of capacity)	<p>Overall, lack of volunteer capacity for the majority of groups.</p> <p>Current volunteers</p> <ul style="list-style-type: none"> Constrained capacity due to the need to balance volunteering, work and family. If not managed, excessive work leads to being over-extended and burnout. Concerns about the health and physical capabilities of older volunteers now and in long-term. There is a profound emotional toll on volunteers who are witness to the degradation and loss of places and species they love, which reduces their motivation and ability to volunteer. <p>Recruiting and maintaining new volunteers</p> <ul style="list-style-type: none"> Difficulty recruiting young people, and younger people (young families and middle-aged people), as the next volunteer workforce due to their lack of capacity. Difficulty maintaining young people who often 'pass through' including moving location or leaving as they start a career. Concerns about the ability to recruit new volunteers due to the stresses people are experiencing due to the challenging current context (links to Socio-economic conditions below). 	<p><i>I'm still trying to do what I can. I'm just overextending myself because I want to protect things. (Interviewee_19)</i></p> <p><i>There's quite a lot happening for people's mental health in the community that isn't being recognised, just with international events. There's a lot of people in the community who are sad and downcast. [...] We have to get better at what we do because ultimately the community will just be too exhausted or burnt out to actually participate. (Interviewee_12)</i></p> <p><i>I lost five years of my life in two years trying to save it, as you do, and then I went and curled up in a little ball because I lost it, and then slowly came back into it again. That's when I've finally ended up with this group. (Interviewee_02)</i></p>
Financial	<ul style="list-style-type: none"> Lack of overall funding was experienced by some groups. Lack of funding for specific activities e.g. for ongoing maintenance due to funding conditions i.e. what is funded and how long funding lasts. Competitive, short-term grants that are contrary to long-term conservation work and the collaborative intent of Landcare. Funding not increasing while prices are rising. 	<p><i>No follow up grant funds are available for maintenance, and maintenance is one of the biggest issues I guess for sustainability of your project and dealing with the climate factors as in no rain, as in excessive rain. (Interviewee_04).</i></p> <p><i>We're all going for the same funding. It's not tenable... (Interviewee_12).</i></p>
Access to information and technology	<ul style="list-style-type: none"> Lack of information and certainty often in relation to climate change e.g. what to plant to ensure planting is adapted (further discussion of the impacts of climate change in Section 8 below). 	
Infrastructure	<ul style="list-style-type: none"> Lack of watering infrastructure at sites thereby influencing where plants and planted, and increasing costs is watering is done. Lack of tools and infrastructure for the Groups, e.g. vehicles, equipment, and storage sheds. 	
Socio-political		

Category	Specific barriers	Related quotes
<p>Government structures and governance</p> <p><i>These link to Inequity, power, and marginalisation particularly where the groups have a lack of power to influence governance.</i></p>	<p>Leadership</p> <ul style="list-style-type: none"> Lack of clear, consistent leadership on environmental protection, which affects the Groups' standing in the community and community members' support for the groups. <p>Coordination</p> <ul style="list-style-type: none"> Poor coordination between government departments inhibiting the progress of initiatives and affecting volunteer momentum and motivation e.g. The Ironbark Gully Trail. Poor coordinator between authorities where they themselves have not established and communicated roles and responsibilities. <p>Administration</p> <ul style="list-style-type: none"> Administrative burden associated with compliance that is demanding, complex, duplicated across groups, not always relevant to activities, and subject to change, including Working with Children Checks, safety requirements, and insurance. <p>Tenure and management arrangements</p> <ul style="list-style-type: none"> State Parks – requirements for evidence from community groups to support their proposed activities e.g. nest boxes, that sets a standard beyond the communities' existing capabilities and resources. State Parks – lack of authority preventing some activities e.g. signage. Heritage status – the heritage status of the bluestone in Bendigo Creek prevents waterway restoration. 	<p><i>We do need the powers that be to actually recognise that we are in, to put it politely, 'deep shit' and to actually step up and protect nature, full stop. (Interviewee_02)</i></p> <p><i>We just kept the enthusiasm going because at that stage the plan for the path all the way through from Nolan Street to Eaglehawk Road was stuck in bureaucracy and it was stuck because there were different departments of different governments managing all the patches of land along the gully. (Interviewee_10)</i></p> <p><i>Some of the expectations that they have of us ... we applied to put more nest boxes in DEECA land, they said, 'well, it's got to be a scientific study before you can do that'. We know that it doesn't have to be a scientific study, and we're just volunteers, we're not scientists. (Interviewee_21)</i></p> <p><i>Example provided of lack of clear and communicated roles and responsibilities between DEECA, CoGB, and Parks Victoria regarding an area along Emu Creek (Interviewee_11).</i></p>
Socio-economic conditions	<ul style="list-style-type: none"> Changing modern lives, and demographics in regional areas are barriers to community members having time and motivation for volunteering (links to Human resources above) While expressed as a barrier to volunteering, there is a profound emotional toll on the community, and particularly young people, who experience a sense of helplessness in relation to the environment affecting their motivation to engage in conservation volunteering (links to Human resources above) 	<p><i>Some young people [...] would come in and say [they] are just feeling 'there's nothing we can do ... our wildlife are disappearing, we've got many vulnerable species, our waterways are drying up, the Murray Darling is stuffed, what are we going to do?' (Interviewee_12)</i></p>
Inequity, power, and marginalisation	<p>Knowledge</p> <ul style="list-style-type: none"> A key means for Groups to share local knowledge that has influence in government decision-making is through entering data into the Victorian Biodiversity Atlas (VBA) however VBA is difficult to use, slow to be updated, now unfunded, and not used as it should be. <p>Power</p> <ul style="list-style-type: none"> The power of the development industry was a strong theme whereby participants saw unsustainable development occurring rapidly with detrimental impacts to the environment and amenity. <p>Democratic engagement</p> <ul style="list-style-type: none"> A lack of voice and recognition in government decision-making was a theme expressed by some groups particularly on issues of development, and bushfire management. Values are fundamental to democratic engagement such that values shape how decisions and outcomes are perceived. A lack of opportunity to share values, and misalignment in values are barriers. 	<p><i>We spoke at the meeting last night that VBA is not doing what VBA is supposed to do. I mean, VBA is basically the roadmap for nature in Victoria, Victorian Biodiversity Atlas. Everybody has to go there, every council has to go there, every department has to go there, every contractor has to go there if they're going to go into the bush because they've got to see what they're possibly going to destroy or disable or whatever. At the moment, VBA is not being funded. (Interviewee_02)</i></p> <p><i>It will be destroyed if we're not watching. (Interviewee_03)</i></p>
Cognitive and behavioural	<p>Community perceptions and actions</p> <ul style="list-style-type: none"> Misinformation and misunderstanding about ecosystems, and species can contribute to opposition e.g. misinformation about bats, and conflicting ideas about climate change. Community concerns, for example, about bushfire risk, can reduce support for groups in the urban environment planting trees e.g. Ironbark Gully. Behaviours including littering and dumping rubbish affect sites. <p>Local relationships</p> <ul style="list-style-type: none"> Changing local relationships, such as school principals influence support for, and longevity of, specific programs. 	<p><i>We have some people in the neighbourhood who don't like trees because they think they are a bushfire hazard. We have had a bushfire come to within about a kilometre of here in February 2009. [...] These people here, they were getting sparks. That's how close it was for them. (Interviewee_10)</i></p> <p><i>People treated it like a dump. Since we've started to work on it, new houses are being built and they face it. They don't have their backs to it, they used to just throw their</i></p>

Category	Specific barriers	Related quotes
	<ul style="list-style-type: none"> Misunderstanding about the small size of many of the groups, and the extent of the workload, leads to community perception that the groups don't need help. 	<i>rubbish over the fence ... so, there's community ownership happening, which is really good, with the newer people, the young people building houses. (Interviewee_10)</i>
Communication and language	<ul style="list-style-type: none"> Effectively communicating about climate change, sustainability, the importance of biodiversity, respecting for species, valuing nature connection, and service to the community, were strong themes related to engaging with the community and encouraging new members. 	
Physical systems and processes		
The overwhelming need for conservation work	<ul style="list-style-type: none"> The amount of work that is needed to restore, protect, and care for the environment and animals is immense. Previous land uses including mining, land clearing, and introduced weeds create ongoing barriers and challenges to environmental work. 	<i>There's endless work that could be done here. [...] We can supply projects here and try to make up the numbers to help out ... but as I say, our main focus is here. That's a big load on us already. (Interviewee_17)</i>

6.2 Enablers demonstrate the capabilities of the Groups and address some barriers

The above barriers highlight the difficulties the Groups face in being able to carry out their work. However, barriers, by definition, can be overcome. Here we detail some of the enablers described in interviews that consolidate and increase the capacity and capability of the Groups, and some of these directly respond to the barriers. Importantly, given the deep local relationships that characterise conservation volunteering, these enablers are fundamentally relational, and they all interact.

6.2.1 Particular knowledge and experience for effective local action

As discussed in Section 4.2, long-term, detailed, local knowledge and experience are invaluable for effective NRM as an early warning system, insight into regional needs, and facilitating action by knowing where there is resistance and momentum in communities. One participant also highlighted that decades of practical experience can be useful to facilitate knowledge to adapt to climate change:

I collected saltbush seed from Northern Victoria and I brought some to Huntly when we relocated; were in the Millennium drought and [...] we just threw it around the yard and one of the most dominant plants in the patch of green at the moment is saltbush. So that's how you learn about whether what plants will adapt. (Interviewee_04)

6.2.2 Strong relationships and networks

Nature conservation work is fundamentally relational. Participants from all Groups acknowledged relationships within and between the Groups, state and local government and government agencies, local organisations such as schools, non-government organisations, businesses, independent experts, and the community. These relationships were essential to working being done, and being effective, bridging institutions, communities, and the local environment.

The Groups provided examples of supporting each other including attending each other's events and sharing resources such as one participant owning a truck and water tank that they could use to help with watering where infrastructure was lacking. The network of Groups also provided support and mentoring for newer Groups as they got established.

Respectful, trusting, and accessible relationships with government departments and agencies were valued. Many participants noted their good working relationships with local government, and North Central Catchment Management Authority, sharing works and engaging in programs that benefited both parties. For example, one participant described that at Northern Bendigo Landcare Group, one volunteer has horticultural skills and works for the local government, and they provide advice on plant selection as well as identify opportunities for the Group through local government, such as when spare plants are available from the local government bush crew.

These relationships were fundamental to solving problems, and facilitating community voice, as can be seen in this example:

There were some properties that had been flooded (late 2023 and early 2024) in a direction that had never happened before and following that there were a lot of unhappy people who had been impacted. Part of our role is advocacy. So we then took it upon ourselves to help advocate with City of Greater Bendigo and other agencies as the key players that are involved in that, to say, 'ok, what has caused this and what needs to happen?' And one of the successes from that is we were getting monthly updates from City of Greater Bendigo. (Interviewee_01)

Most participants mentioned existing partnerships with local schools, service groups, and the community through which they organised events, shared resources, used premises such as for meetings and storage, and negotiated works, and overall, achieved more in the region:

The other thing our group does to try and work really smart is to collaborate a lot, with your schools, with your Kinders, with the fire brigade or with The Lions Club, or we've got lots of really strong partnerships that we lean on, so we can achieve what we achieve. We always say we're a small group doing big things by working with others.

(Interviewee_15)

Participants also engaged with businesses, non-government organisations and experts. Neangar Nursery was often mentioned in providing plants and expertise. The Australian Conservation Foundation (ACF) was acknowledged as a key instigator of Friends of Riley Street after a founding member took part in the ACF Nature for Neighbourhoods (N4N) initiative that asked ACF groups to initiate a project that would attract community members to volunteer to do something positive for nature restoration and, in the process, encourage some to become advocates better protection of the natural world. Restoration of Riley Street was identified as a project from the N4N initiative. The Australasian Bat Foundation was an important source of knowledge for Central Victorian Bat Alliance. Wellsford Forest Friends and Landcare Group worked with Victorian National Parks Association in advocacy for the Wellsford State Forest to be designated as a National Park. Tailored education sessions were developed for volunteers for example, Axe Creek Landcare Group organised events with an ornithologist and an entomologist, ran an educational workshop on fungi that was highly attended with over 100 people, and organised a search for orchids in the local area with an ecologist (Interviewee_16).

These relationships were also brought together in beneficial ways, which can only occur through strong local connections. One example was coordination between the Blue Light early intervention and prevention program (Weeroona College), which was developed to engage children and young people, and certain Groups that arranged a day of activities including planting, cooking a BBQ, and visiting the Men's Shed to build nesting boxes, and guinea pig boxes (Interviewee_04).

6.2.3 *Sharing knowledge and experience thereby developing individual and group capabilities*

The diverse and available knowledge and skillset within each Group was identified as one of the greatest enablers and included a range of knowledges such as environmental conservation, legal knowledge, grant writing skills, project planning, event organising, and strategic planning – all of which are fundamental to volunteer nature conservation work as discussed in Section 4. Being able to share knowledge, and learn from each other, was a key enabler of volunteers' capabilities, and also their motivation to be involved.

There are people ... with bucket loads of information. One of the people in the group is actually a horticulturalist, so there's a whole range of sort of skills and expertise there. Another guy is a soil conservationist ... if I didn't go to the meetings, I wouldn't be part of learning, ongoing learning quite to the same degree as if I just turned up to pull out a few weeds or plant a few tube stock. (Interviewee_05).

6.2.4 *Good processes*

Each Group had its own culture, and corresponding structure and processes. The key to effectiveness, was that the structure and processes met the Group's needs and culture. A basic set-up included an Australian Business Number (ABN) and a bank account to receive donations, membership fees and grants, insurance for relevant activities, and a minimum governance structure as a Landcare group. Thereafter, the structures and processes varied between the Groups and were more or less formal, which is discussed in NRM governance literature (Coffey et al., 2020). A couple of groups in particular had a series of strategic documents that enabled clarity of purpose; roles, responsibilities and processes; planning and prioritisation; and membership strategies. These documents supported Group functioning, and also looked to the future to ensure the longevity of the Group. Such processes were employed at moments of change and transition, including when volunteers resigned from positions.

Documents include:

- Statement of Purpose
- Committee structure
- Succession plan
- Communication plan
- Strategic plan
- Prioritisation process
- Membership strategy
- Work continuity plan
- Advocacy policy
- Developmental milestones (to place future planning in the context of what has already been achieved by the Group)

I have been in other organisations previously - if you've got a good committee structure and you stay with that committee structure and you've got people who know what they're doing as secretary or minute secretary, those carrying out their roles and responsibilities, and good harmony within the group, it works really well.
(Interviewee_01)

It is really important not only to have a standing within the community but also with your stakeholders. It does help if you can say, 'here's our certificate of currency. We are insured. We have public liability. We have a Statement of Purpose'. All of those things really mean something, and they are important as well as our work on the ground as a grassroots level. Also, the collaboration too. I think if you had a community group and you were without those things maybe it would be a little bit difficult to collaborate with funded partners perhaps. So, we're very glad that we're at that stage now where we've got all the structures either happening or they're in train. (Interviewee_12).

I think we've got to increase numbers, if we can. [...]. We have to build in contingencies for the future, like when people leave - what's going to happen? So, we need future orientation direction setting. I help them churn out a whole lot of objectives that are future oriented. Then we go through them and see, which ones can we manage - do we have the human resources and the financial resources to do these things? Otherwise, you get a group that takes on too much. What we're wanting to do is - let's do a few things very well, then work from there.
(Interviewee_20).

6.2.5 Working with people's strengths, getting along, and acceptance

Most participants acknowledged their individual strengths and interests, and the roles they preferred when volunteering. Focussing on people's strengths and being accepting of differences were important for effective and harmonious Groups.

I like just engaging with people in my volunteering, but I don't like the administrative side of it. [...] That's why I say I can talk a lot, but when it comes down to doing things, I really need a kick up the bum to get it done.
(Interviewee_09)

The thing that keeps them [conservation groups] together I think is a commitment to acceptance, acceptance of differences. Until you've got that, and that goes along with trust - it goes along with mutual respect of differences, then unless that's there then you get all sorts of problems. You get power struggles and all that sort of stuff.
(Interviewee_20).

6.2.6 Convenience

Several participants noted that convenience was important for the attraction and attainment of volunteer numbers (Interviewees_04_14_15_17_20). One example was described whereby Friends of Riley Street organised an event on a Sunday from 10:00-12:00 that attracted a high number of people, and 2,000 plants were planted. By finding ways of making events convenient and accessible, whether by time, location or providing additional services (i.e. for children), groups could increase participation. Day-to-day proximity to sites also increased the awareness of Groups, and their activities, and a sense of pride in their achievements, and motivation for ongoing stewardship:

We can see the difference. All of these men apart from me live in that area, so they see the benefits of what we're doing. They want to do it. It's more like a men's shed really because they love getting out and doing it, but they can see the results, keep an eye on what's happening. (Interviewee_14)

6.2.7 Other ideas

- Existing events, festivals and networks were enablers through raising the profile of the Groups and their events e.g. the Groups had a presence at annual events such as the Bendigo Sustainability Festival, and Nature in the Mall, and they ran highly attended, regular events on Mothers' Day, National Tree Planting, and Keep Australia Beautiful day each year.
- State and local government policies, strategies, and plans such as the City of Greater Bendigo Biodiversity Plan provided a platform from which the Groups and government could engage on shared interests, projects, values, and language. Junortoun Community Action Group continues to advocate for a structural plan, which will then support their planning and works.
- Being able to pay for, and find, suitable, effective, contractors for works that are large scale, and for specialist tasks.
- For those organisations that hold events on private land, these could contribute to high-attendance and buy-in from those in the local area.
- Working more closely with universities and researchers to understand, contribute to, and attain relevant knowledge for conservation work and advocacy.
- Technology could be beneficial, including using Teams for meeting, Facebook for promotion and engagement.

7 LOCAL CHALLENGES AND CLIMATE CHANGE

7.1 Local challenges are at the forefront of concerns for Groups and participants

Participants were focussed on immediate, tangible, and significant local issues that were challenges for the Groups. Key issues were planning and development, forest fire management, the ongoing impacts of mining, and unsustainable behaviours in the community (e.g. illegal logging, and littering) and community perceptions (e.g. misconceptions of bats - (*Pteropus poliocephalus* Grey-headed Flying-fox in central Bendigo). For some groups, it appeared that the need to respond to a specific local challenge was a primary driver of the group such as Friends of the Whipstick advocating for change to forest fire management to protect the forest and identified species, and Central Victorian Bat Alliance forming to give voice to bats and counter misinformation. For others, the challenges were significant to their work such as Junortoun Community Action Group's community engagement and work with local government on flood management amidst other activities. The majority of participants expressed personal concern about local development including the loss of trees, biodiversity, flattening of the topography, heat island effect, and flood. The directness and proximity of the challenges were noted.

I guess I notice more the mining because I'm in the middle of an old mining area. If I lived somewhere else, maybe I wouldn't. But because I'm in the middle of an old mining area, it's in your face. (Interviewee_05).

Further, local challenges were not isolated, and rather, interacted, compounding the complexity of the problem and response. For example, one participant discussed the interaction between development, climate change, and behaviour as affecting the life of trees and function of Splitters creek such that tree deaths were observed in the upper and middle reaches of the creek, because hard surfaces from development had transformed the landscape to a permanent waterway, rather than a landscape with seasonal water. In addition, landowners cleared the stream for visual amenity, which affected water flow (Interviewee_01).

Unequal power was a significant concern, particularly in relation to land development, and state government management of forests. In relation to development, one participant discussed trees that were removed for a path in Huntly, including '18 large yellow gum trees [that collectively were] about a thousand years' worth a tree growth' (Interviewee_04). They explained their concern:

I don't know where the logic in that is. Why couldn't the path go like that [indicated a winding path]? No. Straight line. [...] That's just how it is in our society we work in, and developers seem to have too much say, if I can put it that way. Try to maintain the balance and get and increase people's understanding of the importance of what we have, because it is very difficult to replace a thousand years of tree growth loss. (Interviewee_04)

Time and attention to places were significant to people's awareness, values, and concerns. People noticed the impacts of mining and that the region is still dealing with detritus generations later (e.g. Interviewee_06).

In this area, the trees have been all harvested during the mining period. It was all sort of levelled. Most of our forests have got very young trees in, which makes the old trees that are there so much more precious. (Interviewee_14)

Knowing a place, defines it for people, and overrides narrow definitions of what is valuable. This was a strong theme for those concerned about forest fire management, and for the impacts of development with a strong focus on the value of trees. It was a combination of knowing what was there in the past, what was there now, how valuable the species are – whether endangered or not, to the ecosystem and people's connection. Also, the effect of past activities affects current value. Conversations relating to forest management are indicated in the following quotes:

There's plants there that are not found anywhere else. Well, they are as rare as hell anywhere else in the bush anyway. If you burn them, they're gone, and there's proof of that because historical, we used to have those plants there, we used to have them there and we used to have them there on that hill. They've burnt that hill and they're not there anymore. That's not a real and endangered plant, but it is a plant and it's part of the biodiversity. As soon as you touch the biodiversity, you basically destroy it. (Interviewee_02)

...we've had lots of meetings with them [DEECA] to try and talk about areas that we regard as important. That was part of the reason for having this flora survey done and coming up with the endangered species that were discovered there, the regionally significant ones. (Interviewee_14)

These issues cause distress, which comes from both action and the lack of value placed on the environment.

When you think about the number of unique Australian animals that are dependent on large hollow trees for their shelter and so that they can actually breed, it's at least 200 different species of Australian animals and there's quite a few birds and small mammals and reptiles in this part of Victoria that are dependent on tree hollows for those activities. It takes close to 200 years for a tree to start establishing hollows that can be lived in. That's a long time and I don't think people fully appreciate the destruction that they bring about when they cut down a tree that's been there for 200 years, and they might not even think it's been there. They wouldn't give it a thought, I'm sure, and I find that really distressing. (Interviewee_21)

7.2 Impacts of climate change on work – disruption, loss and damage, demands, distress, risk, and uncertainty

All groups have experienced direct impacts of climate change including disruption, loss and damage, increased demands, concern and distress, increased risk, and uncertainty. These categories have been developed from a thematic analysis of the interview data, and descriptions and specific examples are included in the table below. These direct impacts cross all activities of conservation volunteering and thereby represent a systemic challenge. Further, these are the directly observable impacts. There are further indirect impacts to workloads, lost opportunities to engage with communities, lost benefits of nature restoration work, impacts on motivation to join volunteer groups, impacts of volunteer numbers and outputs. When asked, participants identified the ways that the region has changed over time, and the majority stated that while the climate and weather has always varied, it is now more unpredictable, and extreme, so these impacts can be expected to become more frequent, intense, and challenging.

Category	Direct impact description	Example or quote
Disruption	Cancelled community event: Scheduled annual event cancelled due to predicted storms.	Welcome to Summer event cancelled by JCAG.
Disruption	Cancelled working bees: Scheduled designated planting aligned with an annual event cancelled due to dry conditions, and another due to storms. Cancelled nest box monitoring.	National Tree Day, and Fathers' Day planting events cancelled including by LDLC, nest box monitoring cancelled by Wellsford Forest Friends and Landcare Group.
Disruption	Cancelled planting and unable to acquit grant in time: Scheduled, funded, planting attached to a grant was cancelled and acquittal extension was required.	Mothers' Day tree planting cancelled that was attached to a grant for Northern Bendigo Landcare Group.
Disruption	Increased workload in constantly rethinking plans: Described need to constantly rethink planting due to climate variability, more than previously.	Considerations included planting at different times of year, the need for follow-up watering, how best to plant such as focussing on high-density planting in a shorter period of time rather than large scale planting over months.
Disruption	Adjusted events for extreme weather: Adjusted times for events and ensuring breaks to account for extreme heat and cold, and adjusting locations when a site has been flooded.	Events started earlier in Summer, from a usual time of 10am to 8:30am, and planning for shade and rest in Ironbark Gully. Groups need to change sites for working bees when they've been flooded, e.g. FOSSALS.
Loss and damage	Damaged property and grief: Members' and communities' properties damaged due to flood in 2024 and ongoing grief and concerns in the community.	2024 flood impacting Junortoun.
Loss and damage	Lost and damaged planting due to extreme events of flood and storm: Restoration works along Bendigo Creek destroyed and damaged due to flood, and plants in Ironbark Gully died after a storm event.	<i>Certainly a flood event in Bendigo Creek. Was it three years ago? We had a significant planting on the Bendigo Creek area, which we've probably lost 80% from the flooding, which exacerbated weed germination and strong competition. (Interviewee_04)</i>
Loss and damage	Lost and damaged planting due to bushfire: Planting burnt by fire.	Planting in Bendigo Creek burnt by bushfire in 2020.
Loss and damage	Reduced survival rate of plants due to dry conditions: The observed survival rate of plants dropped on average from around 75% to 50%.	Commonly reported by participants and estimation of observed reduce survival rate from Ironbark Gully.
Loss and damage	Illness and death of animals in extreme events: The bats suffer in extreme heat and require consolidated response efforts from organisations.	<i>During heat waves that we sometimes get - days in the 40s, they really suffer. As soon as we find out that we're having a really bad heat event, DEECA jumps on it, the Council jumps on it. Any volunteers that can come in, help. [...] Where they can, actually put on the sprinklers, and things like that - so having to do that extra care for these animals in heat waves. It really affects them quite dramatically. (Interviewee_19)</i>
Increased demands	Additional watering required: Extended dry conditions mean that more watering is required adding time, cost, and effort.	<i>A lot of places, the areas we plant, we don't have the ability to hook up to a hose and water in, I suppose most re-veg projects you're relying on rainfall. (Interviewee_13)</i>

Category	Direct impact description	Example or quote
Increased demands	Increased clean-up after a flood event: Increased workload to clean-up after a flood event including rubbish and spreading of weeds.	
Increased demands	Increased weeds due to wet winter: 2022 winter was very wet and contributed to weed growth in Spring.	More weeding will be required and in one example from Northern Bendigo Landcare Group the weeds overtook a planting.
Increased demands	Increased mitigation efforts to protect animals: Increased efforts required to protect bats from extreme weather including heat and storms.	
Increased demands	Increased workload in needing to communicate with the community: Lack of awareness and acceptance of climate change requires increased effort to communicate about impacts and risks and encourage action.	<i>I think that's the other thing with climate change - is we've just got to teach the community because there's too many naysayers out there that I can't help it but think, 'haven't you walked outside your door lately? Haven't you looked around you?' (Interviewee_19)</i>
Increased cost	Increased cost of plant guards and watering: Increased cost to protect plants from extreme weather and pay for watering when required.	<i>The guards and stakes are very costly, we don't just get them for rabbits, we do get them because of hot winds and protection from extreme hot winds in the summer, we just feel it gives them a little bit of a microclimate compared to being out in the open. [...] So that is expensive. It's quite costly to factor that into grants. (Interviewee_15)</i>
Concern and distress	Expressed concern for animals: Concern for the wellbeing of bats during extreme heat.	<i>Then the last one that we're working towards is heat stress events. With our climate warming and hotter summers et cetera, we have grave concerns about the wellbeing for the bats globally but also here in Bendigo. What you're seeing now is a change. (Interviewee_12)</i>
Concern and distress	Expressed concern for volunteers: Environmental degradation, and loss and damage to restoration works from events such as flood cause concern for Groups about how their volunteers will respond, and whether volunteers will lose motivation.	<i>It can create some disillusion amongst volunteers. If volunteers want to go back and have a look at the work they did from 2022, I would avoid taking them there. That's as simple as that - let's go somewhere else where you know is a bit better. (Interviewee_04)</i>
Concern and distress	Expressed concern from participants: Stress and anxiety about climate change reported by many participants.	<i>Climate change alarms me and I can feel quite anxious about it at times and it helps me to be with other people and to be doing something positive to cope with how I feel about it. (Interviewee_21)</i>
Risk	Increased risk of fire and flood: Increased risk of fire and flood are concerns for the community including the potential for flood to cut off roads and isolate communities.	<i>There's the fire risk of course. We're all out in the forest out that way. There's been controlled burns around our place, and even in the Honeyeater Bushland Reserve and Wellsford Forest. Fire is more to the forefront of people's thinking. (Interviewee_08)</i>
Risk	Increased risk to biodiversity and ecosystems: Extended dry periods threaten wetlands and particularly those where there isn't infrastructure for watering.	
Risk	Increased risk of animal mortality: Reduced food sources for animals due to extreme weather causing death of pups.	There are particular concerns for bats in the region.
Uncertainty	Increased uncertainty about plant survival: Increased uncertainty about where and when to plant due to increased climate variability thereby affecting planning.	Examples including Goldleaf Reserve and a shallow constructed lake.
Uncertainty	Increased uncertainty about what to plant: Increased uncertainty about preferred plants and whether non-Indigenous species should be selected to adapt to climate change.	Consideration of purchasing plants from north of the region that may be more adapted to Bendigo regions future climate.
Uncertainty	Increased uncertainty about how to plant: Increased uncertainty about how to mitigate the impacts of extreme weather on plants.	An example was provided on the impacts of a sudden storm on plants, and the question was how to plant in unpredictable circumstances.

All of these impacts add to the work of conservation volunteering, including through the extra time, cost, considerations, pressure, and care for volunteers, sites, and animals.

It also adds mental pressure on the decision makers of the Landcare group - who are of course volunteers, as to make a decision either way and really stress over say, 'do we do all the work, enlist the volunteers to prep the site, plant the plants' and risk having all that work and grant money be most likely to go to waste? And pressure on those volunteers in an administration sense. (Interviewee_13)

8 FUTURE NEEDS AND PLANS

Future needs and plans are considered across social, economic, and political dimensions. Nature conservation work is vital to ecosystems, and biodiversity, and also social relationships, cultural expression, and community identity. With an aging population, limited institutional support, and climate-related disruptions on top of already existing administrative burdens and local challenges, Landcare groups are set against the odds to make environmental volunteering sustainable for volunteers now, and attractive to younger generations, including young people, in the future. Given socio-economic pressures, and stresses and insecurities felt through international events, recruitment is challenging, however, the work must be fostered, not as an 'optional' activity, but as a primary way to support more resilient, adaptive, and sustainable communities. This section includes future needs and plans identified by participants, and the researchers.

8.1 Recognising the value of local knowledge

Local knowledge is particular, developed over time, through sustained relationships and experience in the environment and with local communities. This knowledge exists within communities and cannot be replicated. Local knowledge has benefits to the ways that Groups function, in that it informs what to do, when, and with whom. However, there are barriers to integrating local knowledge into project and strategic decision-making across different levels of government, and government departments and agency. The first step in addressing this, is to value the knowledge as providing essential information, that cannot otherwise be attained. Then, there needs to be efficient means for communities to share different types of knowledge, whether it is bounded in contributing to projects, continuous in providing ongoing data for monitoring, or continual such as contributing to a regular check of community sentiment and changes in the local environment. There is a strong opportunity to find ways to share knowledge in different forums, for distinct purposes.

The seasons are changing, like they're broadening out, they're getting hotter, it's not good for some of our animals and some of our plants, is it? [...] You can see when it's all drying out, when things are all going backwards, can't you? [...] Well, the kangaroos haven't got anywhere to eat, anything to drink, and the plants that are normally up at a certain time of the year are either small or stunted or don't come up. It's obvious if you look and see. A lot of people just don't look. (Interviewee_03)

8.2 Attracting more volunteers and particularly young people

The need to recruit younger people (e.g. young families), and young people (to age 24), to meet immediate capacity concerns, reduce the risk of burnout among existing members, and ensure the longevity of the Groups, was a primary theme in the research. Young people were valued for their energy and skills (e.g. social media and digital communication) and regarded as the future for the region in caring for the environment. The majority of groups actively engaged with young people, often through activities with schools or other educational settings (e.g. TAFE, university, informal sessions at conservation sites), and took a range of approaches including awareness raising, education, or facilitating long-term connection and action. One participant explained that efforts to engage young people haven't resulted in increased membership, however the approach is still important in instilling environmental values in the community:

...I really believe that connecting people with nature, but particularly as kids, that will stay with them somewhere [...] I just think the more you can have fun times in nature, ...the more they can have times together building memories in nature it's got to be a good thing. And you can never underestimate when that will come back and how that will come back in people's lives. But yeah, it hasn't played out in membership. (Interviewee_15)

Participants discussed that traditional environmental conservation work may need to change. For example, motivations for young people may be different to those values and motivations discussed in Section 3. One participant identified that young people may be motivated to volunteer to help make connections, network, get experience, get a job, and learn about their own property and area (Interviewee_13). Further, the ways that Groups are structured may need to change such that young people are less interested in regular meetings, and holding formal positions such as Chair, Treasurer, and Secretary and undertaking administrative requirements:

This young person just wants to come onboard to develop a newsletter. But they said to me, 'I can't get to the meetings. Is that a problem?' I thought that's a great question because we need to think outside the square now. (Interviewee_12)

Rethinking conservation work needs to be undertaken with younger people, and young people, to ensure messaging, structures, values, and interests are beneficial and aligned.

8.3 Increasing collective capacity and capability through networks and coordinating tasks

Many participants reflected on the long-term sustainability of their groups and their capacity to meet increasing conservation and community needs in the context of climate change. Concerns centred on preparing for adverse weather conditions (Interviewee_12), maintaining a diverse mix of skills and knowledge to meet these challenges (Interviewees_12 & 18), and having enough members to meet conservation needs now and in the future. Strengthening connections within and across the Nature Network was seen as critical to maintaining collective capacity (Interviewees_14, 18 & 22). All groups need to be formally established, have insurance, and fulfil administrative tasks, and this replication across groups uses limited capacity and resources. There is an opportunity for improved coordination through Nature Network, including centralising such tasks, sharing expertise, sharing resources, and collaborating across Groups. Ideas for joint events were proposed including protecting large old trees, threatened species, waterways, and native fish (Interviewee_12). In addition, the Groups could coordinate through Nature Network on key engagements including with DJAARA, and local government.

8.4 Supporting Groups in responding to climate change

There is a range of specific knowledge, capacity building, and changes to funding arrangements that are required to support Groups in adapting to climate change. These include technical advice in relation to planting including trialling plants that are likely to better adapt to the changing climate in the region, and how to plant given climate variability and storms. Triage is required for animals, including bats, that includes different stages of triage and integrated services that provide fast and effective support for the animals. Learning about how to care the environment and animals also involves understanding the context of climate change and how the region will change. Such knowledge and support are necessary to give confidence to the Groups that 'are going about things the right way' (Interviewee_23).

It's so amazing just you can walk 20 steps and it's a completely different success rate for things or particular plants. [...] So we tried one thing, we tried putting the mulch around the tree guard after the plant went in, and then we'd get a thunderstorm and the water would fill up inside the guard. Some of the plants didn't like that and they died. It's kind of working out what's the best way to deal with unpredictable circumstances. I don't know, maybe that's something we should ask Landcare to do is give us some ideas about what would work best in unpredictable times. (Interviewee_10)

Set up a triage camp here to be resourced, equipped, have vaccinated rescuers that know what they're doing. They've been trained to work with DEECA and the Biodiversity Team to actually rescue a bat, to rehydrate, to do a subcut. [...] You need to be trained to do that. You need to have the equipment to hydrate with sugar and salt solution. You need to have that here. Then to have water sprays and just mist the flying foxes to reduce their body heat. That's primary triage. Then they go into secondary triage. Then if they don't recover they go into care It has to be integrated, coordinated, funded and resourced. (Interviewee_12)

Funding arrangements need to reflect the increasing cost of doing nature conservation work in covering loss and damage, and additional, and extended maintenance. Further, short-term funding needs to be flexible if activities can't be undertaken due to extreme weather and climate variability. There are also communication needs, in terms of how to engage communities and communicate about climate change to encourage action in times of disillusionment. Also, emotional support is required for the participants themselves who experience concern and distress about the places, plants, and animals they care about. Finally, climate risk management support could be useful for Groups and long-term planning. One participant in particular stated the Groups are 'not being utilised enough' for adaptation in the region and have 'untapped' potential (Interviewee_12).

I see, as most people do I guess, climate change as the big threat that impacts everything from ecological issues and economic issues and social issues, cultural issues, it's just kind of the underpinning thing, the overarching thing that will just affect everything, whether people believe in it, deny it, all that kind of stuff. (Interviewee_18)

8.5 Institutional support through policies, plans, funding, and engagement

Institutional support is needed from state and local government and government agencies in a range of ways. Strategies, policies and plans set direction and contribute to the perception of Groups' legitimacy in the community, guide action, and facilitate conversations between Groups and authorities through shared language and interests, thereby a fundamental structure of local democracy. When regarded in this way, the importance of policy processes taking a just approach to working with communities becomes foundational. Such principles involve the development of accessible, meaningful, and influential processes that have regard for community values, needs, and interests. The Groups are one way for authorities to understand community perspectives, and diversity across the groups can be seen as a benefit. This section is not directed at individuals in government; it is a consideration of systems and how they enable and constrain voices and action. Complex decisions are being made in rural and regional areas, balancing socio-economic development, sustainability, and resilience, and decision-making requires careful processes engendering principles of justice.

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