

Australian Government

Australian Centre for International Agricultural Research

Building global sustainability through local self-reliance

Lessons from landcare

Monograph 219

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Dale A, Curnow J, Campbell A and Seigel M (eds) (2022) *Building global sustainability through local self-reliance: lessons from landcare*, ACIAR Monograph No. 219, Australian Centre for International Agricultural Research, Canberra.

ACIAR Monograph No. 219 (MN219)

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ISSN 1031-8194 (print) ISSN 1447-090X (online) ISBN 978-1-922787-23-1 (print) ISBN 978-1-922787-24-8 (online)

Illustrations by Whitefox Design Studio, based on original artwork by Rob Youl Technical editing by Lorna Hendry Proofreading by Joely Taylor Design by WhiteFox Design Studio Printing by CanPrint Communications

Contents

Preface		xi
Authors		xiii
List of shore	tened forms	xxv
PART A: Intr	oduction to subsidiarity and landcare concepts	1
Chapter 1	Introduction to subsidiarity and landcare: building local self-reliance for global change Allan Dale, Jayne Curnow, Andrew Campbell and Michael Seigel	3
Chapter 2	Landcare: exemplifying subsidiarity as a governance principle for the Anthropocene Andrew Campbell	15
Chapter 3	Exploring landcare as a means of implementing the principle of subsidiarity Michael Seigel	23
PART B: Dev	eloping local resilience and sustainability	41
Chapter 4	Looking after our own backyard: understanding critical factors enabling self-reliance in local communities Sonia Williams	43
Chapter 5	The meaning of support! Kaye Rodden and Terry Hubbard	51
Chapter 6	Community-based governance and global sustainability Graham Marshall and Lisa Lobry de Bruyn	57
Chapter 7	A sustainable resourcing strategy for landcare Paul Martin and Kip Werren	71
Chapter 8	Renewable resources and landcare ethics: community-based ownership for caring for life, land, nature and the environment Tokihiko Fujimoto	85

PART C: Landcare as an integrative concept		97
Chapter 9	An integrative approach to self-reliant people and sustainable land use: Toyama City's resilience strategy Joseph Runzo-Inada	99
Chapter 10	How can landcare contribute to household development outcomes in Uganda? Clinton Muller and Joy Tukahirwa	109
Chapter 11	Landcare as a method of cultivating a sense of richness in life: the keys for encouraging individual capacity Tomomi Maekawa	125
Chapter 12	Landcare: integrating agricultural extension with natural resource management Jayne Curnow	135
Chapter 13	Farming in the arid Koup region: a truly South African example of landcare Francis Steyn	145
Chapter 14	Predicting the success of New Zealand's community-led resource management initiatives Nick Edgar	155
PART D: Land	dcare as a transformative agent in crises	169
Chapter 15	'Everyone, Everywhere, Landcare' Andrea Mason	171
Chapter 16	Landcare, disaster resilience and the transformative capacity of community Stewart Lockie	179
Chapter 17	Lessons from the field: landcare, subsidiarity and community-based extension Mary Johnson and Evy Elago-Carusos	193
Chapter 18	Factors determining the resilience of local communities: a comparative analysis of landcare and a pond irrigation system in the Sanuki Plain Kazuki Kagohashi	207
Chapter 19	Developing the role of landcare: a reflection on the value of community landcare as a subsidiarity practice model for emergency and natural disaster management Jennifer Quealy	219

PART E: Developing community learning and social cohesion		231
Chapter 20	Learning like crazy: prototypes and practices of design for shared learning Ross Colliver	233
Chapter 21	Traditional knowledge as a landcare strategy Liddy Nevile	247
Chapter 22	The contribution of landcare towards gender equity: the accidental equaliser? Jayne Curnow and Mary Johnson	257
Chapter 23	Landcare: leveraging the opaque to build resilience Pip Job	267
Chapter 24	Knowledge and progress: building bridges to empower community action Andres Arnalds, Jonina Thorlaksdottir, Brian Slater and Fred Yikii	273
PART F: Layi	ng the groundwork for landcare's future	287
Chapter 25	Landcare practice: from little things, big things grow Jennifer Quealy	289
Chapter 26	Behind Landcare's success: sound management at state and national levels Rob Youl	303
Chapter 27	Intrepid Way: an adventurous way forward Megan Lee, Naomi Edwards and Peter Pigott	313
Chapter 28	Place-based education for sustainability: a strategy that promotes environmental awareness in Ghana through the arts Beatrice Dossah	327
PART G: Lan	dcare's message for the wider world	341
Chapter 29	Cross-scale community-based natural resource management stewardship capacity in the United States Yvonne Everett	343
Chapter 30	Landcare's potential contribution to the Sustainable Development Goals: a local self-reliance approach to global sustainability Lisa Robins	359
Chapter 31	Strengthening national governance systems to support local self-reliance Allan Dale and Michele Dale	379
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List of tables

Table 14.1	Key success factors for community-led catchment management	164
Table 18.1	Core concepts underpinning Seigel's landcare principles	211
Table 19.1	Key attributes of Landcare groups	226
Table 20.1	Government and community ways of governing	240
Table 30.1	Major Australian Government funding initiatives for landcare-related activities	361

List of figures

Figure 7.1	Intangible resources	78
Figure 10.1	A characteristic treeless and exposed soil landscape in Kween District, 2002	112
Figure 10.2	Location of Landcare and non-Landcare households surveyed in Kapchorwa and Kween districts	116
Figure 10.3	Total group membership breakdown of households surveyed	117
Figure 10.4	Group activities undertaken by Landcare and non-Landcare groups	118
Figure 10.5	Simplified social network analysis of group partners	119
Figure 10.6	Vision types of Landcare and non-Landcare groups	120
Figure 17.1	Distribution of natural hazards in the Philippines	195
Figure 17.2	ACIAR Mindanao Agricultural Extension Project pilot sites	198
Figure 17.3	Administrative divisions in the Philippines	200
Figure 20.1	Nonaka's model of knowledge creation	237
Figure 20.2	Transforming the community-government partnership	242
Figure 24.1	The role of context in understanding	278
Figure 29.1	Federal land in the United States as a percentage of total state land area	345
Figure 29.2	Location of Humboldt and Trinity counties, California, USA	349
Figure 30.1	Australia's 56 natural resource management regions, formalised under the Natural Heritage Trust Extension	362

List of shortened forms

ACIAR	Australian Centre for International Agricultural Research
AMAEP	ACIAR Mindanao Agricultural Extension Project
AT Uganda	Appropriate Technology Uganda
CAO	City Agriculture Office
CBDRR	community-based disaster risk reduction
CBRM	community-based resource management
CENRO	City Environment and Natural Resources Office
CGIAR	formerly the Consultative Group on International Agricultural Research
CLEA	Community Learning for Environmental Action
CSIRO	Commonwealth Scientific and Industrial Research Organisation
FAC Net	Fire Adapted Communities Learning Network
GDP	gross domestic product
ICM	integrated catchment management
ICRAF	International Centre for Research in Agroforestry
IUCN	International Union for Conservation of Nature
KADLACC	Kapchorwa District Landcare Chapter
KCLID	Kagawa Canal Land Improvement District
Landcare Australia	Landcare Australia Limited
LID	land improvement district
LIFE	Livelihood Improvement through Facilitated Extension
NAACP	National Association for the Advancement of Colored People
NAADS	National (Uganda) Agricultural Advisory Services
NRM	natural resource management
NUISE	Nanzan University Institute for Social Ethics
OBLA	Olo-clofe B'laan Landcare Association
OECD	Organisation for Economic Co-operation and Development
PCAARRD	Philippines Council for Agriculture, Aquatic and Natural Resources and Development
PULL	PCAARRD-UP Mindanao-Landcare LIFE
ROCP	Regional Onsite Conservation Program
RMIT	Royal Melbourne Institute of Technology
SDGs	Sustainable Development Goals
TOFA	Tuban Organic Farmers Association
UN	United Nations
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNHCR	United Nations High Commissioner for Refugees
UNU-LRT	United Nations University Land Restoration Training Programme
WWF	World Wide Fund for Nature





Landcare as an integrative concept





CHAPTER 9

An integrative approach to self-reliant people and sustainable land use: Toyama City's resilience strategy

Joseph Runzo-Inada

Abstract

Sustainable quality of human life and sustainable land-use practices are critical and irrevocably inter-related issues for the 21st century. Toyama City is recognised both in Japan and abroad as a model of ecological land use and resilience planning. It is the first Japanese city to be chosen for the Rockefeller 100 Resilient Cities initiative, the first non-national entity to sign a Memorandum of Understanding with the World Bank, the only Japanese city in the United Nations Sustainable Energy for All program, and a nationally designated Japanese Environmental FutureCity. Toyama City is a virtual laboratory for best sustainability practices. Unusual within the 100 Resilient Cities, Toyama City encompasses a large land area of 1,242 km², with extensive areas devoted to agriculture. Seventy per cent of the land is forested and two major and eight minor rivers flow through the city boundaries. To address this complex combination of rural and urban concerns and opportunities, the key to Toyama City's official resilience strategy is an integrative, comprehensive and holistic approach. The Resilience Strategy 2050 foregrounds core initiatives for the sustainability of Toyama City's agricultural and forested areas, the integration of the rural and urban/suburban areas, and vigorous initiatives to nourish its citizens' connection to the land and to agriculture.

This Japanese agrarian approach parallels fundamental principles of the Australian landcare movement: locally motivated and volunteer-based sustainable resource management and enduring care for the land that helps maintain productive farmland while protecting the environment. Importantly, the Landcare model of sharing the acquired wisdom and skills of sustainable land management with others and with future generations is also a core value of the Toyama City model.

Introduction

Toyama City was created in 2007 from the coalescing of seven former municipalities under a Japanese national program to combine rural and urban centres. Toyama City's 30-year Resilience Strategy 2050 explicitly seeks to unify and harmonise urban, agricultural and rural areas for long-term resilience. Covering the entire 1,242 km² of the city boundaries, with vast rural areas from the Sea of Japan to the crest of the northern Japanese Alps, the Resilience Strategy 2050 contains a multitude of programs for rural sustainability, agricultural protection and ecological preservation. The city's self-understanding is not an opposition between urban, suburban and rural, but is rather one of a holistic entity with essential rural, suburban and urban elements. Most importantly, the key lesson from the city's resilience planning process is that administrative processes, programs and projects do not alone make an integrated rural/suburban/urban municipality. Rather, communal bonds, respect for others and respect for nature are the foundation for self-reliance and resilience.

While Toyama City, with a population of more than 420,000 and home to high-tech, robotics, banking and pharmaceutical industries, is not a predominately agricultural city, agricultural society plays an essential role in the health and resilience of its society. In 1845, Henry David Thoreau famously left the comforts of urban society in the town of Concord, Massachusetts, to live in a small cabin on Walden Pond and practise simple living and self-sufficiency (Thoreau 2004). In our contemporary world of rapid population growth, urbanisation and the resultant pressures on the natural environment, we need to ask how the life and lessons of the practices of self-sufficiency of Thoreau and others like him might be compatible with, and even applicable to and integrated into, our modern, urbanised societies. Starting from its inception in 1986 in Victoria, Australia, the grassroots landcare movement is one thread of this rethinking of sustainability. Toyama City offers another, parallel thread, where land-care concerns intersect with the creation of an integrative and comprehensive vision of sustainability for a comprehensive urban/rural municipality.

Located about 250 km north-east of Tokyo on the Sea of Japan, Toyama City's land ranges from sea level at Toyama Bay to the 3,000 m crest of the northern Japan Alps, which is only 44 km from the city centre. This stunning natural setting, with its rich farmlands and abundant forests, presents the city with unusual challenges as well as opportunities to create an environmentally friendly and landcare-sensitive municipality. Indeed, Toyama City's established success in modelling a longstanding comprehensive commitment to sustainability and environmental issues led the Japanese Government to choose Toyama City as the host of the G7 Environment Ministers' Meetings during the 2016 G7 Summit in Japan.

Structure of Toyama City's resilience strategy

Working with the Rockefeller 100 Resilient Cities program in 2015 to 2017 to design a comprehensive 30-year resilience strategy, Toyama City first developed a vision that emphasised the importance of communal bonds and respect for nature that are the foundation for the city's urban/rural/nature balance:

The Toyama vision is to be ... a model of resilience and environment-friendly living, where strong community bonds help citizens flourish, and the high quality of an active lifestyle for all its residents achieves a harmonious balance between traditional arts and modern technology and between economic prosperity and the inspiring natural surroundings of the pristine Northern Japan Alps (Toyama City & 100 Resilient Cities 2017).

This vision is summed up in the slogan 'Community, nature and innovation for the future'. Toyama City's vision is of resilience. It has four related elements: resilient people, resilient infrastructure, resilient prosperity and resilient environment. Toyama City's Resilience Strategy 2050 is then structured in a logical flow from the guiding vision, through the four resilience elements, to 10 major 30-year cross-cutting initiatives, which in turn have 35 subinitiatives. Each of the resilience elements is addressed in a vision statement. Of particular concern here is the resilient environment vision:

The Toyama Vision for the Environment is a harmonious balance between human health, animal health and the health of Toyama's bountiful nature. This comprises two aspects, each reflecting a different though complementary value and ethical stance: environmental management (human health) and environmental conservation (the health of nature and animals for their own sake). Working with international organizations like UNEP, NOWPAP, SEforALL, IUCN and IGES, Toyama will continue to vigorously support eco-friendly socio-economic practices, efficient waste management systems, green industries and long range conservation plans (Toyama City & 100 Resilient Cities 2017).

The four resilience elements form an organic whole. The defining feature of the city's comprehensive approach to resilience is the principle that every policy should be directed towards the single goal of long-term comprehensive resilience. Other stated key principles in Toyama City's Resilience Strategy 2050 are:

- an emphasis on social bonds and self-realisation for citizens
- wide stakeholder engagement (including rural communities)
- integrated cross-silo communication and cooperation
- efficient planning with multiple resilience dividends from each project
- maximum utilisation of public-private cooperation
- mutually integrated plans that address specific issues for the urban, suburban and rural agricultural areas.

Of the 10 major cross-cutting initiatives for 2050, four are especially relevant here:

- water, waste and energy management
- rural Toyama and agricultural sustainability
- citizen health, wellbeing and participation
- conservation and environmental education.

Water, waste and energy management

Toyama City's water, waste and energy management initiative is intended to create an integrated approach to these three sectors while simultaneously supporting future needs, addressing global environmental challenges and stimulating economic diversification into new areas of the green circular economy. This initiative focuses on local production of renewable energy including micro hydro-electric facilities, solar power generation and waste energy projects.

One innovative waste-to-energy project in Toyama City is the Greenhouse Horticulture Project, developed by the waste management company Kankyo Seibi, one of Japan's most advanced forerunners of industrial waste management. The inevitable excess heat generated from the final burning of waste products in a steam generator, to produce electricity as one waste-to-energy process, is now used to heat an array of 28 greenhouses totalling 4 hectares. Ingenious heat transfer containers transport the excess heat to the greenhouses while electricity from the generator powers the greenhouses. This waste-to-energy greenhouse project produces a 95% reduction in fossil fuels that would have been used for the greenhouse operation, and a 53% reduction in electrical power costs for the all-LED and computer-controlled greenhouses.

Another of Toyama City's environmentally friendly agricultural related projects involves working with local companies to develop a range of micro hydro-electric systems. The city has several test stations, one generating 689,200 kWh annually, enough to completely power a neighbourhood of 125 houses. When they are installed in rural areas, these micro hydro-electric systems can be used on slow-flowing bodies of water like irrigation canals, enabling rural areas that have inadequate access to the electrical grid to become energy self-sufficient. The electricity can be used to power agricultural electric vehicles, and the surplus sold for income.

Paralleling the Landcare model of sharing knowledge, Toyama City is committed to sharing its agricultural resilience knowledge and serving as a model for other cities, often in cooperation with private companies. In 2014, under the auspices of the Japan International Cooperation Agency, Toyama City signed a Memorandum of Understanding to start introducing these small hydro-electric generation systems in rice terrace areas of the Tabanan region of Indonesia, which have been designated UNESCO World Heritage sites. In 2018, Toyama City signed Memorandums of Understanding with both the Iskandar region on the Malaysian Peninsula and the city of Kota Kinabalu in Borneo, Malaysia, to introduce these small systems. Through these overseas projects, Toyama City hopes to be able to help bring clean-energy-generated electricity to rural areas and help reinvigorate local agricultural areas.

Rural Toyama and agricultural sustainability

Following the national reorganisation program to consolidate Japan's rural and urban areas, Toyama's agricultural landscapes are an integral feature of the city. The goal of the Rural Toyama and Agricultural Sustainability Initiative is to 'protect and enhance the rural areas which are vital for our regional economy, our identity, and environmental quality'. In this initiative, it is expressly stated that:

We will celebrate and maintain the rural landscapes through establishment of a volunteer forest management project, conservation of the traditional rice terrace landscape, and we will promote regional forestry products as a characteristic of Toyama (Toyama City & 100 Resilient Cities 2017).

As noted above, 70% of Toyama City's municipal area is woodlands. Toyama City has specific programs to carefully remove excess trees to keep the forests healthy, and some of this is done by volunteer groups. The city is now promoting the use of wood pellets, which are created from timber derived from this forest-preservation thinning. These pellets are used as fuel for stoves and boilers, achieving a resilience value from so-called 'waste'. Given the importance of its forestry resources to Toyama City's self-identity, it has been working with Rob Youl, Chair of Australian Landcare International, to organise an urban forestry exchange between Australian Landcare International and Toyama City. Toyama City's Forestry Policy Division has agreed to help foster an information exchange with a team of Australian farm foresters led by Rowan Reid of the Australian Agroforestry Foundation, Australia's leading trainer in and practitioner of farm timber management and utilisation. This exchange would cover species selection, laying out forests, silviculture, pruning, measuring volumes, logging, sawmilling, forming self-help networks, seasoning, marketing and managing for multiple goals including water production and safety.

In a more high-tech solution to environmental issues and sustainability in rural areas, Toyama City has partnered with Nissan Corporation, which has provided 30 all-electric Nissan e-NV200 utility vans cost free to the city for three years. These will primarily be deployed to rural areas where gasoline stations are becoming less common and where the electric vehicle batteries can also provide emergency electricity during disasters. This will help reduce the impact of vehicles on rural environments as well as reducing destructive CO_2 emissions.

Toyama is a rice-growing region and the city has targeted specific projects aimed at sustainability and environmental conservation in these rural communities. The city's rice terrace maintenance program partners with the Japanese Government. The government provides direct payment for 81 villages in the mountain areas while the city provides actual maintenance through citizen support in 22 villages within the city limits. The city also provides subsidies for areas where cultivation has been abandoned to help prevent summer flooding. Additionally, the city promotes rice terrace conservation by encouraging children to learn about rice planning. One of the most important ways to promote land conservation is through programs for children, who are the future generations. In 2016, 106 children were involved in this project.

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Another interesting program that involves farmers is a program for diversifying rainwater catchment reservoirs during flooding. Excessive rainwater is temporarily stored on school fields, small suburban retention areas and, importantly, in rice fields. Rice field storage, which is carried out in cooperation with the community, reduces the outflow by 4.4 times into waterways, greatly reducing flooding in urban areas. Farmers who cooperate in this program receive a subsidy. During heavy rains in July 2004 along the Tsubono River, 60 households suffered river flood damage, but in the heavy rains of 2007 – after this scheme was implemented – no households suffered damaged.

Historically, Toyama City was the centre of traditional medicine for all of Japan. Medicine peddlers travelled out from the city to deliver medicines throughout the country. Working with farming communities, the city is dedicated to promoting sustainable agriculture by identifying and promoting important medicinal and health benefit plants, supporting farmers to expand the planting area to increase productivity and adding new commercial value to medicinal plant products. This includes sharing farm machinery to reduce agricultural costs, and a new generation of young farmers is being encouraged to develop low-cost, high-value agricultural businesses.

Egoma (*Perilla frutescens*), a member of the mint family used in traditional Chinese and Japanese medicine, has long been grown in the Toyama foothills. Highly desirable because it is rich in omega-3 fatty acids, it is sometimes called the 'fish of the fields'. Toyama City is supporting the recultivation of abandoned farmland within the city limits for large-scale farming of *Perilla frutescens*. A Toyama City company is developing a factory to produce 92 million soft capsules annually, which are designed to prevent oxidisation of the fragile

oil. The city is also working with a food institute in Italy to produce an especially nutritious variety of olive oil that incorporates the oil of the egoma plant.

As part of Toyama City's strategy to promote agricultural sustainability, new agricultural skills are developed and new farmers are nurtured by providing agricultural training to increase the employment opportunities in agriculture. This includes opportunities for children to both learn agricultural skills and learn about the importance of agriculture in protecting nature. The city's Rakuno Gakuen program supports farmers and non-farmers who are interested in agriculture. In Japan's ageing society, farmers face several difficulties: working on high ladders and cultivating heavy vegetation becomes more difficult, often there is no successor for the family farm, and viable farmland is left idle. Four courses are offered in this program:

- 1. The Farming Challenge Course offers practical activities for people interested in farming or in developing more complex farming skills.
- 2. The Agricultural Business Course offers basic knowledge for starting an agricultural business.
- 3. The Farm Training Course provides two years of training on vegetables and fruits, or flowers and rice. The participants' ages range from 30 to 70, with most participants being in their 60s.
- 4. The Home Garden Course is a one-year course on vegetable cultivation.

Citizen health, wellbeing and participation, and conservation and environmental education

The goal of Toyama City's Citizen Health, Wellbeing & Participation Initiative aims to ensure a high quality of life and self-realisation for citizens of all ages by enabling active participation in inclusive communities. Of particular relevance here are subinitiatives to implement intergenerational programs for community participation, specifically those focused on local conservation and agricultural and farming promotion. The goal of Toyama City's Conservation & Environmental Education Initiative is 'to preserve nature for future generations and conserve nature and accessibility to nature for citizen's self-realization and resilience' (Toyama City & 100 Resilient Cities 2017:78). Since Toyama City's Resilience Strategy 2050 initiatives are cross-cutting, some aspects of these two initiatives have already been described above, but several subinitiatives are noteworthy.

Toyama City has initiated a One Tree Per Child tree-planting project with elementary school students. From 2017 to 2022, the students will plant trees to help them learn how forests absorb CO_2 and reduce global warming. The hope is that planting trees and creating a rich natural environment will help children become aware of themselves as part of the environmental and agricultural community. The goal is to have 1,000 trees planted by 1,000 elementary school children working in teams of four. This is an intergenerational project.

Another project, this one in the urban centre, is Toyama City's Community Gardens Project, which creates gardens in previously abandoned squares in the city centre. These gardens offer opportunities for the elderly to remain active, encourage intergenerational interactions and help bring nature into the city centre. The city has so far provided seven areas and private landowners contributed five additional areas. The city supports this project by providing subsidies to neighbourhood associations (World Bank Group 2017:22).

Another interesting facet of Toyama City's dedication to nourishing interpersonal bonds and bonds with agriculture is the fact that major city corporations such as INTEC have agricultural fields (for example, growing Japanese pears (nashi)) where employees can learn about caring for agricultural products and intergenerational groups can work together. Although these are private operations, they reflect a city-wide vision of the importance for all stakeholders of landcare and intergenerational agricultural learning.

On a larger scale, the Eco-Town Park, which the city started developing in 2002, is an 18-hectare industrial park developed under public-private partnership. It currently includes seven private businesses which, with city incentives, turn various types of putative 'waste' (including wood, water, cooking oil, leftover food, plastic and used automobiles) into useful products. Integral to the park is an extensive waste-recycling education centre to increase awareness of the methods and importance of waste recycling. Citizens, schoolchildren and visitors can learn about the importance, methods and valuable end products of recycling.

Relationship morality, resilience and nature

The preceding section outlines Toyama City's Resilience Strategy 2050 and describes some specific policies and projects. But while policies, initiatives and mechanisms may be conducive to, and even instrumental in, developing a people's self-reliance and resilience, policies, initiatives and mechanisms do not produce self-reliance and resilience. Identifying the foundational conditions for self-reliance and resilience are the most important lessons of Toyama City's resilience journey and the crux of the city's resilience strategy. Through the process of developing the city's Resilience Strategy 2050, it was discovered that a vibrant communal spirit, a caring-for-others social perspective and deep bonds to nature form the resilience backbone that underlies the past, present and any future success of Toyama City's specific resilience policies, initiatives and mechanisms.

A vibrant communal spirit, a caring-for-others social perspective and deep bonds to nature form the resilience backbone that underlies the past, present and any future success of Toyama City's specific resilience policies, initiatives and mechanisms.

Embedded in the identity of the city and its citizens is a deep Japanese sense of both the sacredness of nature and the centrality of agricultural and rural lands. Within the self-understanding of the importance of a robust relationship between rural and urban residents, and also deep interpersonal and community bonds, Toyama City's Vision 2050 emphasises 'community and nature' and the critical balance of the four essential elements – resilient people, resilient infrastructure, resilient prosperity and resilient environment – that must be maintained to nurture an enduring and resilient city. Toyama City faces the dual challenge of preserving the exceptional quality of its natural and human-made assets. Environmental standards are high and rural areas are currently sustainable, but diligence and evolving methods are required to maintain and improve the quality of the environment and the conservation of nature and rural areas. Likewise, the city's social cohesion, community bonds and self-reliance are strong, but these will wither without nourishment.

Ultimately, success in building and nourishing these relationships depends on taking the moral point of view. One key element of taking the moral point of view regarding

persons is benevolence: one must take others into account in one's actions not just out of self-interest, but because one respects them as persons. In his book *Relationship morality,* the American philosopher James Kellenberger explains the moral point of view by arguing that the ultimate grounding of obligation, and finally of all morality, is a single but universal relationship between each and all (Kellenberger 1995). Applying this principle to relations between people, Kellenberger argues that the realisation of a 'person/person relationship' to others creates 'a sense of duty grounded in a recognition of the intrinsic worth of persons' (Kellenberger 1995:53). For those who see the intrinsic value of animals and nature, this concept of relationship morality can be extended to animals and nature as person-living being relationships and person-nature relationships, which will both in turn engender human-nature bonds. As Kellenberger says:

As we come into the presence of persons and discover their inherent worth as persons, so too we can come into the presence of nonhuman animals, into the presence of inanimate but living beings, like an oak tree, and into the presence of nonliving natural entities natural settings like a pasture or a mountain range or a desert and thereby discover an inherent value analogous to that possessed by persons. (Kellenberger 1995:382).

Relationship morality entails an organic view of human-human and human-nature bonds. Toyama City, with its natural and agricultural setting and Japanese cultural milieu, sees itself in organic terms. On Toyama City's model, resilient cities are like resilient people. A suggestive parallel might be the resilience of athletes. Two mountain climbers might have the same 'measurables' but one performs at a consistently outstanding level and the other does not. What is the underlying difference? With athletes, we sometimes talk about 'heart' – that immeasurable something extra of the successful athlete. For Toyama City, it is essential that the city maintain strong civic pride, exceptional community bonds, a deep and abiding commitment among citizens to the self-realisation of oneself and of others (which is a Confucian ideal) and deep respect for nature. These are qualities of 'heart', which are not fully measurable (Toyama City & 100 Resilient Cities 2017:39).

The initiatives in Toyama City's Resilience Strategy 2050 incorporate the high degree of mutual support and volunteerism inherent in its citizens' self-understanding, which includes an inextricable and abiding relationship with the land.

The pragmatic effect of these immeasurable qualities of 'heart' help explain how Toyama City's urban dwellers do not look down on rural dwellers as 'peripheral', and explain Toyama City's drive for a long-term plan that supports all segments of society and all regions of the city. This plan must prioritise the deep relationship between the city and the natural environment, including both environmental management and the conservation of nature. The word that best sums up the essential centrality of relationships to people and nature in Toyama City is *itadakimasu*, which is traditionally said (especially in rural areas) before eating, to give thanks to every being that made one's meal possible: the fish and the fisherman, the fields and the farmer, the cook and the server. The initiatives in Toyama City's Resilience Strategy 2050 incorporate the high degree of mutual support and volunteerism inherent in its citizens' self-understanding, which includes an inextricable and abiding relationship with the land.

Conclusion

The increasingly rapid global population shift from rural to urban residency, and the evolution of the human manipulation of nature from the industrial/mechanical era through to the electronic and digital eras, has resulted in the physical and spiritual distancing of humans from the land and from nature. The movement towards self-reliance and genuine resilience, which includes a fulfilling appreciation of ourselves as literally formed from the 'dust' and our health and destinies as inexorably tied to nature, can help counter the modern trend away from the richness of person-person relations grounded in person-nature bonds.

The Resilience Strategy 2050 is Toyama City's model for achieving this deeper connection to others and nature. But it is just one of many steps in a long-term commitment to creating a resilient city that achieves a harmonious balance between quality of life and economic growth, and between environmental/conservation concerns and social values. Working with the World Bank's City Partnership program, the Rockefeller 100 Resilient Cities initiative, the Organisation for Economic Co-operation and Development, the United Nations Sustainable Energy for All program, the United Nations Environment Programme and Australian Landcare International, Toyama City's aspiration is to introduce others to the Toyama City model and vision for a sustainable and resilient city of the future where human relationships and relationships with nature create self-sufficiency and long-term resilience in the context of a meaningful relationship with the land.

Moving the world towards sustainable practices will not be easy, but as Thoreau concludes in *Walden*:

I learned this at least from my experiment; that if one advances confidently in the direction of his dreams, and endeavours to live a life he has imagined, he will meet with a success unexpected in common hours (Thoreau 2004:313).

Importantly though, we will not be able to create practices that are genuinely sustainable for the quality of human life and for the land if we live merely as self-reliant *individuals*; we will create this vision of genuine sustainability for the quality of human life and land as a *community* of self-reliant individuals who share human-human and human-nature bonds.

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CHAPTER 10

How can landcare contribute to household development outcomes in Uganda?

Clinton Muller and Joy Tukahirwa

Abstract

The sustainable management of natural resources has been placed on the global development agenda as being equal in importance to poverty eradication. The interlinked nature of these global challenges is increasingly apparent, particularly in sub-Saharan Africa, where incidences of rural poverty are closely associated with degraded landscapes. Solutions for management of land degradation are viewed as requiring collective approaches through engagement of community at the grassroots, and actors within the landscape.

In Uganda, the Australian-inspired landcare approach has been adopted since 2001 as a means of empowering the community to manage natural resources through linking land management practices to livelihood outcomes. This chapter examines a study that investigated the effectiveness of the landcare approach in Uganda at the household level as a mechanism to contribute to food security and livelihood outcomes. A comparative assessment of households engaged and not engaged in landcare was undertaken to determine if there was a relationship to livelihood and food security indicators through landcare participation. The study found a higher performance of landcare member households against several defined indicators, suggesting that landcare has a positive contribution on these issues. Furthermore, the application of the landcare approach in enabling effective collective action was examined and discussed in the context of the sustainable adoption of positive land management practices. We conclude that the unique nature of landcare as a subsidiarity-oriented community model to empower local people to address landscape-scale degradation should be further considered as a development approach to address incidences of poverty and land degradation.

Introduction

The global development agenda

As the post-2015 development agenda shifts from the Millennium Development Goals to the Sustainable Development Goals, so too does the need to identify new approaches and pathways to progress the sustainability agenda, building on lessons achieved to date (Sachs 2012). Since 2000, the Millennium Development Goals have focused on reducing extreme poverty in developing countries. Poverty eradication remains one of the greatest global challenges today, and an indispensable requirement for the achievement of sustainable development (United Nations General Assembly 2014). However, some have argued that pursuing a post-2015 agenda focused only on poverty alleviation could undermine the development agenda's purpose and that there is a need to place equal priority on the protection of the Earth's life support system as there is on poverty reduction (Griggs et al. 2013).

It is widely recognised that the process of facilitating a sustainable trajectory of eradicating poverty while improving lives and livelihoods needs to also promote sustainable access to food, water and energy while protecting biodiversity and ecosystem services (Griggs et al. 2013). The nexus of issues of poverty, environmental degradation and food security prioritises the need to intensify and expand sustainable land management practices to create food secure communities, while reducing degradation of natural resources. Greater emphasis is being placed on the principle of subsidiarity that positions community at the forefront of landscape management and decision-making activities through approaches such as landcare (Catacutan et al. 2015).

The nexus between poverty and land degradation in Uganda

In the east African country of Uganda, despite significant progress in reducing monetary poverty at a very rapid rate, attributed in part to favourable market prices and weather (World Bank 2016), about one-third of all rural households live below the national rural poverty line (IFAD 2012). Agriculture is the main economic activity and the primary source of livelihood for most of the population, contributing 40% of gross domestic product, 85% of export earnings and 80% of employment (Government of Uganda 2004). A challenge that needs to be addressed to reverse the trend of increasing poverty is the relationship between low incomes in rural areas in Uganda and stagnation of agricultural production. A key constraint to achieving a vision of improved agricultural productivity in Uganda, as in many sub-Saharan Africa countries, is widescale land degradation (Birungi and Hassan 2010).

The combined impact of land degradation and poverty in sub-Saharan African countries like Uganda are forecast to continue to worsen unless sound intervention polices are implemented. Designing appropriate intervention policies and programs, however, requires an understanding of the factors that determine the adoption of land conservation practices (Birungi and Hassan 2010). This includes a thorough appreciation of the social and institutional environment in which policies to curb land degradation can be implemented, including among grassroots community groups. Appropriate design of these interventions could facilitate knowledge transfer, encourage cooperation and help to coordinate and monitor service delivery, in addition to improving farmer access to credit, markets and farm equipment, all of which are important for the adoption and diffusion of agricultural technologies among smallholder farmers (Nyangena 2005).

Landcare - an approach for consideration?

Landcare is one approach that has been adopted in some regions of Uganda that seeks to contribute to development outcomes through strengthened social capital to allow effective collective action for natural resource management (NRM) at a landscape scale. An Australian-inspired community empowerment approach, landcare is based on voluntary farmer groups and other committed people working collaboratively together at a local level to address common NRM issues (Campbell 2009). Landcare has demonstrated potential as a community strengthening approach in comparison to traditional processes of collective action, particularly given the content focus on resource management (Mowo et al. 2009). While landcare can be approached as an ethic that facilitates individuals and communities in approaching NRM from a holistic standpoint, the contribution of landcare to poverty alleviation at the household level warrants investigation.

Within eastern Africa, the landcare approach provides a platform for smallholder farmers to engage in integrated NRM as a means of empowering local rural communities (Tanui 2005). Mowo et al. (2009) have described the approach as being based on local voluntary groups working collectively and in partnership with local government units to foster better land management for improved livelihoods. This adaptation of the landcare approach emphasises multistakeholder partnerships with strong support from the local government to enable technological innovation and link better land management practices to livelihood and enterprise options. Tanui (2005) adds that through this approach, local communities are empowered to effectively manage land resources for sustainable production, income generation and food security.

Kapchorwa and District Landcare Chapter

In Uganda, landcare was first introduced in 2001 through the African Highlands Initiative ecoregional project, led by the World Agroforestry Centre. Based on knowledge transfer from the success of the approach in the Philippines, landcare was applied to address a myriad of complex and linked NRM and social issues in Kapchorwa District on the northern slopes of Mount Elgon. The issues were principally focused on:

- indiscriminate removal of vegetation
- excessive erosion from free grazing
- · encroachment and extraction from the protected forested areas
- · declining soil fertility
- gender inequality in labour and decision-making roles
- poor governance around NRM
- conflict with the displacement of the Indigenous people
- land abandonment in lowland areas from cattle rustling with population displacement in the highlands.

The combined effect of these challenges was nowhere more evident than in the management of excessive run-off and landslides, which destroyed crops, property, infrastructure and even took lives (Catacutan et al. 2015). The extent of the landscape degradation of the region prior to landcare is illustrated in Figure 10.1. This 2002 photograph of Kween District is characteristic of the region's landscape prior to the introduction of landcare. The Kapchorwa District Landcare Chapter (KADLACC) was formed as an Indigenous platform of smallholder groups, with a shared vision for integrated NRM.



Figure 10.1A characteristic treeless and exposed soil landscape in Kween District, 2002.
Photo: Simon Nygas

KADLACC has been successful in bringing together stakeholders, facilitating community action in soil and water conservation and championing local level innovations to bring about landscape-scale restoration. Based on the success of the outcomes from Kapchorwa, the landcare approach has been shared with other sites in Uganda including Masaka and Kabale, with the Uganda Landcare Network being formed in 2015 (Catacutan et al. 2015).

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The formation of KADLACC provided a unique Indigenous platform of smallholder groups with a shared vision of integrated NRM. The process of formation was convened through a participatory discussion of the challenges facing the district between the local community and other stakeholders across the Kapchorwa District. At the time, this included the administrative districts of Kween and Bukwo, which were separated in 2010 as part of a national decentralisation initiative of the government of Uganda to ensure more equitable distribution of resources (UBS 2012). Through the facilitated meeting, the community identified that the long-term solutions to the landscape challenges would only be realised through the adoption of a harmonised approach to livelihood and conservation efforts. By empowering the community in the decision-making process, under the auspices of the landscape to take ownership and accountability of individual actions under the

common vision for improving the natural resource base. This has included partnership creation and collaborations with stakeholders at a range of levels within the community, supporting training, cross learning and knowledge-sharing activities, while promoting an enabling policy environment for wider adoption of these activities within the district-level government (Catacutan et al. 2015; Barungi and Tukahirwa 2017).

An impact evaluation of the effectiveness of the landcare approach in Kapchorwa was undertaken by Mowo et al. (2009). This evaluation concluded that the rapid adoption of landscape remediation practices by landcarers was achieved through facilitated learning and community interest in improving livelihoods as well as their environment. Much of the success of landcare in Kapchorwa was attributed to the highly participatory and consultative process applied, which included:

- the selection and implementation of research and development activities
- partner engagement
- support services offered through a multidisciplinary team
- facilitation of farmer grassroots institutions and their linkages to district levels of governance
- the use of integrated approaches and holistic NRM.

Furthermore, the landcare approach has built the capacity of the local community to experiment with different technologies and share the outcomes of these interventions with their peers, facilitating the scalability of experimentation and adoption. In turn, this has improved cooperation in solving common resource issues and increased the access to information among smallholder farmers. The successes of these outcomes are noted among participating households, who have reported positive changes in food availability, and increased milk production and household incomes through engaging with landcare (Mowo et al. 2009).

Poverty measures, food security and livelihood indicators

Factors influencing food security and livelihoods

A range of factors affect food production and food security. These include the quality and quantity of agricultural land, biodiversity, pressure on water resources, pollution, resource depletion, climate change, the economic environment and market access. The common solution to such challenges is to increase agricultural production from the same area of land while reducing the negative environmental impacts. High population density also has a profound effect on food and livelihood security. When the human and livestock population at the village and district level rises beyond a sustainable level, it threatens food security, as food stores are depleted. Farmers without secure land tenure tend to also be food insecure, as they are unable to produce adequate food for themselves. On the other hand, the factors that affect food access are income level and food cost, as smallholders with low incomes are unable to purchase adequate food (Renzaho and Mellor 2010).

Ashraf et al. (2013) have identified several factors that affect livelihoods, including natural assets such as land and soil fertility, vulnerability to shocks and adverse trends such as overpopulation, environmental changes, political unrest, social conflict, climate change and education levels. Similarly, Singh et al. (2008) have adopted a global approach, identifying constraints in livelihood and food security as global warming, increasing human population, costly agro-inputs, ecosystem degradation, unequal distribution of produce and abiotic

stresses. Consideration is given to characteristics including education, with Anderson (2012) noting that people with a higher level of education were more likely to pursue off-farm activities to improve living standards, whereas uneducated labour is associated with subsistence farming. This tends to translate into lower levels of income for smallholders and difficulty in accessing credit, which can impact the adoption of improved management practices and technologies. Similar consideration is also given to attributes of land ownership and proximity to infrastructure and urban areas for participation in agricultural and non-agricultural activities (Winters et al. 2009). Additionally, effective collective action has a positive relationship with livelihood indicators, with a study by Abenakyo et al. (2007) finding that strengthening collective action is a powerful way to improve livelihood assets of smallholder farmers in Uganda.

Land resource degradation and development challenges in Uganda

In Uganda, there is a strong and clear link between the contributing factors to food insecurity and poor livelihoods with natural resources. High rates of poverty, fast-growing populations and insecure land tenure are exacerbating the issues of land degradation across the country. Subsequently, degraded land poses a threat to national and household food security and the overall welfare of rural populations (Lyamchai et al. 2007). This degradation includes significant soil loss, reduced soil fertility, decreased vegetative cover, declining water quality and increasing water scarcity (German 2006). With this reduced natural resource base, agricultural productivity is declining, leading to reduced income generating potential among landholders (Okoba and de Graaff 2005). This is particularly alarming, as the livelihoods of more than 80% of the rural population are dependent on natural resources. The combination of these factors is a key contributor to increased poverty and food insecurity within already vulnerable and skill-deficient communities (Pender et al. 2006).

In Uganda, land degradation is identified within the Agricultural Development Strategy and Investment Plan as one of the major constraints to increasing agricultural productivity and production, and subsequently a key impediment to addressing incidences of poverty (MAAIF 2010). About 85% of land degradation in the country is accounted for by soil erosion and nutrient depletion (NEMA 2001), with low land productivity resulting from soil erosion noted as one of the biggest challenges to improving the performance of the Ugandan agriculture sector (Barungi et al. 2013). The worst affected areas include the highlands of Kapchorwa, Bukwo, Kween and Mbale in Eastern Uganda, and Kabale and Kisoro in Western Uganda (Zake et al. 1999; Olson and Berry 2003).

Efforts in the past by development agencies and research partners to reverse the land management challenges plaguing communities have generally had limited impact (Farrington 1998). Evaluations of on-ground activities have found evidence of project success being confined to small pilot site areas and rarely translated into government-level policy or practice (Pender et al. 2006). The nature of such development programs and initiatives have been criticised as being overly prescriptive, and lacking inductive participatory approaches that engage communities in identifying development solutions (Burkey 1993; Schuurman 1993).

At a country scale, east African countries are undertaking progressive policy changes to encourage more demand-driven and market-oriented agricultural services (Friis-Hansen and Duveskog 2012). This includes a policy shift from centralised extension systems to decentralised demand-driven agricultural advisory systems (Anderson and Feder 2007). National extension programs, including the former National Agriculture Advisory and Development Services in Uganda, had begun to recognise the important role of farmer empowerment, public-private partnerships and local participation in providing extension services to facilitate agricultural growth (Friis-Hansen and Duveskog 2012). To be effective, these programs have in the past assumed that smallholder farmers are organised and capable of articulating informed demands to external service providers. However, experience indicates that without a deliberate empowerment effort, farmers are often subjected to manipulation by these external service providers, which results in limited access and outcomes from the extension services (Government of Uganda 2005). This emphasises the need for farmer empowerment as an important element in the development of demand-driven advisory services, enabling farmers to make their own decisions rather than blindly adopting recommendations from others (Friis-Hansen and Duveskog 2012).

Landcare as a mechanism for building local self-reliance

As a mechanism to facilitate the mobilisation and empowerment of grassroots rural institutions for integrated NRM, the adoption of the landcare approach in Uganda provides a pathway to build capacity through strengthening existing social capital. This provides a framework that facilitates action at the community level to address land degradation and promote agricultural growth.

The fundamental value of the landcare approach is the importance that is placed on engaging local actors to identify and take ownership of locally relevant solutions to address the challenges contributing to resource degradation across the landscape. Through strengthened social capital, collective action and enriched institutional arrangements, Landcare groups in Uganda have demonstrated evidence of sharing NRM information, diffusing technologies and the adoption of behavioural changes. To this extent, the landcare approach has provided an approach to establish networks and multisector partnerships to address both land management and livelihood objectives (Tanui 2005).

Contribution of landcare to household food security and livelihoods

Muller (2015) undertook a study in the Eastern Uganda districts of Kapchorwa and Kween on the northern slopes of Mount Elgon to test whether the landcare approach benefited participating household members in terms of food security and livelihood improvements. Benefits to the household were assessed based on measures of food security and livelihood through a comparative analysis between member households that did or did not practise landcare. The effectiveness of landcare as an approach in improving food security and livelihood outcomes was examined in the context of the effectiveness of collective action strengthened through the approach.

The communities of the Kapchorwa (population 109,300) and Kween (population 98,900) districts belong to two major ethnic groups: the Bagisu and the Sebei. Livelihoods of the Sebei are predominantly pastoral, with the Bagisu heavily dependent on growing crops including coffee, bananas, beans, maize, wheat and potatoes. The region is characterised by fertile volcanic soils and an abundant rainfall, with an annual mean rainfall range of 1,500–2,000 mm. The Mount Elgon region is susceptible to natural disasters, including floods, landslides, drought and famine, with recent studies indicating that climate change is expected to result in an increase in disasters (Nakakaawa et al. 2015).

A random sample of 168 households was selected across Kapchorwa and Kween districts. The sample included 55 households who were members of a Landcare group and 113 non-Landcare members (Figure 10.2). The non-Landcare households belonged to other collective action groups, including self-help, financial (savings group), industry (dairy group), women's and marketing groups. All households surveyed had an affiliation with either a Landcare group or a collective action group of some nature. Of the total households surveyed, 21% were a member of a Landcare group (Figure 10.3). Households from Kapchorwa comprised 54% of those surveyed, while 46% were from Kween.



Figure 10.2 Location of Landcare and non-Landcare households surveyed in Kapchorwa and Kween districts



Figure 10.3 Total group membership breakdown of households surveyed

Key research findings

Across most indicators examined through the study, households that belonged to a Landcare group performed better than households who did not. This was particularly evident among measures of assets and infrastructure, as well as proportion of off-farm income and a number of land management issues. This finding was supported by qualitative data collected as part of focus group discussions, which concluded a greater diversity of group self-help activities and vision complexity among Landcare groups.

The findings of several statistical analyses concluded that Landcare member households were more food secure than non-Landcare member households. This was based on household assets, farm assets and livestock, which were significant variables for food security and scored consistently higher among Landcare group member households. A positive correlation was also observed through an assessment of livelihood variables, which concluded there was a significant influence on livelihoods based on the strong performance of Landcare member households in the variable indicators of education, land ownership, household asset ownership and farm assets.

Landcare member households were more food secure than non-Landcare member households.

To further understand these results, the effectiveness of landcare as an approach for improving food security and livelihood outcomes was examined through a comparative analysis and thematic clustering of group vision and activities based on data from 12 focus group interviews (six Landcare groups and six non-Landcare groups).

Group activities

Activities Landcare groups were engaged in (Figure 10.4) have a fixed focus on landscape management, with all groups undertaking some form of revegetation (for example, tree planting, fodder shrub planting) or soil conservation works (for example, construction of erosion bunds, planting grass for soil stabilisation). None of the non-Landcare groups were undertaking environmental works, but rather focusing predominately on savings and loans, and agricultural practices and production. Overall, Landcare groups were undertaking a wider range of activities, with groups participating in an average of 5.5 activities. Non-Landcare groups had a more limited focus, with only 2.5 activities per group on average.



Figure 10.4 Group activities undertaken by Landcare and non-Landcare groups

Group networks

Interviewed groups were asked to identify external partners that they work with. While no group offered an exhaustive and complete list, the responses provided an indication of the priority partners viewed by the group. These partners were linked through a simplified social network analysis (Figure 10.5). This analysis identified that 75% of the groups interviewed identified Landcare as a partner through either the KADLACC or the Landcare member group Tuban Organic Farmers Association, who provide soft skill development and technical training on soil conservation within the districts. A much richer and diverse stakeholder engagement was observed among the Landcare groups, with two non-Landcare groups indicating they did not partner with any external stakeholder or group.



Figure 10.5 Simplified social network analysis of group partners

Notes: KADLACC: Kapchorwa District Landcare Chapter. TOFA: Tuban Organic Farmers Association. NAADS: National (Uganda) Agricultural Advisory Services. AT Uganda: Appropriate Technology Uganda. IUCN: International Union for Conservation of Nature. ICRAF: International Centre for Research in Agroforestry (World Agroforestry Centre).

Group vision

Visions of non-Landcare and Landcare groups identified through the study showed that all the non-Landcare groups expressed visions related to production, livelihoods and/or finances (Figure 10.6). While these visions were also shared by Landcare groups, the focus of the Landcare groups' visions were on improving agricultural and business production as well as restoration of the natural environment. There were two outlying visions among Landcare groups noted in the Other category. These included increased respect in the community and reduced population.

The main difference observed between the non-Landcare and Landcare group visions was the clarity within the group visions. The Landcare groups' visions were specific and measurable (for example, 'purchasing equipment for value addition of coffee production'). In the non-Landcare groups, the visions were more generic and unclear (for example, 'access to more information, technologies and services'). By focusing on improvements in agriculture and business activities, Landcare groups had a clearer understanding of the activities necessary to support their vision, correlating with the results in Figure 10.4. Furthermore, the Landcare groups' visions included both long-term and short-term objectives, in comparison to only half of the non-Landcare groups who did not qualify their vision from a temporal perspective.





Conclusion

This chapter has articulated the contribution of the landcare approach to food security and livelihoods in Uganda as a measure of contribution to poverty alleviation. A key driver for poverty, as well as a barrier to improved rural development, is identified as the continued degradation of the natural environment and resource base on which smallholder farmers depend. The evidence of the convergence of these issues has been clearly demonstrated for Uganda, and in particular, the focus sites of the study in Kapchorwa and Kween districts.

In light of failures of development efforts to address land degradation and alleviate poverty in rural areas, landcare as a systematic community empowerment approach to landscape management needs to be considered. The findings from Muller's study (2015) found there was a difference in the contribution of factors between Landcare group members and non-Landcare group members in influencing household level food security and livelihoods. Muller concluded that Landcare member households performed better than non-Landcare member households in the identified variables, supporting the claim that landcare in Uganda can contribute to improved food security and livelihood outcomes at the household scale.

Consideration of the contribution of landcare to the household development needs of rural communities raises scope for future consideration of the potential of landcare. As an approach, Landcare could contribute to the development agenda, especially given the unique crossover between landscape restoration and poverty alleviation through community empowerment. This is particularly relevant when exploring the potential to adopt and embed landcare principles into existing institutional arrangements at the grassroots.

The transaction costs of landcare in comparison to other approaches warrants further examination. It has been argued that when social capital is strong, communities are able to provide more cost-effective solutions than either governments or markets. This is particularly pertinent to Landcare for the protection of common resources necessary for the livelihoods of rural households. Subsequently, an analysis of the cost effectiveness of investing in strengthening social capital for effective collective action in lieu of government or market responses would add further value to the efficacy of the landcare approach.

As the global development agenda explores opportunities to address the nexus of issues between land degradation and incidences of poverty, the landcare approach and demonstrated experiences from Uganda bring a compelling argument to the table. Landcare is a unique model in that it facilitates effective collective action through empowering community to be at the forefront of landscape-scale planning and action implementation. While focused on a bottom-up participatory approach, landcare recognises the importance of multistakeholder partnerships to support the vision of community through enabling conducive policy environments and accessing necessary skills and technical capacity. Through creation of an environmental ethic to protect the common natural resources that the rural poor depend on, the landcare approach can benefit household livelihoods and positively influence food security. Subsequently, the adoption of a landcare approach that creates community ownership of natural resource challenges, to benefit that community at the household level, demands further consideration as a development approach to address incidences of the linked nature of poverty and landscape degradation.

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CHAPTER 11

Landcare as a method of cultivating a sense of richness in life: the keys for encouraging individual capacity

Tomomi Maekawa

Abstract

What are the keys for encouraging people to be engaged in landcare? In this chapter, as a Japanese scholar interested in landcare issues, I describe landcare as a method of cultivating the sense of richness in the lives of people who are engaged in it in various styles. Looking back on my days spent in Australia some years ago, through sharing the stories of people I met, I identify three factors that encourage individuals to exercise their own landcare capacity:

- · organising things with a joyful mind
- helping each other in neighbourhoods
- being open and generous to others.

These key factors are consistent with the principle of subsidiarity envisaged in this book.

Introduction

After spending time as a Japanese scholar experiencing landcare in Australia, I especially remember the relaxing and joyful time that I had with many warm people who provided me with a lot of valuable suggestions for my research and life. I lived in Albury while carrying out my field research on Landcare groups, and was based at the Charles Sturt University Institute for Land, Water and Society. The focus of my research was describing how landcare worked in Australia as a social system and looking at what Japan could learn from this. This chapter is based on the research and ideas explored in Maekawa, Seigel and Kuwako (2016), Maekawa and Aron (2016), Maekawa (2016) and Seigel (2010, 2012).

The trigger for the start of my life in Albury was brought by an encounter with Professor Michael Seigel in April 2012 when I was a PhD candidate. At that time, Michael had been introducing the concept of landcare in Australia through his papers written in Japanese. These papers showed the example of one Landcare group and the ideas of the landcare concept. Through meeting and listening to him, my interest in Landcare grew, and gradually I hoped to know firsthand what landcare was. With Michael's advice and support, I decided on a one-year stay in Australia by myself. During my time in Australia, I was fortunate to get many chances to meet and talk with people who were engaged in landcare in various ways. Some were members or staff members of local Landcare groups or networks, and some were temporary volunteers at the activities hosted by the Landcare groups or networks.

People I met shared stories with me of their days in landcare. When I hoped to visit groups or networks to carry out the interviews, people helped me by introducing me to their fellows or by providing transport to activities, offices or members' homes. I was glad to be able to have extensive time to talk with them on the long journeys in their cars. The stories, which were full of encouraging words, and their humanity have remained with me, although it is already over eight years since I was in Australia.

Things in Australia might have changed, particularly in the wake of the COVID-19 pandemic and its consequent social and economic impacts. However, I believe that it is valuable to focus on the fundamental attitudes of the people who were engaged in landcare. This will help future research on community design, which includes searching for the methodology for better communication among people with differing perspectives and values.

Purpose and methodology

In other publications, I have described three characteristic elements of landcare as a social system:

- establishing a system and a spirit of multiparty partnership
- securing human resources that, with flexibility to adjust to each locale, act as coordinators supporting local groups
- maintaining a holistic support system from governments who respect the autonomy of local groups.

These, however, must not be the only reasons that landcare has spread across Australia as a movement and attracted many people. This is because landcare activities are originally and continuously voluntary and autonomous, based on the will of the individual.

In this chapter, through describing the fundamental attitudes of people involved in landcare from the stories provided by the people I met and from my participation in landcare activities, I will show that landcare is not just a natural resource management approach that provides efficiency in caring for the extensive land of Australia, it also holds the key for cultivating richness in the lives of people.

Organising things with a joyful mind

The first fundamental attitude of landcare is that these groups and networks have a culture of organising their activities to be joyful for people who join them as volunteers or visitors. This gives the group members rewards for their work. This fundamental attitude can be seen in landcare activities such as assisting with field learning for students or a tree-planting tour for revegetation in rural areas.

Assisting field learning for schoolchildren

At a nature park in a suburb of Melbourne, a 'Friends of' group organised and carried out field learning on the environment for local schoolchildren. I visited this park before this event and enjoyed watching beautiful birds while thinking how wonderful it would be if Tokyo had such an expansive nature park in the middle of the city. Later, this experience helped me see many little seasonal birds in trees, even at a nature park near my home.

The field learning at the park was organised and carried out through the collaboration of several different community groups and organisations. The content was rich in the variety of what the schoolchildren could learn from the local specialists. There were four activities:

- counting the number and the species of insects
- tree planting
- · playing with some of the traditional tools of Aboriginal culture
- attending lectures about the living creatures in the water from rangers, with water watch instructions and analysis of the water bugs of the wetland.

The schoolchildren learned about biodiversity in the nature park, and about the existence and work of the community group and the volunteers who care for the park.

The local volunteers enjoyed assisting the schoolchildren with tree planting, teaching them how to use the tools and to treat the seedlings, and with analysing water bugs using magnifying glasses and tweezers. The volunteers were mainly retired local people. Some of them told me that they were happy to be volunteers and to contribute to helping others. Being a part of such a voluntary group and its activity seemed to make them feel connected with others, such as with fellow volunteers, with the staff members of environment-related organisations, and with the schoolchildren. They did not have to feel isolated in societies or communities, even after they had retired from their workplaces.

A tree planting tour for revegetation

In a farming area in western Victoria, a Landcare network hosted an annual two-night camping event for tree planting on local farms, wetlands and other properties. This event was part of a project of making biolinks (wildlife corridors) in this area. It had achieved the planting of over 1 million seedlings from 1997 to 2013. By hosting the camping event, the Landcare network expanded the biolinks, and at the same time, formed connections among the participants of the event and between the participants and the environment.

The volunteers came from the city or the suburbs of Melbourne. On the first day, we travelled by bus from Melbourne to the lodge where we would stay. Unfortunately, it was rainy weather during the day time, especially on the second day, so we sometimes had to stop planting and rest under the trees. Despite this, about 200 participants successfully planted around 14,000 seedlings in the target areas.

What we enjoyed was not only simply planting trees, but also the communication with the other participants in the field. Some of the women told me that they had participated in this event every year for over 10 years. Some had met at this event for the first time and had become friends. This event was where they met to chat about their common interests, such as bushwalking and gardening. One man had retired from his workplace in Melbourne and had come along for over 10 years as well. He told me that he liked working in the field under the beautiful sky and the sunshine. He looked very happy talking with others while planting trees and over cups of tea during the event.

Tree planting was not the only activity. There were also many ideas to help the participants from the city enjoy the time and the local environment. In the evening, when we came back to the lodge from the fields after the hard work of planting, our tired faces turned happy with the wonderful barbecues and the campfire and country music under the canopy of thousands of stars. We enjoyed the talks by the local farmers and rangers, and wildlife watch tours behind the campsite. It was a warm and joyful time, even though it was winter. I remember hearing the guitar when I woke up at midnight from stiff legs and arms.

Helping each other in neighbourhoods

The second fundamental attitude of landcare is helping each other in neighbourhoods. When a Landcare group is launched and the group starts planning its activity, its members are motivated by helping their neighbours in the local community, and by overcoming the challenge they are facing. This fundamental attitude can be seen in the shared stories, such as a bushfire recovery project and a series of activities by a Landcare group to overcome serious soil erosion.

A bushfire recovery project

In a hilly area of Victoria, a Landcare network had been carrying out a bushfire recovery project since 2009. This was a project aimed at rebuilding and rehabilitating the local environment on the private properties that had been damaged in the Black Saturday bushfire, by supporting the landholders and local communities in this area. After the bushfire, the members of the network recognised that what was needed was recovery, support and direction to assist landholders. With the support of the Catchment Management Authority and the Australian Government, they started the project. They got voluntary support from private companies, the public sector, schools and other organisations in various ways. These investors supported in-field activities such as planting trees, building nest boxes for wild birds and animals, and supplying seedlings for plantings.

A wide range of activities were carried out as part of this project, such as assessments of burnt and non-burnt resources, seed collecting, revegetation and fencing. However, when I visited and talked with the members of this network, they told me that what they were carrying out through their Landcare network was simply helping each other. I realised that the required connectedness was built through being a member or a staff member of a Landcare group, and this tie among the local people worked effectively, especially when the risk of natural disasters appears.

Overcoming soil erosion in rural farming

In the foothills of the Great Dividing Range in north-east Victoria, there was a Landcare group that had connections to local farmers since its inception in 1988. The Landcare group, composed of local farmers, was formed to tackle the problem of land degradation and other issues that were common in this area. Since its establishment, the group had

played an essential role of connecting the farmers to each other, and this became the basis for dealing with the shared problems. However, connecting the local farmers to each other is not an easy task in a rural farming area in Australia. Because of the expansive land of this continent, the farmers didn't have the time or the chance in their busy days across vast properties to meet at one place in ways that enabled them to talk and share information about their worries and hopes, and what they should do.

In this group, the key that enabled them to overcome this difficulty (caused by the huge physical distance among the local farmers) was the effort of the facilitator of this group. At that time, because Landcare itself had not been well known, the facilitator had to visit each house and explain what Landcare was and what the benefits were of establishing a group with other local people for dealing with the local environmental issues. This dedicated work by the facilitator encouraged the farmers to start a Landcare group. Since the establishment of the group, almost all the local farmers in this area became members.

They got together, discussed the issues they were facing in their area, planned and carried out their activities. They helped each other, with consultation and encouragement from the staff members of the Soil Conservation Authority. Being a member of the group gave the local farmers the opportunity to share their time, labour force, ideas and ideals. This resulted in completion of various activities for improving the health of the soil and the landscape of the area.

Soon after the group was established, they started activities aimed at improving the soil health in each property, by doing things such as implementing a method called 'whole-farm planning', in cooperation with each other. They gradually, however, came to plan and act, not simply in each property, but also in other places of this area, thinking of the whole community. When I visited the harvest festival organised by this group at a community hall, I saw that many families, including small children and elderly people, were enjoying their time with family and friends in a beautiful landscape.

In a rural farming area of Australia, the existence of a Landcare group and its activities were precious opportunities for local people to get together and enhance their social connectedness by spending joyful time with others. The harvest festival showed the fondness of the group members for their local environment and for the community, far beyond the boundary of private properties.

Being open and generous to others

The third fundamental attitude of landcare is being open and generous to others. This is illustrated by a story from a staff member of a Landcare network in the southern coastal area of Victoria. When I visited this network to see how it supported local groups, I got not only a detailed understanding of their network but the opportunity to meet some members of groups and join a field event hosted in the area. All this was done with the help of transportation and accommodation at a network staff member's home. She talked to me about the area where she lived, which has a beautiful coastal landscape. She also talked about her own experience in Landcare, which showed me the importance of the existence of a Landcare group.

Because of the beautiful beach and the tourist-friendly facilities, the area is very popular with Melbourne residents who spend their time there during the holiday season. However, this means that there are houses that are empty for most of the year, except during the summer holiday season.

I didn't realise this was a problem until the staff member told me about her own experience. When she moved to this area with her family, the street they live in had about 20 houses. Her house, however, was the only one occupied all year around. She told me that Landcare creates an opportunity for the local people to come together, talk with others and join in with the local community. In this region, there were fewer churches than before, and these used to be places that provided these opportunities for local people. Considering this situation, the existence of a Landcare group and the network in this area not only provides an improved environment or farming-related situation, it also creates social connectedness among the local people, not just the farmers and environmental activists.

As I talked with her, I realised that the essential fundamental attitude of Landcare networks is openness and generosity to others, not only to members but also to non-members – even someone like me, an outsider from overseas. Through all of my visits to the Landcare groups and networks, I became convinced that the generosity of the members of the network and groups enables them to cooperate with one another when they face challenges that need to be overcome.

Encouraging individual capacity by growing local connections

Creating invisible and unique value

The stories described above suggest the range of benefits that landcare activities have brought to people, beyond the visible outcomes such as positive change in the landscape of Australia. These come from the links between the individuals, and between the individual and the local community. The three fundamental attitudes in landcare can be thought of as the key elements representing the social welfare that landcare creates or promotes. This leads me to think that landcare has contributed to cultivating the sense of richness in life for the people who participate in it.

Looking at these stories, we can see that people have a chance to exercise their own capacity, not only during emergencies such as natural disasters, but also in their daily lives. Landcare encourages people to take positive actions through their connections with others, especially when they are in a physically or mentally difficult situation (for example, when they were remote from city conveniences, or from their families or from workplaces after retiring).

A farmer's life-changing story

One story that shows how landcare cultivates the sense of richness in life is about a woman who was both a farmer and a member of a Landcare group. She was a member of the Landcare group mentioned in the 'Overcoming soil erosion in rural farming' section above. The Landcare group she belonged to had carried out many local activities to overcome the issues caused by land degradation. When I visited her property, I could not see any remnant of the past degradation issues. However, she told me that there used to be a lot of land degradation and scarring from soil erosion before she started working with the other farmer members of the group. To illustrate the impact, she showed me pictures of the gradual visual changes of her property.

What she emphasised was that her life changed after she joined Landcare. By bringing local farmers together and working at a landscape level, they had changed the brown land

into a beautiful green land. She said that she had rarely had opportunities to learn how to improve the soil health and the productivity of the property, because she lived on a farm remote from the township for many years.

Landcare encouraged her to increase her capacity – her hope to learn and practise new knowledge became a reality through forming a local group with other farmers and working together. She realised her will and capacity through learning methods and practising them in the field to overcome the challenges that she and other farmers had been facing.

She said that through being active as a member of a Landcare group, she took roles in the activities of the group, such as project management, communication, planning, reporting, and editing and publishing the outcomes of their group to share them with others who were facing similar challenges. By creating social connectedness in local communities, Landcare groups function as a trigger that promotes individual capacity to be both exercised and shared with others.

By creating social connectedness in local communities, Landcare groups function as a trigger that promotes individual capacity to be both exercised and shared with others.

Conclusion

Concerning the 'sense of richness in life', there must be various criteria for explaining or evaluating it. The stories in this chapter suggest ideas for enlightening the value of what landcare creates through linking people – an idea which may be hard to visualise and not suited for standardisation.

Through visiting and talking with people engaged in landcare, I recognised the idea of the 'sense of richness in life' as the delight that is brought by local connectedness, especially when we experience difficult situations in our lives. The suggested key foundation attitudes of people in landcare – organising things with a joyful mind, helping each other in neighbourhoods and being open and generous to others – can give you a hint for how to understand and exercise the concept of the 'richness in life'.

Acknowledgements

The field research carried out in Australia was greatly supported by Charles Sturt University Institute for Land, Water and Society, Mr Rob Youl (then Chair of Australian Landcare International) and the late Professor Michael Seigel at Nanzan University. In addition, the research could not be realised without the help of many people in the landcare field. I sincerely appreciate everyone who kindly provided me with support or help in Australia, especially those people who made time to carry out the interviews and to let me participate in their group activities.

The stories in this chapter are based on field research carried out from June 2013 to May 2014.

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CHAPTER 12

Landcare: integrating agricultural extension with natural resource management

Jayne Curnow

Abstract

The flux inherent in agricultural extension continually provides novel opportunities for innovation. Entry points are through:

- the introduction of new technologies and agricultural practices the what of agricultural extension
- methods such as technology transfer or participatory approaches via different modes of delivery by public and/or private providers – the how of agricultural extension.

While constantly evolving, the refrain of low adoption is an enduring theme in the discourse and practice of agricultural extension. Despite the 'obvious' benefit to the farmer, the extension field is littered with the seeds of great ideas that did not grow. In the southern Philippines, a group of researchers, staff at government and non-government agencies and farmers have been trialling the delivery of agricultural extension based on landcare principles augmented with an assets-based community development method of engagement. The Livelihood Improvement through Facilitated Extension approach breathes new life into both the 'what' and 'how' of agricultural extension to deliver cost-effective extension driven by local communities that benefits people and the environment.

Introduction

Landcare exists in at least 25 countries around the globe, emerging largely without any systematic strategy to gain a global footprint. It operates in Australia, Indonesia, the Philippines, Japan, Pakistan, India, Sri Lanka, South Africa, Uganda, Tanzania, Kenya, Malawi, Botswana, Namibia, Zimbabwe, Ethiopia, Rwanda, Spain, Germany, Iceland, Canada, the United States, New Zealand, Fiji and Tonga. In two countries - Australia and South Africa - landcare has been incorporated into government policy and programs to deliver conditional grants framed within national, state and provincial priorities. In both countries, landcare has provided a platform for exchanging information, knowledge, technologies, skills and experiences among farmer peers and a wide range of stakeholders. This makes it relevant and worthy of analysis as a form of agricultural extension. Landcare also continues to be part of the South African Government's efforts to manage natural resources, increase agricultural productivity and provide employment (see Francis Steyn in Chapter 13). Australian Government policy commitments peaked during the Decade of Landcare in the 1990s, after which resources were redirected to other approaches, primarily regional natural resource management (NRM) bodies in all states and territories. At the state level, interest appears to be resurfacing in South Australia, with the enactment of the Landscape South Australia Act 2019 establishing eight landscape regions with emergent details on management, and grants mirroring many aspects of Landcare.

A key strength of landcare is that it is not rigidly structured, nor is it rules based. As such, it can arguably be adapted at any scale. Landcare concepts are equally applicable as government policy and a clarion call for community-led action. Scholars and practitioners debate where the margins lie and what can or cannot be considered landcare (Lockie 2014). Attempts to define exactly what landcare is and is not invariably lead to cordial, productive debate that commonly results in the agreement that it is a difficult exercise. I have been party to a number of these fascinating discussions seeking to define landcare, to distil an essence from the policies, principles, practices, ethics and grassroots and community movement monikers that are attached to landcare. While this makes for good conversation, and at times a lively intellectual debate, the key point is that landcare is successful precisely because its tenets are broadly applicable and readily translated into actions to address local requirements and diverse issues of concern, ranging from commodity, community and/or conservation interests.

What appears most fruitful is to consider landcare as adhering to a suite of broad principles. The *Australian Framework for Landcare* (Australian Landcare Council Secretariat 2009) lists six principles that suggest that landcare:

- · delivers self-determination
- is inclusive and collaborative (encourages working in partnerships)
- is apolitical (might have multipartisan support)
- is flexible, adaptable and innovative
- · is responsive to different needs and cultures
- is based on a clarity of purpose.

In a different but not incompatible register, South African Landcare (Prior 2012:18–19) identifies six more detailed principles that seek:

- integrated sustainable NRM addressing the primary causes of natural resource decline
- community-based and led NRM within a participatory framework

- the development of sustainable livelihoods for individuals, groups and communities utilising empowerment strategies
- government, community and individual capacity building through targeted training, education and support mechanisms
- the development of active and true partnerships between governments, Landcare groups and communities, non-government organisations and industry
- the blending of appropriate upper-level policy processes with bottom-up feedback mechanisms to give voice to local communities.

Further, many instances of NRM or sustainable land use can be considered landcare even if they are not labelled as such. In Chapter 9, Joseph Runzo-Inada looks at the parallels between landcare and the resilience strategy of Toyama, Japan, which seeks to integrate rural and urban spaces with locally driven sustainable NRM 'to nourish its citizen's connection to the land and to agriculture'. Rather than rigidly demarcating what is or is not landcare, a focus on adherence or contribution to landcare principles has been a positive self-identification approach (Prior and von Maltitz 2004; Johnson and Muller 2020).

For both the Australian and South African governments, restoration of denuded landscapes and NRM has been a priority. The emergence of landcare in the Philippines was also based on NRM issues but was promulgated by the efforts of an international non-government organisation and self-organised farmer groups. Philippines landcare is subsidiarity in action; it is locally based and action-oriented, and it draws authority and legitimacy from its membership. More recently, landcare in the Philippines has been leveraged as a form of agricultural extension that incorporates NRM. Through an examination of landcare in the Philippines, I outline the many ways that Landcare can not only deliver modern agricultural extension, but can do so in a way that addresses NRM and the complex interactions of biophysical and social forces. Agricultural extension that draws on the principles and practices of landcare can contribute to the positioning of people at the centre of agricultural extension, mitigating strong tendencies towards a focus on technology transfer that frequently struggles to gain widespread adoption.

Philippines landcare is subsidiarity in action; it is locally based and action-oriented, and it draws authority and legitimacy from its membership.

Agricultural extension

Agricultural extension in most countries is now delivered by a range of service providers across the public and private sector. From a global perspective, extension is increasingly pluralistic, with public, non-government and private sector players (Davis et al. 2020). Common among providers of extension services is the challenge of low rates of adoption and limited uptake of new technologies. The predominant, linear 'research knowledge to farmer technology' transfer approach is failing to improve agricultural development in the 21st century (Tropical Agricultural Platform 2016). Davis et al. (2020) make a number of policy recommendations, including the need to make extension more demand-driven and to reduce top-down approaches to sharing information. These contemporary insights add

a refreshing perspective to the large body of literature that frames the limited efficacy and impact of extension as an issue of farmer behaviours, perceptions and decision-making processes. What is still uncommon is a focus on issues to do with the extension provider's assumptions, motivations and modes of delivery within the broader social and political position of farmers.

One of the hallmarks of best practice in extension has been to approach technological challenges or opportunities within the context of farming systems (Kernot, personal communication, 2019). A focus on agricultural systems emphasises the interconnectedness of the biophysical environment with an understanding of the trade-offs and knock-on effects of interventions on the agriecological ecosystem at nested scales. The biophysical focus has often been complemented with economic insights, but most frequently, there been little attention to how extension fits into the social, gendered and political context of the farmer and the agricultural enterprise. To address this dearth of understanding, a humanising of agricultural extension is proposed (Cook, Satizabal and Curnow 2021). The humanising proposition aims to meaningfully orient extension towards female and male farmers by bringing the dynamics of power, place and people into the frame along with technical innovations.

Landcare and agricultural extension in the Philippines

Landcare is one pathway to a more humanised form of extension that empowers farmers by starting with their lived realities and valuing their expertise and their deep knowledge of their environment. This is exemplified by the practices of landcare as extension in the southern Philippines. In the early 1990s, the International Centre for Research in Agroforestry (ICRAF) undertook a program to address soil erosion in Claveria on Mindanao Island. At the time, there were limited personnel and resources to deliver government agricultural extension services, so ICRAF brought together local actors, including farmers, researchers and government staff, to use and adapt contour hedgerows and natural vegetation strips to conserve soil (Johnson and Muller 2020). Farmers quickly began to organise themselves to pass on these techniques. By the turn of the century, these groups had formed the Claveria Landcare Association, connecting more than 200 groups.

Landcare is one pathway to a more humanised form of extension that empowers farmers by starting with their lived realities and valuing their expertise and their deep knowledge of their environment.

In the late 1990s, ACIAR commissioned a study into the success of the approach in the Philippines and found that it delivered strong positive impacts both in terms of conservation and building farmers' social capital (Vock 2012). Based on this evidence, ACIAR funded an action-research project that commenced in 2003 to trial agricultural extension based on the principles of landcare more widely across Mindanao, including in zones vulnerable to conflict. The Australian–Philippines research team partnered with the Landcare Foundation of the Philippines, which had commenced operations in the same year. The positive impact of the work prompted ACIAR to commission subsequent projects and this has delivered a pipeline of research-for-development funding for more than 20 years. The Philippines Government has been an active partner from the most local level (*barangay*) through to the national level, through the Philippines Council for Agriculture, Aquatic and Natural Resources and Development (PCAARRD).

In the most recent project (ACIAR n.d.), the principles of landcare have been operationalised with the methods of assets-based community development to further integrate a focus on farmer livelihoods in agricultural extension. This has resulted in the Livelihood Improvement through Facilitated Extension (LIFE) model. LIFE has been designed, tested, revised and retested and is now being rolled out in multiple sites across Mindanao. PCAARRD and the Landcare Foundation of the Philippines lead the scaling of the LIFE model, and members of the ACIAR-commissioned research team provide an on-demand support role in the shift from research-for-development to government-led implementation and integration into policy and services.

Why has the Landcare/LIFE approach to agricultural extension and NRM gained traction in the Mindanao context of communities vulnerable to conflict? The significant investment of time and resources in research-for-development cannot be ignored; however, landcare has also been hugely successful on Bohol Island in the Philippines without this scale of investment (Campbell 2018). I suggest that adherence to the principles of landcare has been the major factor in delivering agricultural extension on Mindanao with such enviable results and impacts. Revisiting the principles of landcare as articulated in South Africa, the LIFE model delivers through:

- Integrated sustainable NRM addressing primary causes of natural resource decline. The genesis of this approach was addressing soil erosion, which had been achieved within the context of different farming systems. NRM issues continue to be a touchstone around which LIFE is deployed. In the South Cotabato region of Mindanao, 92% of members from the participating farmer groups (Saravia and Assumption) were involved in generating income from charcoal production, which contributes to deforestation. After participating in LIFE, 46% of farmers reported that they had completely stopped making charcoal to solely focus on vegetable production as an alternative livelihood.
- **Community-based and led NRM within a participatory framework.** Soon after ICRAF introduced hedgerows, natural vegetation strips and soil conservation techniques, farmers took over and drove a process of extension through organising groups to disseminate the information. In this instance, community participation preceded the organising of participatory framing. Local communities rally around an issue of shared interest, which often leads to other positive outcomes. For example, the Ipil Municipal Environment and Natural Resource Office in Zamboanga Sibugay province is partnering with the Katipunan Vegetable Agar-agar Growers Association to implement a program related to the declaration of the turtle protection and sanctuary areas. This well regarded and active growers association will encourage community awareness of and compliance to sanctuary protocols.
- Development of sustainable livelihoods for individuals, groups and communities utilising empowerment strategies. The focus of increasing production and improving NRM was always conceived as being in the service of improving wellbeing and food security in locations that are varyingly remote and impacted by the conflict on Mindanao. Social organisation, trust and cohesion were positively impacted as farmers from different religious faiths found common ground. The Magdaup Vegetable Growers

Association (in Ipil, Zamboanga Sibugay) formed through the LIFE project comprises predominantly women members of different faiths and cultural backgrounds. The group is based in an area of historical violent armed conflict. Through joint activities, such as farmer field schools, the relationship among the association's members has vastly improved. Previously there was a lack of trust, but members are now keen to help each other. These farmers now visit each other's farms, and significantly, the women encourage involvement in activities that promote cooperation and peace (Beza, Johnson and Fuentes 2018).

- Government, community and individual capacity building through targeted training, education and support mechanisms. Landcare/LIFE is communicated through local individuals who are trained as community facilitators. In a significant shift away from top-down technology transfer, the co-creation and sharing of knowledge is emphasised (Carr 1995). The LIFE manual, developed through a co-creation process, includes modules on engaging farmers and institutional partners, including multiple tiers of government as well as the application of the model following disasters with insights from managing the COVID-19 pandemic.
- Development of active and true partnerships between governments, Landcare groups and communities, non-government organisations and industry. 'Seeing is believing' is a mantra of Landcare/LIFE. This involves facilitating a range of meetings and workshops and travelling to different sites. These opportunities for interaction are where representatives from all these groups can instigate, affirm or expand productive partnerships. As outlined below, the PCAARRD-led PULL (PCAARRD-UP Mindanao-Landcare LIFE) program exemplifies genuine, active partnership building.
- Blending appropriate upper-level policy processes with bottom-up feedback mechanisms to give voice to local communities. At trial sites, Landcare/LIFE continues independently of the ACIAR-commissioned research, providing an opportunity for those who formulate and implement policy to visit sites and hear directly from these communities. This has seen Landcare/LIFE incorporated into *barangay* (village/ district), municipal and provincial development plans and annual investment plans. This is exemplified in the active collaborations between the Olo-clofe B'laan Landcare Association, the *barangay* council and the city agricultural office described by Mary Johnson and Evy Elago-Carusos in Chapter 17.

This principle of blending policy processes with bottom-up feedback mechanisms dovetails neatly with the implementation of the principle of subsidiary, defined earlier in this book as the making of decisions at the most appropriate scale to effect positive outcomes for society. With the LIFE model, a great deal of decision-making power is vested in farmers and farmer organisations, which then feeds up to the *barangay* level. PCAARRD has heeded the messages from the communities and invested in the 'Enhancing livelihoods in conflict-vulnerable areas in Mindanao through the LIFE model' program, also known as the PULL program (University of the Philippines, Mindanao n.d.), on the pathway to informing national policy and programs. Of significance is the breadth of partnering agencies involved in this activity:

- four barangays (Magdaup, Canahay, Talisawa and Tomicor)
- four municipalities (Surallah, Ipil, Datu Abdullah Sangki and Ampatuan)
- Department of Agriculture Region XII (regions are an administrative unit and Region XII includes four provinces, five cities, 45 municipalities and some 1,195 *barangays*)
- Department of Social Welfare and Development Region XII

- Bureau of Fisheries and Aquatic Resources (Surallah, South Cotabato and Ipil, Zamboanga Sibugay)
- Department of Trade and Industry
- Philippine Coconut Authority
- UP Mindanao and Landcare Foundation of the Philippines from the previous ACIAR-commissioned research.

With such a wide diversity of agencies involved, a multiplier effect may come into play. Opportunities for policies to be informed by community feedback across or between agencies may also emerge that further institutionalise the LIFE model or stimulate innovation in other sectors.

Conclusion

Debate about what landcare is or is not comes to the fore when 'jumping the fence' to create different applications of landcare across the globe. The principles of landcare are foundational to the implementation of LIFE in the Philippines. From this base has grown a low-cost, sustainable model of agricultural extension that effectively integrates human wellbeing with NRM. The LIFE model is a starting point for operationalising the principle of subsidiarity, with decisions emanating from the grassroots being actioned locally and then feeding into decision-making at higher levels of government. The success of LIFE has prompted more formal tiers of the Philippines Government to follow suit by formulating programs, allocating funds and codifying in policy this new mode of extension that puts female and male farmers at the heart of the 'how' and 'what' of agricultural extension.

Acknowledgements

I am very grateful to Dr Mary Johnson who provided substantive input on landcare in the Philippines. Thanks also to Mary and Noel Vock for reviewing a draft of this chapter and providing critical insights.

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CHAPTER 13

Farming in the arid Koup region: a truly South African example of landcare

Francis Steyn

Abstract

The landcare model has offered practical and vital solutions to a group of landowners farming in the arid central Karoo region in the Western Cape of South Africa. These farmers sought to address threats around stock predation (with farmers losing more than half their lambs to predators every year) and drought. The landcare model seeks to plan holistically and strategically, at an area-wide scale as opposed to a farm scale. Landcare's support for collective approaches that seek ways to protect natural resources and to secure a viable farming business caught their attention. Once this group of farmers realised the need to design, develop and implement the plan from the ground up, they officially launched the Koup Area Wide Planning Project. Over many years, this project became known as a gold standard for community-based natural resource management, and it now serves as an example for any farming community around the world.

Introduction

Landcare is a national movement aimed at restoring sustainability to land and water management in both rural and urban areas. It encompasses integrated sustainable natural resource management (NRM) where the primary causes of natural resource decline are recognised and addressed. Landcare is community-based and community-led and seeks to achieve sustainable livelihoods through capacity building and related strategies.

In South Africa, in the arid central Karoo area, a group of farmers has captured the essence of landcare. Facing a set of extreme challenges, including drought and predation, these farmers set out to understand, repair and enhance their agricultural and natural landscapes. They achieved this by launching an area-wide planning project. This project was designed by a landcare partnership consisting of landowners, government departments and academia. It's an ideal example of developing self-reliance through partnerships and networking. However, ultimately the Koup Area Wide Planning Project is implemented from the ground up by people who make use of the natural resources on the ground and who benefit from the project. This is vital to landcare in the Western Cape in South Africa. My philosophy is that farmers must lead the process and be at the centre of the journey in order to achieve sustainability in the agriculture sector. The landcare model is where local people identify concerns, set the future vision of their home and prioritise and implement activities. We, as landcare partners, transition this vision to reality.



Photo: Francis Steyn

Surviving the challenges – droughts and predators

Farmers in the Koup region in the central Karoo face many challenges that are threatening the viability of farming. Some farmers have even paid the ultimate price and not survived the tough environmental and economic climate. Stock predation tops the list of concerns for farmers here. Most land users farm with sheep, but sheep are vulnerable to predators such as black-backed jackals and baboons. On average, farmers lose up to 60% of their lambs annually to predators. This has economic implications for the sector. At the same time, the ongoing drought has impacted the agriculture sector. Since 2014, farmers have received considerably less than average annual rainfall. Given that average annual rainfall is only around 120 mm, any reduction impacts negatively on livestock and the natural environment.

According to Lukas Botes, a local farmer and Chair of the Koup Area Wide Planning Project, water levels in his boreholes have dropped dramatically. 'I have never had it this bad,' he says. As a result, he has reduced the number of sheep on his farm to nearly half the carrying capacity of the land. Other farmers in the region have done the same. Botes says, 'As a result of the drought, farmers here have less sheep than they should have. And I keep asking myself the question: Will I loan money to feed the sheep, or must I sell more sheep? If the drought keeps going, I will have to sell more.'

For Botes, the impacts of the drought stretch beyond his livestock and his livelihood. Farmers here care deeply for their environment. They farm on natural landscapes containing threatened plant species. The district is covered in Nama Karoo biome vegetation. It is unique – many plant species are endangered and some are already extinct. He says, 'For me as a farmer, it's not about the critters and little insects, it's about the plants. If I destroy the plant, how can I get it back with just 120 mm of rainfall? And that's what I believe we should protect. Because with our rainfall so low, there's little chance for the plant to recover.'

Given this challenging environment, farmers were forced to start questioning the viability of agriculture. Botes says, 'The farming community in the Koup are in the weakest financial position ever.' That in turn affected the livelihoods of farmworkers. The number of employees on farms in the region on average decreased from four to one. Workers were seeking other employment opportunities because the landowners were not able to pay them. Botes says, 'The problem for us in terms of agriculture is how to make it sustainable again.'

The start of the Koup Area Wide Planning Project

Farmers first expressed an interest in the landcare model in 2011. The Department of Agriculture, Western Cape, hosted a workshop for farmers in the Koup and Koup IV region in the central Karoo. Here the landcare team in the Western Cape introduced the concept of holistic, area-wide planning. After the meeting, I was approached by farmers from the Koup area and they expressed an interest in following this concept.

At a second meeting, attended by farmers and extension officers, the landcare principles were detailed. It was explained that landcare is a community-based NRM initiative where the community takes leadership. It was explained that they, as farmers, need to build a business plan for the area they choose as the project area. Farmers took up the challenge, and together highlighted their main focus: to address the challenge of predators.

[Farmers] took control of the project, ensuring it was planned by those affected and implemented by the community. Since then, this project has become one of the best examples of community-based NRM in the Western Cape, and is an example for any farming community in the world.

It was only at the third meeting that farmers really understood the essence of landcare. During this meeting, fewer farmers and fewer extension personnel attended. The chairperson of the meeting was unhappy with the attendance, and questioned Landcare officials about the poor numbers. The reply from the officials was, 'You as the community are in charge of this initiative, you are in total control of who you invite and any actions or projects that are decided upon. Should this area-wide planning project fail, then it is because you did not do anything. This is a vital part of community-based natural resource management.'

This completely changed the way farmers in the area understood their role. They took control of the project, ensuring it was planned by those affected and implemented by the community. Since then, this project has become one of the best examples of community-based NRM in the Western Cape, and is an example for any farming community in the world.

A project with big reach

At this point, 19 farmers, led by Botes, covering an area of 80,000 hectares, created the Koup Area Wide Planning Project. The community agreed to build the project on three legs:

- 1. job creation:
 - a fencing project
- 2. a series of research studies on themes:
 - economic research into farming
 - ecological research into predators
 - ecological research into vegetation and carrying capacity of the land
 - a scanning project to investigate low weaning percentages
 - a sociology project to measure the improvement of livelihoods of people in the farming area
 - · a farmworker survey to determine skills and needs
 - a study group formed to continue to assess sustainable farming methods, strategies and plans based on research
- 3. empowerment:
 - a fencing project to increase maintenance
 - farmworker training projects (for example, AgriReap)
 - mentorship support.

First, the farmers had to bring in the right partners. This reflected the landcare model, where local autonomy and self-reliance are supported by partnerships and networking. The Landcare team in the Western Cape was one such partner. The farmers developed a

funding application (which included a jackal-proof fence and the repair of boundary fences between farms) but their initial application was turned down by government. The farmers went back to the Landcare team, and on their advice, transformed their proposal into a community-led job-creation scheme. This was presented as both a jackal-control effort and a means to facilitate sustainable agricultural livelihoods and wildlife stewardship (Nattrass et al. 2014). This time, the Koup project was successful, with funds obtained through a Landcare fencing subsidy scheme. By now, the proposal had evolved to an empowerment project, providing employment to former agricultural workers, managed by team leaders from historically disadvantaged communities.

According to researchers from the University of Cape Town's Centre for Social Science Research, the project was possible only through the support and innovative funding strategies of Landcare officials. According to Nattrass et al. (2014), 'The experience points to the centrally important role of innovative and supportive government officials in leveraging funding for initiatives like the Koup fencing project.' It also highlighted the efforts of individual farmers, who took on the leadership roles required. These farmers were responsible for addressing any collective action problems that resulted in the project (where previously some farmers may have felt they do not have to take responsibility for the work taking place on their properties). These leading farmers could communicate with landowners at various local social gatherings, to encourage greater buy-in and responsibility.

The Koup Area Wide Planning Project also connected with the Centre for Social Science Research team as a project partner. By involving social scientists and ecologists, the farmers could expand their area-wide fencing project into a study site, including looking at the biodiversity on sheep farms and the relationship between ecology, predation, farming practices and stock losses in the area. This provided a huge step forward in generating further interest and momentum (Nattrass et al. 2014).

Creating jobs and empowering communities: the launch of a fencing project

Some jackal-proof fencing infrastructure had been completed in 1952, with the full subsidy provided by government. But the fence had not been maintained and was no longer controlling the movement of predators. With support from Landcare Western Cape, the community launched a fencing project. Salaries were paid for by Landcare, while farmers co-funded up to 40% of the work by providing necessary infrastructure, such as the droppers to make the fences and transport.

The project provided employment to 25 fencing workers, who were part of four teams. These workers lived in rural and peri-urban communities in and around the town of Laingsburg. According to studies by the Centre for Social Science Research (Nattrass et al. 2014), before the project they had lower levels of education, lived in larger households and were in the lower bands of per capita household income distribution when compared to those in historically disadvantaged communities in the town itself. The workers fenced a stretch of 238 km across 80,000 hectares. The fence was made as jackal-proof as possible, with rocks packed along the base of the fence to prevent predators from creeping below. The fencing work started in 2011 and concluded four years later.

During that time, the farmers created a non-profit organisation called AgriReap to handle the procurement and manage all the required audited book systems in the region. This dealt with the administrative and capacity-building support for the fencing team. With AgriReap's help, every worker opened their own bank account and registered with South Africa's social grants system (this was the first such experience for many of them). Two local farmers also provided mentorship and training support to team leaders and workers, with a focus on financial and personnel management.

Studies undertaken by the Centre for Social Science Research captured the impact of the project on the livelihoods of these workers. The study (Nattrass et al. 2014) found that income from the project accounted for around 40% of the household income of these workers. Thanks to the fencing opportunities, the proportion of workers living in the poorest income category dropped from over one-third to under one-tenth. The researchers suggest that this shows the extent to which access to low-paying jobs such as those provided by the fencing project can improve both the absolute and relative socioeconomic position of those fortunate enough to obtain them.

According to Botes, the jackal-proof fence has additional benefits. 'The fence makes it more difficult for the jackal to get through; they cannot move as freely now. But it also keeps game out and the neighbour's livestock. You can't manage your grazing if the neighbour's livestock is in your veld.'

Government costs were also reduced. Based on similar projects elsewhere in the country, this project should have cost R22 million (excluding procurement and management costs). Instead, the project cost just R2.2 million (contributed by the Department of Agriculture). This saving arose because of the innovative funding model, where farmers provided co-funding and managed the teams working on their lands (removing the need for a costly contractor to oversee the teams).

Understanding predators, the landscape and the viability of farming

Botes says farmers had many questions before the first research projects started in the Koup region. They wanted to understand the predators and how to best manage the challenges around predation. They also had questions about productivity and what it means to farm sustainably in the Koup. Many farmers lacked farm-scale information around financial viability. 'Many farmers here had simply not kept records so they couldn't determine their losses. So it wasn't about bad management, but rather about poor record keeping.' Researchers sought to change this, by answering these difficult questions. Over the next six years, the Centre for Social Science Research, led by Beatrice Conradie, Associate Professor in Economics and Director of the Sustainable Societies Unit, compiled a number of published research and working papers. Topics included:

- a brief history of predators, sheep farmers and government in the Western Cape, South Africa
- an understanding the black-backed jackal
- findings from the Laingsburg management survey of the Karoo Predation Project
- the Laingsburg management surveys
- the Koup fencing project (community-led job creation in the Karoo)
- the effect of predator culling on livestock losses
- jackal narratives and predator control in the Karoo
- a comparison of the performance under field conditions of woolled and mutton sheep flocks in a low rainfall region
- productivity benchmarking of free-range sheep operations.

Once the studies were complete, farmers could use the results to guide their farming practices and support better business practices. One study looked at the grazing management of farmers in the Koup region. The rangelands are the cheapest and most valuable resource for livestock farmers. However, the last assessment of the region's carrying capacity had been completed in 1974 and things had changed considerably since then. The new study confirmed that farmers who follow a rotational grazing system (resting their rangelands for more than six months at a time) enjoy considerably better conditions than farmers who don't plan resting periods. Their grazing capacity is also better than the long-term recommended grazing capacity. It was found that overstocking also leads to a general decline in rangeland condition. However, the study found that species richness did not necessarily improve on farms where the grazing capacity was better or similar to long-term recommended grazing capacity (Saayman et al. 2017).

Following this study, farmers and their Landcare partners implemented a monitoring protocol, where rangelands are monitored every three years. This has highlighted the need to manage rangelands conservatively, especially during the drought. Many sheep farmers are now farming at just two-thirds of their carrying capacity and are providing feed for their sheep.

The question around grazing management is particularly important for those farming with other game species. Because of the challenges around livestock predation, many farmers in the area opted to farm with game. But it is not as easy to manage game numbers on natural vegetation, and research found that on game farms in the Koup, the veld was not given sufficient chance to rest. Botes says, 'We wanted to get data on our grazing through this project. Our grazing is our greatest asset. Now we have a basis to work off. If we're told to reduce our sheep numbers, then so be it. We don't want to lose our most important resource.'

The Department of Agriculture also supported a scanning project in the Koup. Farmers had never scanned their ewes before the launch of this project. When scanning started, farmers could ascertain conception figures before predators could capture lambs. The funded project ran for three years and helped farmers improve their livestock pregnancy records. Botes says, 'This really helped with the management of sheep, as farmers realised they needed this data. Now they are still scanning, even though the funding has stopped.'

University of Cape Town research assessed the value of the biodiversity in the Koup region. Researcher Marine Drouilly set up 176 camera traps on different locations in the project area. She also set up 156 camera traps on locations in the neighbouring Anysberg Nature Reserve, a reserve managed by the CapeNature conservation authority in the Western Cape. Her study found that the farming areas provided more biodiversity than expected, even when compared to the Anysberg Nature Reserve. Small mammals like the duiker, steenbok and bat-eared fox were present here. Her findings suggested that livestock farmers in the Koup play a key role in protecting nature (Drouilly et al. 2017). Her research also found that black-backed jackal in the agricultural areas preferred sheep, while jackal living in the reserve would eat mice and other small rodents.

From the Koup Area Wide Planning Project, farmers have created a study group. These farmers meet regularly to discuss challenges and seek solutions. The study group has now expanded beyond the borders of the initial project group and has tied in with other local farmers' associations.

Where to from here?

Farmers across the Koup and beyond have seen the success of the Koup Area Wide Planning Project. Now six farmers, covering an area of 20,000 hectares, are set to join, including emerging farmers. Botes says, 'The plan is now to expand and include them and have a fence around their farms too.' He adds, 'I think there's better cooperation than in the past. The ideal is for us to work together. Over an area of 80,000 hectares, we would be a mega-farmer. I don't just want this to become a conservation area. I want to have something tangible for farmers. I want to ensure that soil restoration work takes place, and other (natural resource management) activities to help the environment. This can't just come from the Department of Agriculture.' He hopes to achieve this by setting up a new farming model, such as a special management area. This is a more formal structure for farmers, and could include signing title deed restrictions to ensure conservation takes place in perpetuity.

Other farming communities have seen the area-wide planning work that has emerged from the Koup and are now looking to develop their own plans. According to Landcare's Phyllis Pienaar, a project in the neighbouring Koup IV has developed its own fencing operation based on the work that has taken place here. Four more farming groups are investigating their own opportunities based on the Koup model.

What does area-wide planning mean for this group of farmers?

What started as a fencing project to control jackal soon developed into a much broader area-wide plan and a community-led job-creation scheme. The project was implemented using the landcare methodology of community-based NRM, where the farmers are the leaders in this project. It involved more than just a fence – it ended up being a sustainable resource management plan for 19 farms over an area of more than 80,0000 hectares.

This is the essence of landcare, and the only viable option for farms in South Africa going forward. Planning must be conducted at a scale larger than an individual farm. That is the only way to effectively address many natural resource issues and strive for sustainable development of land, water and biodiversity. It must be designed by an integrated group of partners. It must also be led by the very people that use these resources on ground level: the farmers and the community.

Conclusion

A landcare approach is exactly the method adopted by the Koup Area Wide Planning Project. Farmers identified their challenges and sought proactive solutions to these, supported by Landcare. What they have subsequently developed in the Koup region has become 'something of a gold standard', according to University of Cape Town researchers (Nattrass et al. 2014).

These farmers still have questions and more work needs to be undertaken to understand the viability of farming here, given these challenging times. Farmer Piet Gouws, who died after the tough economic reality took its toll, said shortly before his death, 'We dream of returning to a place of mutual sustainability for agriculture and the environment.'

As discussed at the Nagoya conference, the Koup Area Wide Planning Project can be considered an international success that is still surviving after a four-year drought. All the projects and research done in this area are the initiative and hard work of the community and the partners that contributed. But it is led by the community.

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CHAPTER 14

Predicting the success of New Zealand's community-led resource management initiatives

Nick Edgar

Abstract

The intensification of land-use practices is causing the degradation of water resources in New Zealand. Considerable effort is being directed towards enhancing the participation and leadership of farmers and landowners in solving water quality issues. One of the most significant challenges to improving catchment management outcomes is understanding enablers and barriers to effective community engagement in managing water resources.

This chapter examines the outcomes of a series of enquiry processes aimed at identifying the key success factors in community-led catchment management. This includes a detailed review of a highly successful catchment management initiative focused on the Aorere River, Tasman District. Reviewing other catchment management initiatives in New Zealand has identified several factors that contribute to achieving community-led outcomes. Prioritising support and resourcing to enhance how these success factors are expressed within communities can build improved foundations for catchment management. Landcare principles are centred on developing equitable and sustainable models for locally self-managing community water resources. Understanding the enablers and barriers to effective community-led catchment management is directly relevant to understanding how the principles of landcare can be applied to managing our precious natural resources, both in New Zealand and across the globe.

Introduction

Freshwater ecosystems are intrinsically connected to the health, livelihood and culture of New Zealand. However, more intensive agriculture and the difficulties of managing intensive land use and water abstraction are adversely affecting these water resources (Ministry for the Environment 2005). There is a growing awareness that the nation must face some difficult decisions related to the economic benefits of intensifying land use versus the adverse impacts on water resources (Edgar 2009).

Agriculture physically dominates New Zealand's geography, with over half the land area classified as farmland (Statistics New Zealand 2009). Not only is farming physically dominant, it is also a major sector of the New Zealand economy, particularly in export and employment. Overall, the primary sector accounts for 7.1% of gross domestic product and contributes over 50% of New Zealand's total export earnings (The Treasury 2010). Direct impacts of land-use intensification on water resources often result from land clearance and conversion of land from native indigenous forest to introduced pasture grasses. Large-scale draining and clearing of wetlands to create dairy farms are common methods for expanding dairy production. Baskaran et al. (2009) report that the intensification of dairy farming is associated with impacts such as nitrate leaching to streams and rivers, large-scale increases in the demand for surface and groundwater for irrigation, and reduced biodiversity in pastoral landscapes.

The effects of these changes on water resources include:

- the enrichment and eutrophication of streams, rivers and lakes and the associated species shifts in response to nutrient-enriched conditions (Moller et al. 2008)
- water abstractions reducing stream and river levels, which, if altered below minimum flow levels, change the biotic composition of aquatic ecosystems (Boulton et al. 2003)
- changes to flow regimes influencing life history patterns of aquatic species
- loss or erosion of stream connectivity needed for viable populations for various riverine species (Bunn and Arthington 2002).

In addition, the run-off of faeces and urine in and near streams can cause contamination by a range of viruses, bacteria and parasitic protozoa and have a significant negative impact on water quality and stream biota. Much of this degradation of water resources has resulted from the complexities of managing non-point source agricultural water pollution (Edgar 2009; Anastasiadis et al. 2014).

Reducing pollution from farms remains a significant challenge to improving and protecting New Zealand's waterways. One of the key responses to these water quality issues has been increased resourcing for, and application of, catchment management initiatives across the country (Edgar 2007; Duncan 2013). The devolution of natural resource management (NRM) decision-making to local government, combined with significant efforts to engage communities through education and communication initiatives addressing water resource management, has led to a resurgence in community-led catchment management initiatives in New Zealand (Curtis et al. 2014). Considerable attention is now being focused on methods to enhance the participation of communities in solving water quality issues. One of the most significant challenges is developing effective methods to engage with farmers and landowners who are directly responsible for managing land and water resources both at the farm and catchment scale (Tyson et al. 2011).

The NZ Landcare Trust is an independent non-government organisation focused on working with farmers and land managers at the catchment scale through education and communication initiatives to encourage economically and environmentally sustainable farming practices

that result in both profitable farms and improved water quality. This organisation won the inaugural Morgan Foundation New Zealand Riverprize for its support of farmers improving water quality in the Aorere River catchment, Tasman District, New Zealand (International River Foundation 2015).

The NZ Landcare Trust has recognised that one of the most significant challenges to improving catchment management is to identify the determinants of effective community engagement and participation in managing water resources (Lees et al. 2012). Reviews and case studies of some of its most successful catchment management projects, including the Aorere River initiative, has helped to identify critical success factors (Tyson et al. 2012).

Understanding the enablers and barriers to effective community-led catchment management is fundamental to planning, implementing and monitoring catchment management education and communication initiatives. This chapter aims to further build understanding of the key predictors of successful community-led water quality management by:

- reviewing the lessons learned from the Aorere River initiative
- reflecting on the outcomes of a national catchment management workshop focused on identifying enablers and challenges to effective catchment management
- examining literature related to water resource management and behaviour change theory.

Case study: the Aorere River catchment

The Aorere River catchment is in Golden Bay at the top of the South Island of New Zealand. The Aorere catchment is 573 km² in area, located in the Tasman District. Eighty per cent of the catchment is native forest, with dairy farming occupying 16%. The Aorere River begins at its headwaters in Kahurangi National Park and flows for 40 km before draining into the Ruataniwha Estuary. Dairying is the most common farming type in the catchment. There are 34 dairy farms with approximately 11,000 to 13,500 cows being grazed (Robertson et al. 2013).

The catalyst for the 2006 Aorere River initiative was contamination by pathogens from dairy farms that was affecting marine farms in the receiving estuary and coastal marine area. Many of the farms are located on flood plains, so management of effluent and riparian areas is especially important. In 2006 the catchment was depicted as a high-level polluter in media articles and at community meetings. Microbial contamination from dairy pollution was said to reduce the local shellfish industry's harvesting windows from 70% to as low as 30% per year. The situation was unique in that the reduced harvest time for the shellfish farmers offered a 'canary in the coalmine' indicator of environmental problems. This situation was also different from other farming situations in that the primary pollutant was faecal bacteria run-off rather than nutrient run-off.

NZ Landcare Trust's involvement in the Aorere River initiative now spans a period of more than 12 years (2006 to 2019). Over this time, this farmer-led initiative has reduced bacterial contamination and benefited the ecological health of the river and estuary. It has helped to build social cohesion between the dairy farming community and the aquaculture industry. It has educated farmers and the wider community about water quality and introduced best management practices to most of the farms in the catchment. It has also informed the development of a national resource: a community-owned catchment management toolkit influencing collaborative catchment management across New Zealand (Edgar and Slade 2015).

The Aorere River initiative was the inaugural winner of the Morgan Foundation New Zealand Riverprize. In reviewing the Aorere River initiative and preparing the New Zealand Riverprize application to the International River Foundation, many factors were identified that contributed to the successful implementation of this catchment management initiative. These success factors included:

- farmer ownership
- clear problem identification
- independent facilitation
- technical support
- achieving results
- knowledge exchange
- celebrating success.

This farmer-led initiative has reduced bacterial contamination and benefited the ecological health of the river and estuary. It has helped to build social cohesion between the dairy farming community and the aquaculture industry.

Farmers took ownership of the issues and formed the Aorere Catchment Group, working closely with the NZ Landcare Trust to identify the underlying reasons for water quality decline. The NZ Landcare Trust commissioned an independent scientific review of river water quality issues, including preparation of a land-use/water quality model that clearly identified the cause-and-effect pathways of *Escherichia coli* contamination in the catchment. NZ Landcare Trust was invited by the Aorere Catchment Group to provide independent project management and facilitation services to ensure a professional approach to collaborative stakeholder engagement.

The NZ Landcare Trust commissioned technical expertise to ensure science-based solutions, particularly farm environment plans, were tailored directly to the issue of reducing non-point source run-off into the river. Achieving tangible, measurable improvements in the water quality of the Aorere River and the near shore coastal zone of Golden Bay was integral to the success of this catchment initiative. There was a focus on sharing knowledge and successful approaches to implementing on-farm best management practices both within the Aorere River catchment and to other catchments. Celebrating success was an important way to communicate farmer investments of time and money to improve water quality in the catchment and to maintain the momentum of the initiative (Edgar and Slade 2015).

Farmer ownership

One of the key factors in the success of this project, and one that made it ahead of its time in New Zealand, was its farmer-led inception and its collaborative approach. The initiative built resilient and collaborative relationships between formerly hostile parties (dairy and marine farmers). Success was also demonstrated by farmers taking a proactive leadership approach to improving water quality. The initiative focused on promoting and empowering local 'farmers as leaders' and acknowledging and utilising local knowledge, leadership, peer mentoring and willingness to implement best management practices. A 2012 evaluation of the project noted that the initiative adopted approaches that recognised and built from the strengths in the farming community. Two key strengths that the project leveraged off were:

- the farming community's deep connection to their land and water
- the desire for local ownership of environmental problems and local leadership to achieve solutions.

Farmer surveys had identified the key underlying farmer values:

- · desire for healthier local waterways
- pride in the beauty and qualities of local waterways.

Harnessing these values by promoting the adoption of tailored best management practices for local waterway improvement was central to the initiative's success. Equally important was directly engaging farmers with the initiative. Farmers reported that the project helped to give them the power to solve their problems, allowing them to become proactive about environmental issues. Farmers reported that the initiative brought the community together and united them towards a common goal. It was an approach that built respect and self-esteem rather than blaming farmers for environmental damage (Robertson et al. 2013).

A key outcome of the initiative was the formation of the Aorere Catchment Group in 2006. This farmer-led group established credibility in the wider dairy community. This helped disseminate information and persuade farmers to adopt best management practices on farm and across the catchment (at considerable cost) to improve water quality and support their 'licence to operate' in the catchment. Forming the Aorere Catchment Group was an early example of a farmer-led, community-owned catchment management project addressing water quality in a rural community. Farmer ownership of water quality issues in the catchment has been recognised as a critical factor in the success of the initiative.

Clear problem identification

The primary river health indicator used in the initiative was the measurement of faecal coliforms – bacterial contamination resulting from *E. coli* entering the watercourse. Unlike many other rivers in New Zealand, high levels of nutrients was not a problem in the Aorere catchment. The contamination of the water by *E. coli* was the major driver for the initiative, as it impacted on shellfish farms (and shellfish harvesting) in the estuary. Measurement of *E. coli* is used as a proxy for general river health and water quality. Measurement of *E. coli* levels over the duration of the initiative showed a trend towards improved water quality over time.

In 2007 the NZ Landcare Trust commissioned environmental consultants to carry out an analysis into the causes of the contamination, using a river plume model that showed the effects of the river flow on its receiving environments. This helped farmers understand the impact of their land use on other parts of the ecosystem. It also guided them in the actions they needed to take to improve water quality. This analysis used existing water quality information and modelled land-use activities to develop catchment contaminant budgets (Robertson & Stevens 2007). This modelling identified the causes of water resource contamination in the catchment and was essential in building a common understanding of the water quality problems and helping the community to accept these problems before tailoring solutions to address them.

It was this clear evidence that persuaded farmers that they needed to change their practices and introduce dairying best management practices. These included fencing off

waterways (and later planting them with native species), only spreading effluent during dry periods and separating liquid from solid effluent to reduce leaching. A key factor in farmers' behaviour change was that the science was independently commissioned by the NZ Landcare Trust. The modelling also helped farmers to develop an understanding of how their catchment worked and what they could do to reduce their impacts on it. Farmers considered the modelling to be an objective source of information that clearly identified the impact of intensification of land use on water quality This was seen as important by the dairy farmers as they felt they were being advised of relevant scientific facts to help them decide what they needed to do to resolve the waterway pollution issues (Robertson et al. 2013).

This approach was important, as councils have previously used science to support regulatory measures, with farmers being required to adopt best management practices. The ownership of the problem by the farmers was the most significant factor behind behaviour change, and this in turn persuaded the marine farmers that the dairy farmers were serious about making changes, reducing both conflict and potential litigation.

Independent facilitation

The NZ Landcare Trust played a lead role in bringing all parties together and supporting farmers to set up the Aorere Catchment Group. The trust's neutrality and independence was cited by farmers as being vital to the success of the initiative. The trust provided project coordination, acted as a knowledge broker, facilitated the partnerships and collaborations with other agencies and provided on-ground support to the farming community (Edgar and Slade 2015).

The NZ Landcare Trust employed a project coordinator to carry out facilitation work and organise field-based training workshops for famers. Other support included preparing funding applications and reporting to funders, which allowed farmers to focus on governance and on-farm actions. The trust also successfully secured the funding that enabled independent scientific advice to diagnose the cause of the water quality contamination.

Technical support

Analysis of data collected from 1996 to 2012 showed that since 2006, there had been a reduction in the number of spikes in *E. coli* during low-flow and medium-flow regimes and that there had been a step change reduction in pathogen concentrations around 2006, rather than consistent gradual reductions over time. The report states 'this sudden reduction may have been the result of the elimination of the assumed cause of such peaks, i.e. irregular, illegal point source discharges from dairy farms in the lower catchment' (Robertson and Robertson 2012:6).

Another possible cause for the reduction in spikes of bacterial concentrations was the reduction of point source contamination by eliminating stock access to waterways by fencing, bridging and culverting, all a direct result of the Aorere River initiative (Robertson & Stevens 2007). The report was important because it used publicly available data to show real changes in levels of contamination with a strong inference that these were directly linked to the on-farm interventions and farmer behaviour change resulting from the Aorere River initiative.

The Aorere River initiative is unusual in that it applied social science theory and techniques from the outset to inform its approach and evaluate changes in attitudes and beliefs. These are precursors to changes in behaviour. In 2007, the NZ Landcare Trust carried out farmer
surveys in the whole catchment. Thirty of the 33 dairy farming families were surveyed using face-to-face 'kitchen table' interviews. These surveys enabled farmers to discuss issues in the privacy of their own homes, leading to more information being revealed and helping to build trust and relationships better than open public meetings could. It also helped facilitate a more accurate understanding of attitudes and limitations than group discussions.

The surveys assisted in measuring behaviour change and understanding the key factors behind it. A second survey of the same farm households was undertaken in 2010, and a third and final survey was undertaken in 2012. The results of these surveys were largely positive and indicated a strengthening of the Aorere dairy community, the building of understanding and trust between dairy farmers and the local shellfish industry, a strong sense of pride within the community and a clear understanding of what farmers could do to improve water quality (Robertson et al. 2013).

The Aorere River initiative included a strong emphasis on providing farmers with technical support to develop environmental farm plans and encourage the adoption of best management practices on farm. Farm plans were adapted to meet the specific requirements of the Aorere catchment, taking into account its climate and typography; for example, high rainfall in the headwaters of the catchment leading to regular and rapid high-flow events. There was a particular focus on providing technical information to farmers to manage non-point source run-off of faecal contaminants into local waterways. Best management practices were identified that could reduce pathogens in farm run-off and these were promoted through field days with farm systems specialists (Edgar and Slade 2015).

As a result of the initiative, coastal water quality improved with increased shellfish harvesting windows.

Achieving results

As a result of the initiative, coastal water quality improved with increased shellfish harvesting windows. In 2006, shellfish harvesting (the window in which to harvest mussels) could only occur 28% of the year due to pathogen contamination. By 2011, harvesting could occur 75% of the year. River water quality monitoring showed fewer spikes in pathogen levels. There was only one incident of pathogens exceeding safe swimming levels between 2010 and 2013, which was down from 13 between 2000 and 2010.

A major achievement was the willingness of dairy farmers to tackle issues caused by their practices, with 24 of the 34 farms developing farm plans. Audits of farm plans showed that, on average, 78% of actions identified by plans had been completed, equalling around NZ\$1.6 million worth of investment in works. This equates to NZ\$67,350 worth of works per farm. Of these, 100% implemented grazing best practice, 64% completed riparian fencing and 89% completed effluent disposal works.

The dairy farmers had an increased sense of pride because of their contributions to resolving the water quality issues in the river and coastal zone. There was a greater feeling of cohesion and connectedness in the local community. The media focused on positive aspects of the farmers' contributions to tackling these issues, rather than blaming them for polluting the environment. The shellfish industry presented the catchment group with an environmental award for their efforts. The community celebrated these achievements at a lunch where the dairy farmers provided the cream, the shellfish farmers provided the mussels, and they created a seafood chowder meal. The meal provided a shared opportunity to acknowledge the role of the dairy farmers in responding to the environmental issues while at the same time improving the certainty of shellfish harvesting to the aquaculture industry.

Knowledge exchange

The NZ Landcare Trust captured the key lessons from the Aorere River initiative and applied them elsewhere. The approach was applied in the catchment of the Rai and Pelorus rivers flowing into the Marlborough Sounds (Marlborough District). The Rai-Pelorus river catchment had similar issues and shared some characteristics with the Aorere River catchment, in particular, faecal pathogen contaminant of water resources from land use practices.

The NZ Landcare Trust developed a 'twinning' knowledge exchange between the catchments to test the applicability of the farmers-as-leaders approach in the Aorere to the Rai-Pelorus river catchment. River 'twinning' is an innovative approach that has been developed by the International River Foundation. The aim of twinning is for one catchment management initiative to partner with a geographically separate catchment management initiative to share expertise and learnings. Effectively, it provides for peer-to-peer knowledge exchange between river management professionals and practitioners as they implement catchment management protection and restoration work (International River Foundation 2018).

The lessons from the Aorere catchment initiative were further refined and then applied in the Rai/Pelorus catchment. The NZ Landcare Trust used this twinning process to support other catchment management projects across the country. This led to a strategic partnership with the Ministry for the Environment to produce a resource: the *Community owned rural catchment management: a guide for partners* (Lees et al. 2012). This catchment management resource was designed to support community-led river restoration across New Zealand and was supported by the rollout of a national series of catchment management masterclasses led by the NZ Landcare Trust.

Celebrating success

As part of the wider Aorere River initiative, several events were held that helped to build relationships and community engagement both between the dairy and marine farmers and across the whole community. It was recognised that bringing people together to celebrate and share in successes was an important part of the initiative.

In March 2008, dairy farmers spent a day out at sea with mussel farmers, learning about the industry and how mussels are harvested. The day was organised by Matt Rowntree, a mussel farmer, as a way of showing the aquaculturists' appreciation of the work being done by the dairy farmers to improve water quality. Rowntree said, 'As someone whose livelihood depends on water quality, I really appreciate the efforts of all those involved in the Aorere Initiative. I think the project is a marvellous example of what can be achieved and is a credit to all those involved' (Rowntree, personal communication, 2008).

In November 2008, Aorere dairy farmers met with marine farmers to celebrate local water quality improvements over a shellfish chowder and fine cheese lunch. Aquaculture industry spokesperson Helen Smale said, 'A great deal has happened. In October 2007 shellfish harvest days were lifted to 79% to reflect improved water quality results' (Smale, personal

communication, 2007). Local dairy farmers Ross Riley and Rob Haldane spoke of the large voluntary investment local farmers were making – in the case of Haldane, an investment of NZ\$60,000 on a new effluent storage system. He reflected that he and his family highly valued swimming, fishing and eeling, which were also benefits of the initiative and improved water quality.

One of the lessons from the initiative is the importance of reinforcing positive outcomes through telling stories in a positive way and substantiating claims through actions and results. Good stories helped to build traction. Several rural content programs featured the Aorere River initiative, including TVNZ's *Rural delivery*, which first featured the Aorere in early August 2007. The *Rural delivery* program also revisited the Aorere catchment in May 2011 to update viewers on its progress. In July 2014, Radio New Zealand's *Country life* featured farmers talking about the success of the Aorere River initiative.

The Aorere River was also featured in the film *Water whisperers – Tangaroa*. Filmed in locations around New Zealand, *Water whisperers* explored the work of 10 communities as they sought to repair waterways and protect them for future generations. The film highlighted the passionate people behind the recovery and conservation of some of New Zealand's precious waterways (Edgar and Slade 2015).

Predictors of success

The importance of working on both a farm and landscape scale to solve issues affecting water resources has led to the realisation that remedial efforts must adopt a communitydriven perspective (Lees et al. 2012; Curtis et al. 2014). Considerable attention is now being focused on methods to enhance the participation of communities in solving water quality issues. One of the most significant challenges to these community-driven approaches is developing effective methods to convince individual farmers to work together to solve these landscape-level problems (Tyson et al. 2011).

An important aspect of this is identifying the determinants of effective community engagement and participation in managing natural resources (Lees et al. 2012). Reviews and case studies of successful community-based NRM projects have helped identify critical success factors in catchment management (Tyson et al. 2012). Understanding the enablers and barriers to effective community engagement are essential to successfully planning and implementing catchment management initiatives.

There is considerable value in identifying the enablers and challenges to achieving bestpractice catchment management. This has led to series of research enquiry processes focused on defining the key success factors for implementing catchment management initiatives in New Zealand. The enquiry processes have included individual reviews and case study examination of catchment management projects, literature reviews and surveys of and workshops for participants in catchment management initiatives.

A key source of information was the outcomes of a national workshop conducted by the Upper Taieri Water Resource Management Project in March 2010 (Newman and Robertson 2010). Workshop participants represented 14 diverse, community-led resource management initiatives from across New Zealand, five regional authorities and seven governmental or non-governmental agencies. A list of essential enablers and challenges to successful community-led resource management was generated collaboratively by participants at the workshop (Newman and Robertson 2010). Another key source of information was credible efforts to reconcile available literature on determinants of successful common property resource management groups (Agrawal 2002) and determinants of behaviour change in an environmental context (Tyson 2009).

The outcomes of surveys of farmers involved in catchment management projects constituted a further line of enquiry. Table 14.1 is the result of these enquiry processes to identify the key success factors for community-led catchment management. Each success factor includes a broader description of its attributes and characteristics.

Success factor	Description		
Community characteristics	Interdependence among group members		
	Homogeneity of identities and interests/community cohesiveness		
	Shared norms in community		
	High level of dependence on resources		
	Users reside near the resource/sense of place		
Collaboration	Confidence that the community-led collaborative management process will work		
	Community efficacy		
	Process of developing plans has been inclusive of all stakeholders from the community/community interaction		
	Process has had effective facilitator, coordinators and leaders		
	Process has had champions from various age groups		
Trust	Fair and accurate media coverage		
	Trust in regional authorities		
	Community perceives broader public opinion of them as being positive		
	Community has developed social capital through experience and trust each another to follow rules and norms of reciprocity		
Communication	Information is widely shared to build broad knowledge		
	Various communication channels are used to inform stakeholders		
	Community has access to effective communication technologies		
Training	Community members have received adequate training in self-efficacy and community efficacy		
	Community members have received adequate training concerning governance issues		
Science	Community has ability to commission scientific studies		
	Community has access to science		
	Decisions made by community are informed by science		
	Scientific studies are not seen as conflicting and manipulative		
Environmental concern	Common concern for water quality, perceived severity and susceptibility of threat		
	Systems are in place to monitor and manage water quality		
Regulatory framework	Environmental policies and rules are clear and simple		
	Rules are locally devised		
	Rules are easy to enforce		
	Those who monitor conditions can be held accountable		
	Graduated sanctions for non-cooperation are considered fair		

Table 14.1	Key success factors fo	r community-led	catchment management
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There is considerable overlap in the findings of the different enquiry processes to identify key success factors in community-led catchment management. Table 14.1 outlines eight success factors. The presence or absence of these success factors can have a significant influence on the effectiveness and outcomes of catchment management initiatives. Their real value lies in the strength of their expression and how they are enacted in the context of implementing catchment management by landowners and the wider community.

How strongly or weakly these success factors are expressed can be used to prioritise effort, for example, the level of attention and resourcing that may need to be devoted to land manager education and communication efforts. Findings from reviewing the expression of these success factors also helps to set a benchmark for subsequent project evaluation. Given that these success factors are determinants of effective catchment management, it would be hoped that significant improvements in how these factors are rated would be detected as catchment management initiatives progress.

Conclusion

The ability to take the successful lessons learned from the Aorere River catchment initiative and apply them both regionally and nationally has been a key priority for the NZ Landcare Trust. Globally, there is increasing effort to engage communities in the management of biological resources and to ensure that landowners and land managers are actively engaged in both the decisions and actions affecting those resources.

A critical component of water resource management at the catchment scale is the key role that farmers, landowners and the wider community play in managing land and water resources (Tyson et al. 2012). One of the most significant challenges to these farmer-led approaches is developing effective strategies to convince individual famers to work together to solve these landscape-level problems (Tyson et al. 2011). Understanding the key success factors for effective farmer engagement, participation and leadership is fundamental to planning, implementing and, ultimately, achieving water resource protection and enhancement within agricultural catchments. Identifying these success factors bodes well for developing an equitable and sustainable system for self-managing community water resources. Yet, these factors (predictors of success) are not static. They must be constantly monitored and nurtured. They can all too easily erode.

The evaluation of the effectiveness of community-led approaches to catchment management is central to understanding what can and cannot be expected of collaborative processes and how they can be integrated with existing regulatory frameworks. Evaluation is fundamental to identifying environmental, social and economic change and enabling progressive learning at individual, community, institutional and policy levels.

Structured and coordinated attempts to implement evaluative frameworks, including evaluation of processes and socioeconomic components of initiatives, are necessary to determine the beneficial outcomes of often substantial private–public investment in catchment management (Edgar 2007). This is especially so as New Zealand, like many other countries, is increasingly focusing attention on collaborative processes between communities and organisations to sustainably manage natural resources.

Agriculture is an important component of the New Zealand economy. The conversion of more land to agricultural practices, and the intensification of agriculture, has resulted in concomitant impacts on the country's water resources (Foote et al. 2015). Integrated catchment management, with a focus on a combination of both regulation and community

leadership aimed at land-user adoption of best management practices, has been promoted by government, industry and communities as an effective way of improving the sustainable management of water (Edgar 2007, 2009).

Due to its complexity, there are a range of challenges to achieving the effective implementation of catchment management practice on the ground. The NZ Landcare Trust has worked with government, agribusiness and community organisations to identify the key factors, or predictors, of successful catchment management. Identifying these predictors of success for community-led catchment management can help with:

- planning, educational outreach and communicating the outcomes of catchment initiatives
- monitoring their implementation
- prioritising resourcing and identifying where further support is required
- evaluating whether such initiatives have achieved their aims and objectives (Lees et al. 2012).

Importantly, knowledge sharing has shown that the success factors for catchment management that have been identified in this chapter are applicable across a range of catchment scales and resource management issues in New Zealand. The success of the innovative 'twinning' initiative between farmers in the Aorere River catchment and farmers in the Rai/Pelorus rivers catchment was one reason that the NZ Landcare Trust was awarded the New Zealand Riverprize. It is hoped that this kind of knowledge sharing is applicable at a broader international level.

The next phase of developing and utilising these success factors in catchment management is to determine their transferability and applicability to resource management issues that transcend national boundaries. The NZ Landcare Trust is seeking to undertake a catchment twinning initiative and knowledge exchange between a catchment in New Zealand and a catchment in the wider Asia-Pacific region. The trust is currently collaborating with Australian Landcare International to initiate a catchment project in Fiji. The aim is to determine if the success factors identified for New Zealand catchment systems are also relevant to catchment systems in other countries. This new initiative will seek to inform and support other proposals to broaden the application of successful landcare models and practices globally.

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