Enhancing biodiversity on Canterbury dairy farms to improve our social license to operate

Kellogg Rural Leadership Programme Course 54, 2025

Nick Vernon

I wish to thank Synlait Milk Limited for their support, which enabled me to undertake this programme. It has been truly valuable, and grateful for the privilege to have this opportunity. I would also like to thank the Kellogg Rural Leadership Programme Investing Partners for their continued support.

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Scholars are encouraged to present their report findings in a style and structure that ensures accessibility and uptake by their target audience.

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Purpose

This project, Enhancing Biodiversity on Canterbury Dairy Farms to Improve Our Social Licence to Operate, aims to examine how biodiversity actions, community expectations, and stakeholder involvement intersect to influence the dairy sector's relationship with the public. By understanding these interactions, the project seeks to identify practical opportunities to build trust, improve environmental results, and support the sector's long-term sustainability.

Executive Summary

Biodiversity is increasingly recognised not only for its environmental value but also for the role it plays in building trust and maintaining the sector's licence to operate. In Canterbury, where farming is both economically vital and highly visible, how farmers manage their land is closely tied to how the sector is perceived. This project sought to explore the relationship between biodiversity and farming more deeply.

This research project combined a literature review with semi-structured interviews involving farmers, rural professionals, processors, and community partners. The literature review provides a theoretical foundation that demonstrates how visible environmental actions, policy frameworks, incentives, and social dynamics influence biodiversity outcomes. The interviews then contextualise these ideas through lived experiences, illustrating how farmers manage cost pressures, regulatory uncertainty, peer influence, and community expectations.

Three themes emerged through this process. First, biodiversity and social licence are tightly linked to what the public sees on the farm, from riparian planting to tidy gateways, all of which matter. These visible actions build credibility and trust, but perception is fragile and easily lost.

Second, farmers face real barriers to biodiversity action, including high costs, time constraints, a lack of vision, and unclear regulations. At the same time, there are strong enablers: peer influence, trusted milk processors, community partnerships, and practical "start small, scale up" approaches. National policy and incentive settings also shape confidence and momentum.

Third, genuine stakeholder engagement is essential for lasting change. Farmers trust relationships built through processors, catchment groups, and local communities far more than top-down regulatory models. Future opportunities lie in aligning these trusted networks with enabling policies, fair accountability, and practical support, including technology that facilitates action rather than complicates it.

The journey through both evidence and the farmer voice points to a clear conclusion: enhancing biodiversity is both a stewardship act and a strategic lever for trust**.** To move forward, the sector must align practical on-farm actions with strong relationships, enabling systems, and a shared commitment to achieving outcomes.

With this in mind, the recommendations in my report are intentionally designed to be implemented by the organisations and individuals who have the greatest influence on biodiversity outcomes in Canterbury. This includes processor-level companies such as Synlait, Fonterra, and Silver Fern Farms, which play a vital role in shaping farmer behaviour through standards, support programmes, and market-driven expectations.

It also includes the Bioeconomy Science Institute, whose science and innovation can help develop simple, practical tools that make biodiversity planning easier for farmersAt a community level, these recommendations are relevant to catchment groups across Mid-Canterbury, including the Mid-Canterbury Collective, who provide grassroots leadership, coordination, and shared effort across multiple farms.

Finally, they are designed for people working in environmental and sustainability advisory roles, from sustainability advisors to rural environmental consultants, who are directly supporting farmers with FEPs, biodiversity plans, and on-farm implementation. Together, these groups can influence change, support farmers, and scale biodiversity action to strengthen both environmental outcomes and our social licence to operate.

Recommendations

- **Create practical biodiversity resources**
  Develop visual guides highlighting the benefits of key native species (e.g., cabbage trees, flax, tōtara). Produce at least three species profiles and distribute to 5 Canterbury catchment groups by June 2026, with annual updates. Plant & Food

- **Upskill farmer-facing teams**
  Deliver biodiversity engagement training to 100% of milk processor reps and advisors, building confidence to lead practical on-farm conversations. Training embedded in seasonal programmes from 2026 onwards.

- **Showcase farmer-led success stories**
  Publish 5 relative farmer biodiversity stories each year across sector platforms to highlight impact at any scale. First campaign launches Summer 2026, reviewed annually.

- **Strengthen community partnerships**
  Partner with eight plus active catchment groups, schools, and local organisations annually to co-deliver planting and restoration projects, reinforcing community connection and trust.

- **Promote 'start small, scale up' projects**
  Support at least 30 new on-farm biodiversity projects per year through templates, guides, and processor rep support. Initial targets met by June 2027.

- **Integrate biodiversity into FEPs**
  Embed biodiversity actions and maintenance plans into FEP templates. Begin with key Synlait Suppliers linked back to the Whakapuāwai Programme, who have a 3–5-year planting plan.

- **Use technology as an enabler**
  Pilot the use of CarbonCrop, a simple digital tool to track and report on-farm biodiversity as a value-added feature. Priorities are ease of use and clear benefits for farmers, to scale implementation across the whole supplier base.

Acknowledgements

Firstly, I would like to acknowledge the support of Rural Leaders and the Kellogg Rural Leadership team: Phill Morrison, Craig Trotter, Lisa Rogers, Annie Chant, and Lyndsey Dance. Thank you for creating such a fantastic opportunity for the NZ Food and Fibre sector and for me to learn and grow as a person and a future sector leader. I have learned a great deal about leadership, politics, global context, and self-awareness; it has broadened my perspective, and I've been inspired to continue learning and asking questions. The programme's structure, the chance to connect with others in the industry, and the high-quality sessions and discussions make it truly special.

For this project, I would like to thank the Synlait suppliers, as well as the wider sector farmers, leaders, and organisations who took the time to be interviewed. You all shared openly and with enthusiasm, encouraging me to continue exploring my broad research topic. Your insights and experiences shaped the report you see here. One of the best parts of this course has been meeting so many great people. I am grateful to everyone I spoke with during this project. I learned a lot from you and feel lucky to have connected with such a knowledgeable and generous group from New Zealand's primary industries.

I would like to extend a massive thank you to my wife, Deb. Her support throughout the Kellogg course has meant everything. Between managing our hospitality business and parenting our amazing son, she has had a lot on her plate and still managed to back me every step of the way. Whether it was giving me the space to focus on the project, picking up the slack at home, or just being there when I needed a reset, Deb has been the steady hand behind the scenes. I could not have done this without her, and I am incredibly grateful for everything she has done to help me through this journey.

Finally, a massive thank you to my fellow Kellogg Cohort 54. I've truly valued the laughs, the honest chats, the fiery debates, and the way everyone brought their own spark to the room. What made it special was how inclusive it felt; no one was ever left out of the conversation. It's been a privilege to learn, grow, and be challenged alongside such a sharp, passionate, and genuinely good-hearted group of people.

1. Key Terms and Definitions

Table 1 outlines the definitions of some key terms used throughout this report.

Table 1: Key terms and definitions

Term	Definition
GBF	Kunming-Montreal Global Biodiversity Framework
kg MS	Kilograms of milksolids
ha	Hectare
NPS-IB	National Policy Statement for Indigenous Biodiversity
B4BI	Biodiversity beneficial insects
FEP	Farm Environment Plan
COP15	Fifteenth Conference of the Parties
ECAN	Environment Canterbury
GBF	Global Biodiversity Framework
MPI	Ministry for Primary Industries

2. Introduction

New Zealand's natural environment is central to both its identity and its economy. However, habitat loss, pollution, and overuse of resources are driving a biodiversity crisis, with many native species declining and ecosystems being degraded. National assessments show the scale of this challenge is significant: an estimated 63% of New Zealand's ecosystems are currently threatened (EY, 2024).

In the Canterbury region, the transformation is especially stark. The Canterbury Plains, once home to extensive lowland ecosystems, have mainly been converted to intensive agricultural production, particularly dairy farming. Today, less than 0.5% of the original remnant habitats persist, making it one of the most ecologically depleted landscapes in the country (Fitzgerald, 2023).

While dairy farming is economically vital, contributing substantially to both the regional and national economy, its environmental externalities are increasingly under scrutiny. Nitrate leaching, sediment runoff, loss of riparian habitats, and river pollution are well-documented issues across Canterbury catchments (Gilbert et al., 2019). These impacts not only degrade ecosystems but also affect the sector's public image and its ability to maintain community support.

Against this backdrop, farmers, regulators, iwi, environmental NGOs, and the public are demanding more sustainable practices. The concept of *social licence to operate*, which refers to the implicit acceptance of an industry's activities by society, is increasingly recognised as critical for the long-term viability of primary production in New Zealand (Elliot et al., 2024).

However, enhancing biodiversity on working dairy farms is not a straightforward process. Trade-offs exist, such as land allocated for native plantings reducing the production area; costs and maintenance requirements are real; and farmers' values and risk perceptions strongly influence uptake. Prior research in Waikato and Canterbury indicates that while many farmers prioritise profitability, a growing number are motivated to invest in biodiversity where it aligns with their values and operational capacity (University of Waikato, 2024).

Figure 1 *– Biodiversity integration on a Canterbury Dairy Farm.*

In Canterbury specifically, remnants such as the Bankside Scientific Reserve illustrate how native species can persist within an intensified dairy matrix but also how fragment edges are vulnerable to nutrient encroachment and habitat degradation (Bowie et al., 2016).

This context emphasises the urgent need to understand how biodiversity enhancement can be effectively incorporated into the Canterbury dairy landscape while also fostering and maintaining social licence. Figure 1 provides a clear example of biodiversity integration on a Canterbury dairy farm. This research aims to (i) identify suitable biodiversity interventions under local conditions, (ii) assess stakeholder perceptions and trade-offs, and (iii) develop a framework for combining ecological and social goals within Canterbury dairy operations.

By doing so, this project aims to support dairy farms in shifting from being viewed as environmental liabilities to being recognised as trusted stewards of the land who actively contribute to better ecological outcomes and enhance community trust.

3. Objectives

Enhancing biodiversity on Canterbury dairy farms to improve our social license to operate

With a focus on biodiversity enhancement, the objectives of this research project are to:

- Identify and analyze the key barriers within the dairy industry that prevent or discourage on-farm biodiversity practices.
- Gather and present evidence demonstrating that increased on-farm biodiversity can coexist with, or even enhance, per-hectare productivity.
- Develop practical tools and recommendations to help farmers overcome these barriers and adopt biodiversity-friendly practices.
- Define what "social license to operate" means in the context of biodiversity and assess how enhanced biodiversity can contribute to maintaining or strengthening this social license, especially in Canterbury.
- Understand the importance of having and maintaining a social license to operate.

4.0 Literature Review

The PESTEL framework was applied in the literature review to provide a structured lens for examining the focus area of this research project (Figure 2). By considering political, economic, social, technological, environmental, and legal factors, the model helps place existing research within its broader context and highlights the external drivers shaping current practice and the debate.

Using the PESTEL analysis technique also ensures a systematic approach to identify trends, pressures, and gaps in the literature, thereby strengthening the rationale for this research and clarifying its relevance. A literature review is not just about summarizing past studies; it also identifies gaps, establishes the broader context, and supports critical thinking.

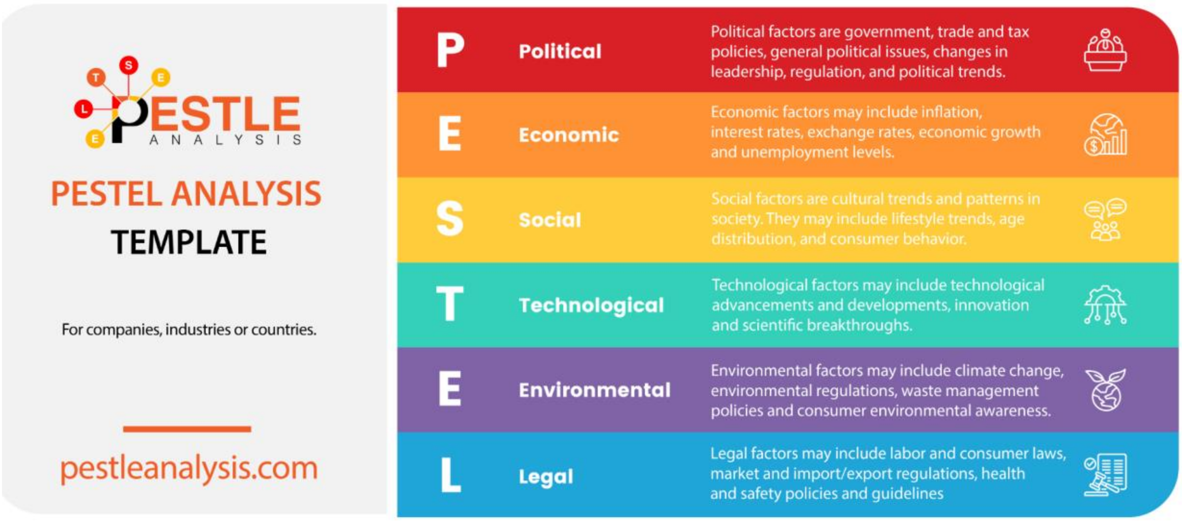

Figure 2 *- An overview of the Pestle framework applied to the literature review (sourced from PESTLE analysis Team, 2019)*

4.1 Political

Across the globe, there is great emphasis on halting biodiversity losses and putting nature on a path to recovery. A critical piece of legislation is the Kunming-Montreal Global Biodiversity Framework (GBF). This framework was developed at the fifteenth Conference of the Parties (COP15) to the UN Convention on Biological Diversity, held in 2021–2022 in Montreal, Quebec, Canada, from December 7 to 19, 2022.

Often described as the “Paris Agreement for nature,” it set global goals and 23 targets framed into three key areas.

- Reducing threats to biodiversity
- Meeting people's needs through sustainable use and benefit
- Tools and solutions for implementation and mainstreaming

To align with this global framework, the New Zealand Government submitted thirteen national targets (Department of Conservation Te Papa Atawhai, n.d). The national targets were objectives from “Te Mana o Te Taiao”, Aotearoa New Zealand Biodiversity Strategy. Figure 3 displays Te Mana o te Taiao Aotearoa New Zealand Biodiversity Strategy 2020 (ANZBS) in complete story form.

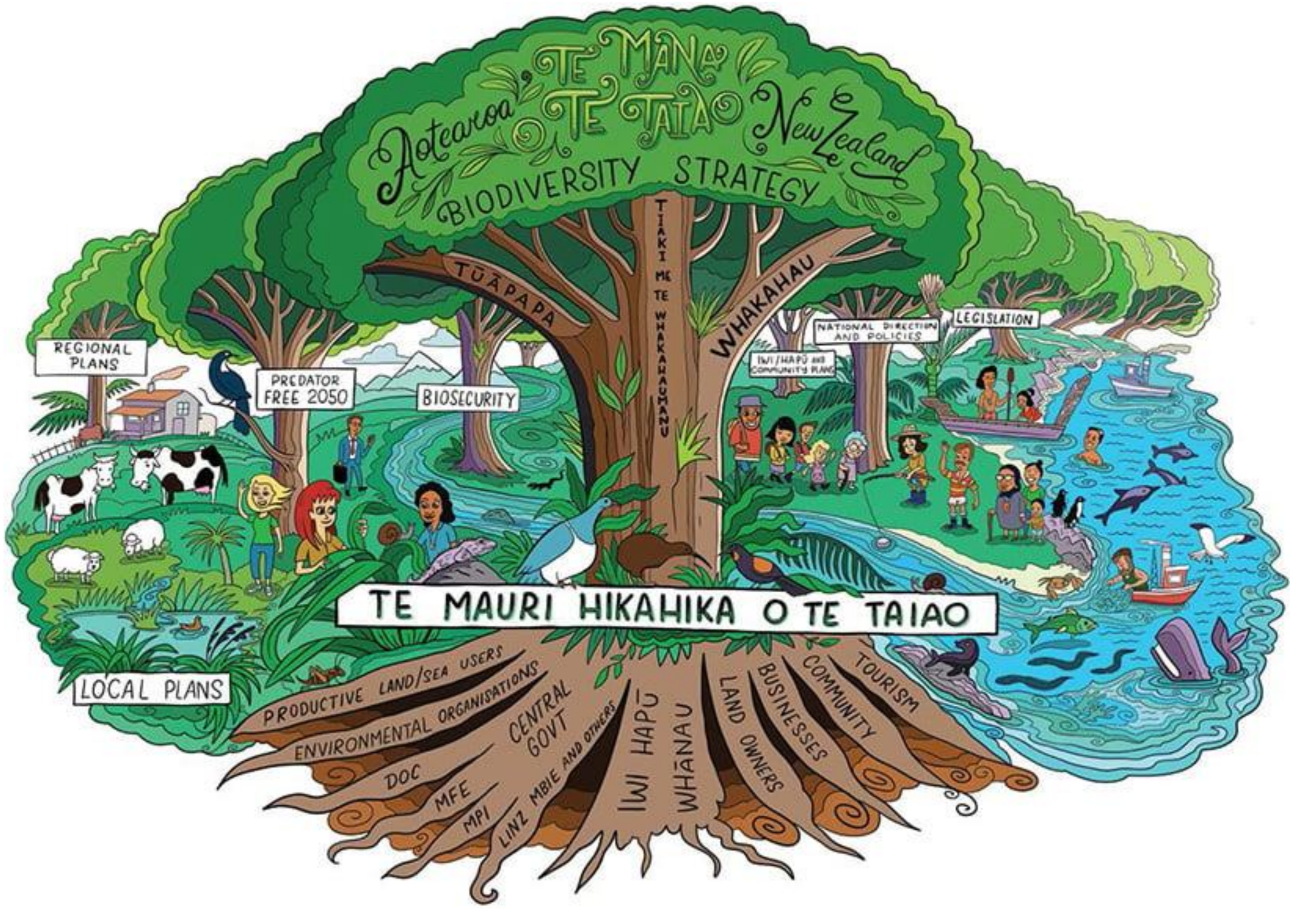

Figure 3 *-Displays Te Mana o te Taiao Aotearoa New Zealand Biodiversity Strategy 2020 in complete story form. Sourced from (Department of Conservation Te Papa Atawhai, 2020).*

Te Mana o Te Taiao is a roadmap guiding conservation action at national, regional, and local levels. This is to address pressures on nature, such as:

- climate change
- invasive species
- exploitation of species
- the way we use our land and sea
- pollution.

It also establishes the policy foundation for how New Zealand contributes to the GBF's flagship '30 by 30' target, which aims to conserve at least 30% of land, inland waters, and marine areas by 2030, including the protection of indigenous and traditional territories (Department of Conservation Te Papa Atawhai, n.d.). This global target is directly reflected in New Zealand's National Policy Statement for Indigenous Biodiversity (NPS-IB), which provides clear direction to support the protection of 30% of New Zealand's land, water, and ocean areas by 2030.

To support these commitments, the Ministry for the Environment's NZ$1.2 billion Jobs for Nature Programme has provided vital funding since 2020 to advance biodiversity restoration and conservation efforts across Aotearoa. However, this funding is scheduled to end by 2025, creating a significant gap in financial support for nature projects and potentially threatening progress towards the '30 by 30' goal.

Implementation at the local level is managed through regional councils. Local authorities are responsible for integrating the NPS-IB objectives into district and regional plans, identifying significant natural areas, and regulating land use via resource consents. This guarantees that national biodiversity priorities are applied, monitored, and enforced within communities.

4.2 Economics

4.2.1 Global Context

Global biodiversity is declining, and economists are increasingly recognizing the rising costs of these losses. According to S&P Global Sustainable (2023), 85% of the world's largest companies in the S&P Global 1200 significantly depend on nature across their direct operations. What underpins "nature" is the cross-functionality of ecosystem services that companies rely on, such as crop pollination and nutrient recycling.

S&P Global Sustainable (2023) emphasizes that, in 2019, over half of the global GDP (around $44 trillion) was moderately or highly reliant on ecosystem services. Table 2 demonstrates the variety of ecosystem services, including their economic advantages, in the United States and worldwide (Pimentel et al., 1997).

Table 2. Total estimated economic benefits of biodiversity in the United States and worldwide (see text for details).

Activity	United States (× 10^9)	World (× 10^9)
Waste disposal	62	760
Soil formation	5	25
Nitrogen fixation	8	90
Bioremediation of chemicals	22.5	121
Crop breeding (genetics)	20	115
Livestock breeding (genetics)	20	40
Biotechnology	2.5	6
Biocontrol of pests (crops)	12	100
Biocontrol of pests (forests)	5	60
Host plant resistance (crops)	8	80
Host plant resistance (forests)	0.8	11
Perennial grains (potential)	17	170
Pollination	40	200
Fishing	29	60
Hunting	12	25
Seafood	2.5	82
Other wild foods	0.5	180
Wood products	8	84
Ecotourism	18	500
Pharmaceuticals from plants	20	84
Forests sequestering of carbon dioxide	6	135
Total	$319	$2928

Total estimated economic benefits of biodiversity in the United States and worldwide

Note. Adapted from "Economic and environmental benefits of biodiversity," by Pimentel, D., Wilson, C., McCullum, C., Huang, R., Dwen, P., Flack, J., Tran, Q., Saltman, T., & Cliff, B., 1997, BioScience, 47(11), p. 752 (https://doi.org/10.2307/1313097). Copyright 1997 by Oxford University Press.

This highlights the broad and often overlooked contributions of biodiversity to human welfare and economic systems. Industries such as food, agriculture, fisheries, and construction depend heavily on biodiversity, making them particularly vulnerable to its decline.

Most ecosystem services are not priced because they are public goods, which creates externalities and weak incentives for conservation (OECD, 2021). Even when services are priced, such as some provisioning and cultural services, markets are often distorted by subsidies or a lack of competition.

The global response to halt and reverse biodiversity losses has been slow (Davis-Preccould, et al., 2023), highlighting that 15% of companies have assessed the impact of their value chain on biodiversity both upstream and downstream. However, companies have shared limited information on biodiversity-related issues.

Conserving, sustainably utilizing, and restoring biodiversity not only reduces risks and costs to society but also presents significant economic opportunities through job creation (OECD, 2021). Investments in nature-based solutions create, on average, about 40 jobs for every USD 1 million spent, roughly ten times more than similar investments in fossil fuels (Levy, Brandon, & Studart, 2020). Likewise, the World Economic Forum (2020) forecasts that nature-positive business models could generate up to 395 million jobs by 2030 while adding an extra USD 10.1 trillion in annual business value.

4.2.2 New Zealand Context

In New Zealand, the economic value of nature is also significant. The Environment Guide (2018) states that studies conducted to assess New Zealand's ecosystem services, most recently in 2013, concluded that the "total economic value" of all land-based ecosystem services in New Zealand is $57 billion per year.

Biodiversity and ecosystem services also play a vital role in supporting New Zealand's dairy sector, which is among the country's largest export industries. In the year ending 30 June 2025, the sector earned $25.5 billion in export revenue, representing a 10% increase from $23.2 billion in 2024 (Ministry for Primary Industries, 2024). Table 3 illustrates dairy export revenue trends from 2020 to 2026, showing steady growth in the sector.

Table 3 - Dairy Export Revenue 2020-2026

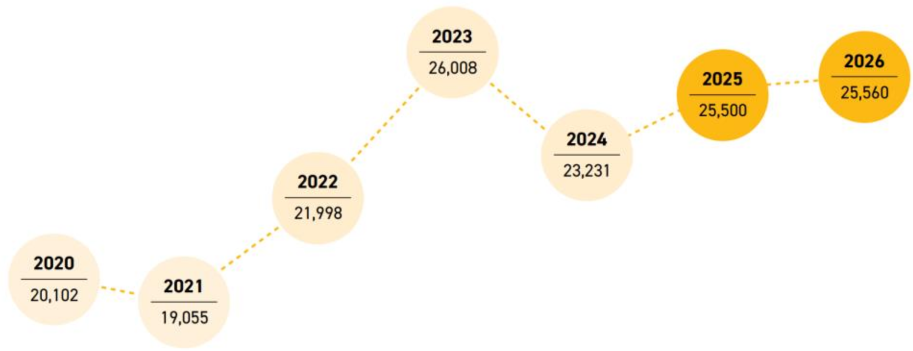

Table 2: Dairy export revenue 2020–26
Year to 30 June, NZ$ million

Note from: Situation and Outlook for Primary Industries, by Ministry for the Primary Industries, 2024

A key reason for Canterbury's extensive contribution to the overall dairy revenue is the implementation of irrigation. This effort started with the Rangitata Diversion Race (RDR) scheme in 1944, which irrigated around 64,000 hectares of land between the Rangitata and Rakaia Rivers (Rangitata Diversion Race Management Ltd., 2008). Early adoption mainly involved border-dyke irrigation, offering drought protection for mixed sheep and cropping systems.

Later schemes included Amuri (1980, government-supported) and the Opuha Dam (1998, farmer-funded). From the 1990s, submersible pumps enabled groundwater use. By the mid-2000s, approximately 400,000 hectares were irrigated, with just over half of the area irrigated through community river schemes and the rest from wells (Bright, 2006).

What this has effectively resulted in for Canterbury is that irrigation and new technologies have enabled farms to run more cows per hectare and achieve higher milking volumes, leading to the region having some of the highest milk solids production per hectare in New Zealand. NZIER's *Value of Irrigation in New Zealand* report, in partnership with AgFirst, estimates that converting land from sheep and beef or arable systems to dairy under irrigation results in an average profitability gain of approximately $3,000 per hectare.

This strong on-farm performance is reflected in the production data. Table 4highlights Canterbury's role as a major contributor to the national dairy industry, producing 417,753,784 kgMS or 47% of total milk solids in the South Island. Canterbury alone accounts for 22% of New Zealand's total milk solid production.

Table 4: Herd Production analysis by region 2023/2024

Region	Total kg milk solids	Percent milk solids	Average litres per herd	Average kg milkfat per herd	Average kg protein per herd	Average kg milk solids per herd	Average kg milkfat per effective hectare	Average kg protein per effective hectare	Average kg milk solids per effective hectare	Average kg milkfat per cow	Average kg protein per cow	Average kg milk solids per cow
Northland	69,777,620	3.7	1,118,344	57,220	44,054	101,274	373	287	660	174	134	307
Auckland	30,586,430	1.6	1,133,378	56,953	44,326	101,280	452	351	803	195	152	347
Waikato	411,769,631	21.9	1,499,350	76,835	59,423	136,257	620	480	1,100	216	167	383
Bay of Plenty	58,226,359	3.1	1,398,067	71,291	55,013	126,304	543	419	963	196	151	347
Central Plateau	95,281,308	5.1	2,436,420	123,639	95,903	219,542	561	435	997	216	167	383
Western Uplands	13,589,301	0.7	1,806,525	94,754	73,015	167,769	446	343	789	176	136	312
East Coast	1,270,592	0.1	1,961,917	102,693	78,820	181,513	493	379	872	190	146	335
Hawkes Bay	15,531,080	0.8	2,691,088	135,698	106,975	242,673	540	426	966	201	158	359
Taranaki	176,092,825	9.4	1,304,629	68,402	52,624	121,026	601	462	1,063	222	171	393
Manawatu	78,383,707	4.2	1,845,178	92,816	72,551	165,366	541	423	963	223	174	397
Wairarapa	51,382,924	2.7	1,544,826	80,033	61,908	141,942	521	403	923	207	160	368
North Island	**1,001,891,777**	**53.2**	**1,497,774**	**76,848**	**59,445**	**136,293**	**558**	**432**	**990**	**211**	**163**	**373**
Nelson / Marlborough	25,936,282	1.4	1,547,475	81,032	62,263	143,294	536	412	948	213	163	376
West Coast	49,052,742	2.6	1,508,152	80,181	62,001	142,182	446	345	791	202	156	359
North Canterbury	311,215,397	16.5	3,870,983	198,059	157,615	355,675	840	668	1,508	247	197	444
South Canterbury	106,538,600	5.7	3,706,519	190,194	151,276	341,470	758	603	1,361	239	190	429
Otago	112,334,387	6.0	2,805,724	144,437	114,398	258,835	642	508	1,150	234	185	419
Southland	275,355,670	14.6	3,007,980	155,532	123,450	278,982	698	554	1,252	258	205	463
South Island	**880,433,078**	**46.8**	**3,041,005**	**156,722**	**124,207**	**280,930**	**710**	**563**	**1,273**	**243**	**193**	**436**
New Zealand	**1,882,324,855**	**100.0**	**1,959,051**	**100,723**	**78,803**	**179,525**	**620**	**485**	**1,105**	**225**	**176**	**400**

Note. From the New Zealand Dairy Statistics 2023/2024, by, DairyNZ., LIC.

According to DairyNZ's (2023) report, the dairy sector employed nearly 55,000 people across New Zealand, with total wages amounting to $3.6 billion in the year ending March 2023. This significant employment base highlights the sector's vital role in providing livelihoods and economic stability for many communities.

These figures illustrate the economic impact of the dairy sector and highlight its social significance, making it a pillar of employment and community well-being across many parts of New Zealand.

4.3 Social

The social aspect of the PESTEL framework emphasises how societal values, expectations, and perceptions are increasingly influencing farming practices both locally and internationally. Communities now expect farmers to go beyond mere compliance and actively demonstrate environmental responsibility, particularly in safeguarding biodiversity and managing waterways effectively. This indicates a shift in how rural industries are assessed, where visible actions are often regarded as equally important as adhering to regulations (Edwards & Trafford, 2016).

A key element of social licence to operate is trust and reputation**.** Trust cannot be demanded; it is earned through consistent behaviour and outcomes that align with community expectations (Williams & Martin, 2011). For dairy farmers, actions such as riparian planting, reducing sediment runoff, and protecting native habitats help demonstrate responsibility and build credibility with both local communities and the broader society.

In the context of Canterbury, cultural values also play a role. Māori principles such as *kaitiakitanga* (guardianship) connect biodiversity and farming to deeper notions of land stewardship and intergenerational responsibility (Harmsworth & Awatere, 2013). This reinforces the need for farmers to engage not only with environmental outcomes but also with the cultural dimensions of land care. Aligning these values with practical action is increasingly important, as changing consumer behaviour further underscores the significance of biodiversity.

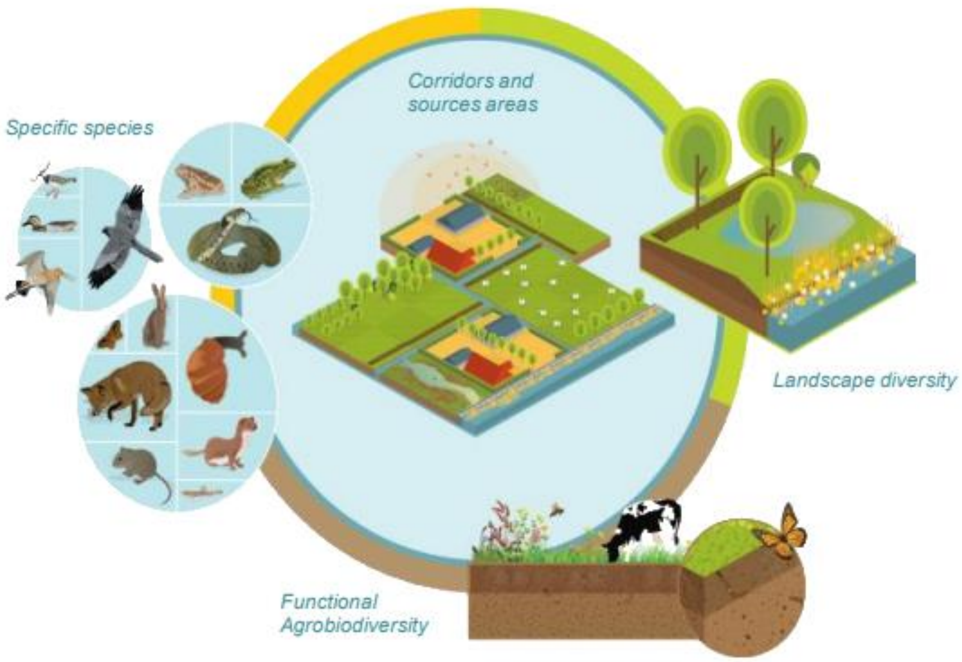

***Figure 4** – Four interconnected Pillar for biodiversity in and around Agriculture, sourced from Erisman et al. (2016)*

As illustrated in Figure 4, four interconnected pillars support agricultural biodiversity: functional agrobiodiversity, landscape diversity, source areas and corridors, and specific species management (Erisman et al., 2016). This conceptual framework closely reflects how social expectations, cultural values such as kaitiakitanga, and community engagement shape biodiversity action on Canterbury farms and across New Zealand.

It highlights that on-farm biodiversity is influenced not only by environmental and economic drivers but also by strong social and cultural dynamics.

Building on this understanding, last year I led a project on five Canterbury dairy farms, developing comprehensive biodiversity (ecology) plans aimed at achieving biodiversity outcomes of 5% or more. This initiative was driven by a multinational client, reflecting the way global consumer expectations are increasingly shaping local farming practices and biodiversity goals in the New Zealand dairy sector.

These specific farm-level actions mirror a broader trend: global and domestic consumers are increasingly demanding sustainably produced food, connecting their purchasing choices to visible environmental outcomes (OECD, 2021). In this way, consumer-driven pressure feeds directly back to farmers, strengthening the importance of biodiversity enhancements not only for environmental stewardship but also for maintaining market access and safeguarding reputation.

Alongside these market pressures, peer and community influence also shape adoption. Farmers are often inspired by the actions of their neighbours, catchment groups, and local role models, as well as visible biodiversity projects such as shelterbelts or riparian zones which help establish community norms that encourage wider uptake (Blackstock et al., 2010). Together, these forces demonstrate that biodiversity enhancement is both an environmental responsibility and a socially contagious practice within farming communities. There is also the added animal welfare benefit of these actions of more shelter and shade for the cows.

4.3.1 Social Licence

Social licence to operate (SOL) is a term commonly used in the primary sector, although its meaning is often unclear. It was first introduced in the mining industry in the mid-1990s to describe efforts to rebuild community trust and acceptance after significant environmental disasters (Thomson & Boutilier, 2011).

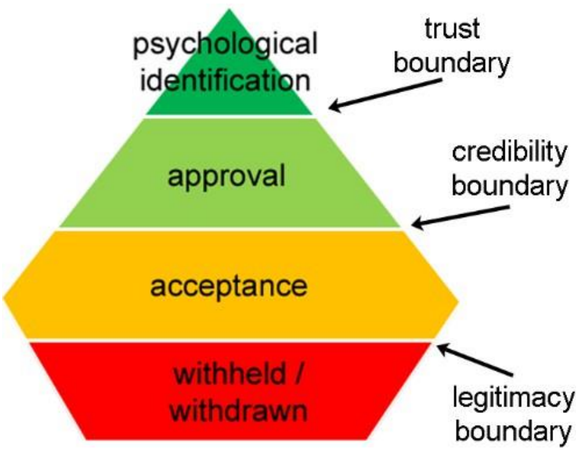

Figure 5 *- The pyramid model of SLO proposed by Thomson & Boutilier (2011)*

The pyramid model developed by Thomson and Boutilier, shown in Figure 5, illustrates the different levels of a Social Licence to Operate (SLO) (Boutilier & Thomson, 2011). At the base is the loss of an SLO, often caused by regulatory or compliance failures. The next level, acceptance, represents the most common form of social licence, where stakeholders tolerate a project or company's actions. If credibility is consistently demonstrated, the SLO can progress to approval.

With sustained long-term trust, it may eventually reach a stage of psychological identification, where stakeholders believe the company always acts in the community's best interests and shares responsibility for project success (Thomson & Boutilier, 2011).

In the context of this report, the SLO model emphasises how tangible biodiversity improvements and proactive engagement with farmers, communities, and regulators can build trust and strengthen a farm's social licence. By demonstrating a commitment to both environmental, animal welfare, and social outcomes, farms can progress from mere acceptance to higher levels of approval and identification, which reduces socio-political risk and boosts their reputation within the community.

Social licence, in this context, is not a legal permit but a form of community trust that shows how well a farm's practices match public expectations. Farmers are increasingly recognising that meeting regulatory requirements alone is no longer sufficient to keep their ability to operate. They must consider the social, environmental, and cultural impacts of their actions. As Williams and Martin (2011) note, while change can be uncomfortable, earning and maintaining community trust is the most effective way to ensure this licence is not lost. Building SLO requires ongoing effort, strong relationships, and a clear commitment to best-practice farming and biodiversity outcomes.

Trust cannot be demanded; it is earned through consistent, trustworthy behaviour and actions. Since SLO is granted by communities rather than organizations, success depends on genuinely acting in the community's interests. It is an ongoing process that must be continually maintained as perceptions and expectations evolve.

Farmers, now more than ever, must go beyond mere compliance, demonstrating to the public that they are doing their best for the environment, their animals, and their employees. At the same time, it is important to recognize that trying to meet every expectation can risk satisfying no one, including the farmer. Care is needed to find the right balance between genuine improvement and practical implementation. In my view, a strong social licence is both the right to start, and the right to continue farming. People are watching more closely than ever, so we must do better and be better.

4.4 Technological

As biodiversity faces unprecedented threats, technology is becoming an increasingly vital tool for conservation. Tools such as remote sensing, artificial intelligence, and data analytics help us better understand ecosystems and support more effective ecological restoration efforts (Campbell, 2024). Agriculture can significantly contribute to conserving biodiversity, as farmland often supports a diverse range of species and ecosystems (Bommarco, Kleijn, & Potts, 2013).

Remote sensing and Geographic Information Systems (GIS) provide farmers with detailed and accurate information about their land, including soil and habitat types; vegetation cover and species distribution. By capturing data from satellites, drones, or aerial imagery, these tools enable continuous monitoring over large areas, allowing for the identification of changes or threats to ecosystems in real-time.

A good example of using satellite and aerial imagery to support on-farm biodiversity is CarbonCrop. This technology combines satellite images with on-the-ground verification to produce detailed farm maps that show all vegetation, classifying it as native or exotic (Figure 6). By providing this clear overview of what is growing where, CarbonCrop adds another layer of information that farmers can use to plan and manage biodiversity more effectively.

These surveys are especially valuable in regions that are difficult to access on the ground. By identifying biodiversity hotspots and monitoring the health of different ecosystems, aerial surveys offer crucial information for planning and implementing effective conservation efforts (Campbell, 2024).

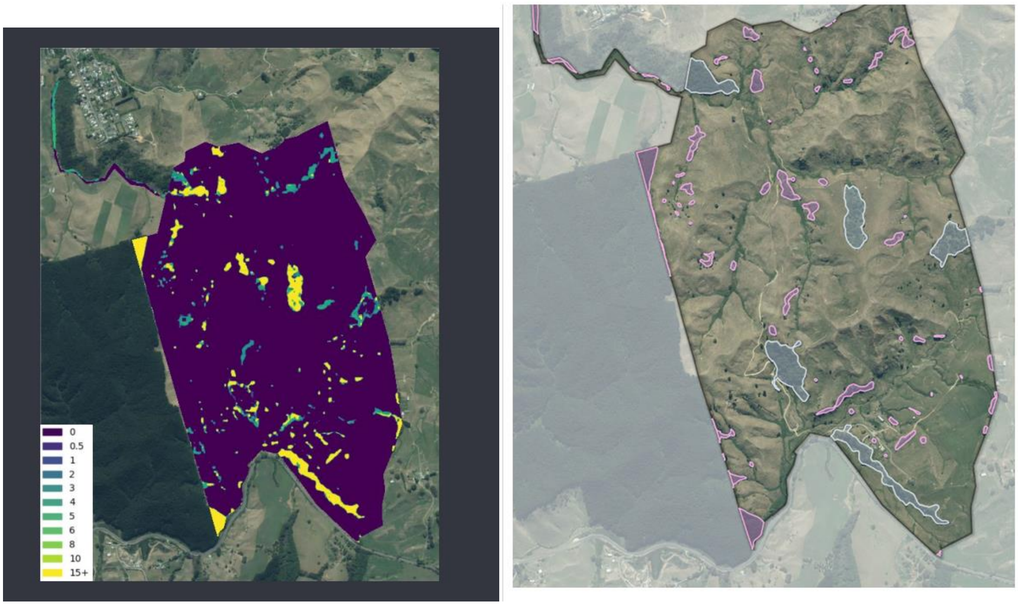

Figure 6 - *CarbonCrop mapping showing the rate of carbon sequestration (left), farm map (right) displaying mapped vegetation.* ***(Synlait 2024)***

Research indicates that integrating GIS and remote sensing into farm management improves both environmental outcomes and operational efficiency (Turner et al., 2003).

Artificial intelligence (AI) is transforming environmental monitoring and conservation. Machine learning can analyse complex datasets from remote sensing and ecological surveys to predict species distributions and assess habitat health, enabling proactive management before serious threats arise.

In New Zealand, initiatives such as Sustainable Living are harnessing AI to improve conservation strategies. By combining AI with local ecological knowledge, these projects aim to enhance the effectiveness of ecological restoration efforts, ensuring that native species are protected and reintroduced into their natural habitats (Campbell, 2024).

By integrating artificial intelligence (AI) with remote sensing, conservationists and farmers can better understand ecosystems, develop more effective restoration methods, and enhance on-farm biodiversity. As these technologies keep progressing, their ability to support sustainable agriculture and ecological restoration will only grow.

Drones are now enhancing this capability. They provide a quick, adaptable, and cost-efficient way to gather detailed environmental data over large areas. With high-resolution cameras and sensors, drones can capture imagery that helps monitor habitat conditions, identify biodiversity hotspots, and evaluate the success of restoration projects. On Canterbury dairy farms, these tools could be used to map native plantings, assess riparian zones, and support more targeted biodiversity planning.

Technology could become the tool through which biodiversity shifts from an abstract idea to tangible, visible proof, helping farmers showcase environmental contributions and strengthen their social licence. Advances in planting, genetics, and smart monitoring systems enable biodiversity improvements to be monitored, shared, and trusted (OECD, 2021).

For example, DairyNZ is already investigating how wearable data can inform pasture management and animal welfare, reflecting the increasing consumer demands for transparency (DairyNZ, 2024). Digital dairy solutions like sensors and automation are recognized as new drivers of this trend in New Zealand (Eastwood et al., 2023).

4.5 Environmental

For this report, biodiversity refers to the variety of living organisms plants, animals, and microorganisms found within a specific area, ecosystem, or across the planet. Biodiversity is vital for healthy ecosystems, supporting services such as clean water, fertile soils, pollination, and climate regulation (Regenerative Agriculture Wiki, 2024).

Figure 7 illustrates how ecosystems in New Zealand provide a wide range of essential benefits that support both human wellbeing and environmental health. These ecosystem services are commonly grouped into four categories: supporting (e.g., nutrient cycling and soil formation), provisioning (e.g., food, fibre, fuel, and water), regulating (e.g., climate control, water purification, flood and disease regulation), and cultural (e.g., recreational, spiritual, and educational values).

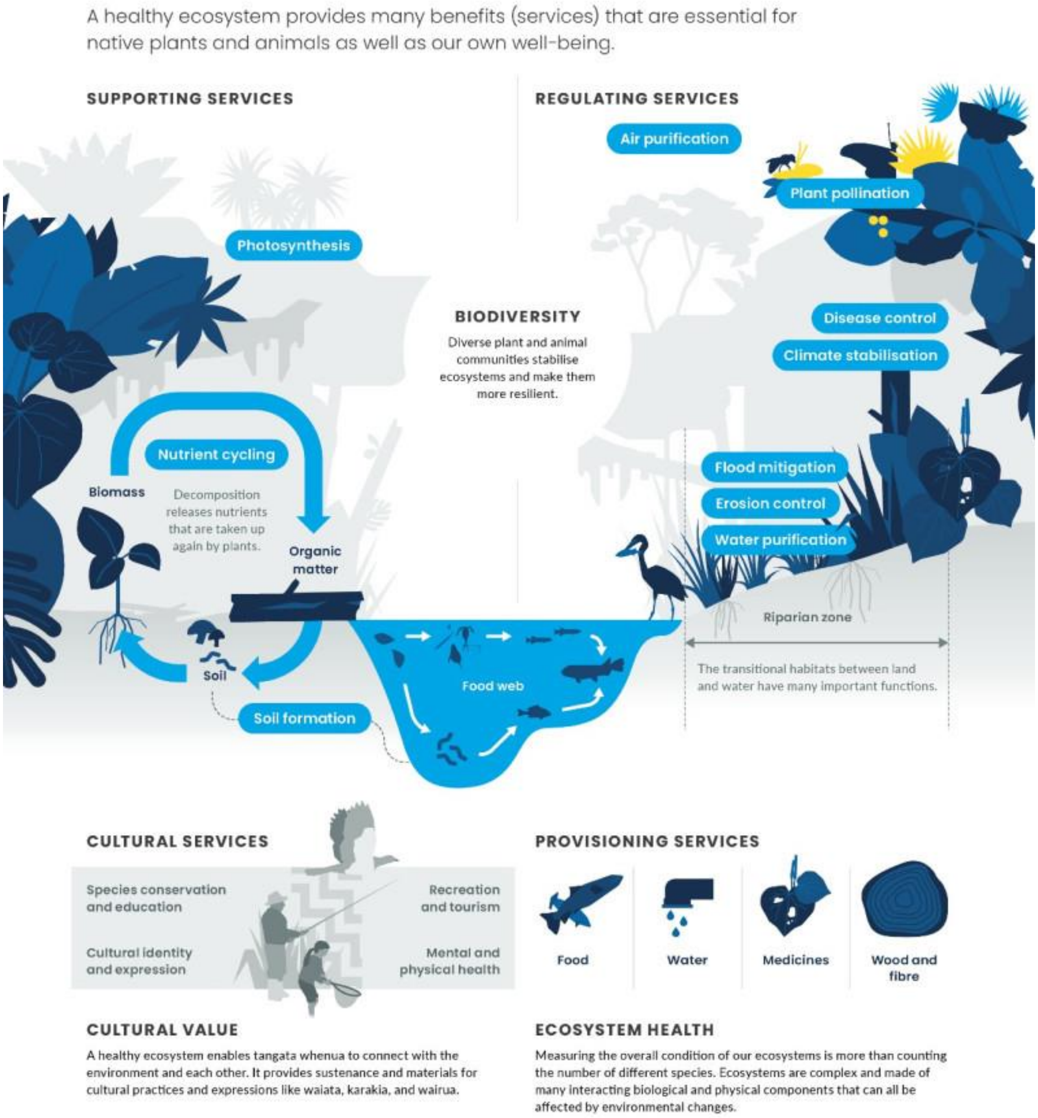

***Figure** 7 - Healthy ecosystem services, source (Ministry for the Environment, 2024)*

Building on this, Figure 8 highlights how ecosystem services are delivered at the farm scale. It demonstrates key benefits provided by diverse planting communities, including flood mitigation, erosion control, and water purification. This example shows a well-developed riparian area functioning as a natural filter system providing shade to suppress weeds, stabilising stream banks to reduce erosion, and improving overall water quality.

Figure 8: *Canterbury spring-fed spring with well-established riparian planting**.** (Sourced: Nick Vernon, 2024)*

Throughout this report, we discuss ecosystem services, which are closely linked to the concept of functional biodiversity and the role native species play in supporting healthy farm ecosystems. For example, planting cabbage trees (ti kōuka) can attract beneficial insects that improve ecological balance and soil health. By presenting these ideas in practical, relatable ways, farmers can apply biodiversity principles on their farms to help reverse habitat loss and restore ecosystem function.

The concept of functional biodiversity emphasises the tangible ecological benefits that biodiversity offers to farming systems, such as enhanced pest control, improved pollination, and healthier soils, rather than just its aesthetic or conservation value.

This idea is reflected in the Sustainable Food and Fibre Futures (SFFF) programme "Biodiversity for Beneficial Insects: Designing Native Plantings for Beneficial Insects," which builds on research by Plant & Food Research (n.d.) showing that native species like tī kōuka (cabbage tree) support a variety of beneficial pollinators and pest predators that improve on-farm ecosystem health

Through the five-year Plant & Food Research project Beneficial Insects (B4BI), scientists discovered that cabbage trees (tī kōuka), when planted among diverse native vegetation, attract a variety of pollinators and pest predators that enhance the health of farm ecosystems. Figure 9 from their study visually illustrates this, helping farmers see how native species like tī kōuka contribute to functional biodiversity on farm.
This evidence helps shift the narrative from "planting natives for looks" to planting natives for function, supporting insect biodiversity that contributes to:

- Natural pest suppression
- Improved pollination

- Enhanced ecosystem resilience

For Canterbury dairy farms, this means that strategic native planting can be an economical, high-impact way to improve environmental results while gaining social licence and meeting sustainability goals.

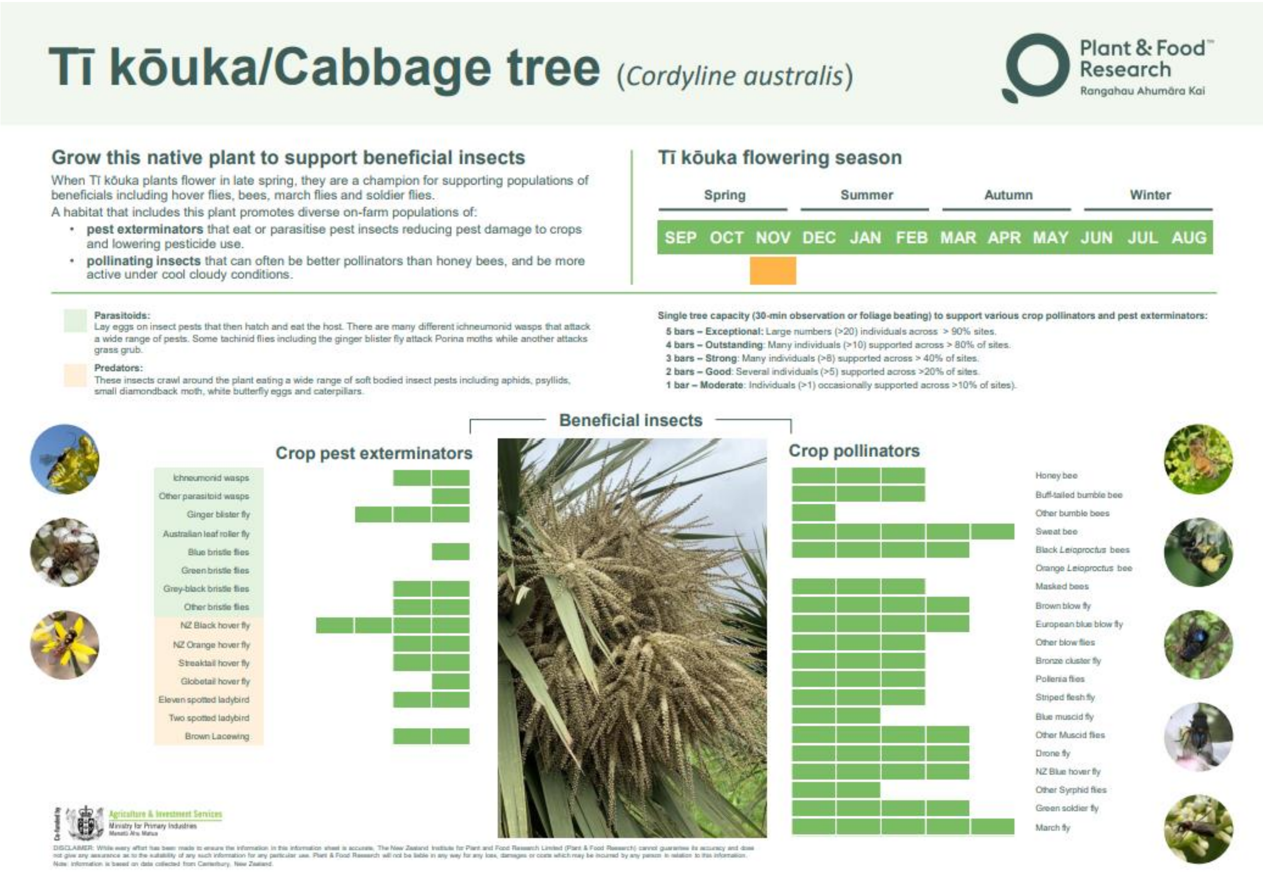

Figure 9 *- Cabbage Tree Factsheet Developed to Support Knowledge from B4BI Project. Sourced from (Plant & Food Research, n.d)*

The wider farming community needs to recognise the additional advantages of planting key native species, such as the cabbage tree (tī kōuka), on their farms. These plantings provide real value, but the science and benefits behind them must be clearly communicated.

Biodiversity is not just about protecting nature; it supports our economy and way of life. Worldwide, over one billion people rely on forests for their livelihoods, and biodiversity remains one of our strongest natural defences against climate change.

4.5.1 Climate change

Climate change is one of the most significant threats to environmental sustainability and is closely linked to the decline of biodiversity. Human activities, such as the use of fossil fuels, deforestation, and intensive land use, have increased greenhouse gas emissions, leading to higher global temperatures and more unpredictable weather patterns. These changes affect ecosystems through both direct and indirect pathways.

As shown in Figure 10, climate change has direct impacts, including shifts in species ranges and altitudes, changes in timing and seasonality, and variations in local abundance and trophic interactions. It also causes indirect impacts, such as increased pest pressure, invasive weeds, new diseases, and greater human pressures like land-use change, water abstraction, and coastal development. Together, these pressures reduce the ability of natural ecosystems to buffer climate impacts and maintain ecological stability.

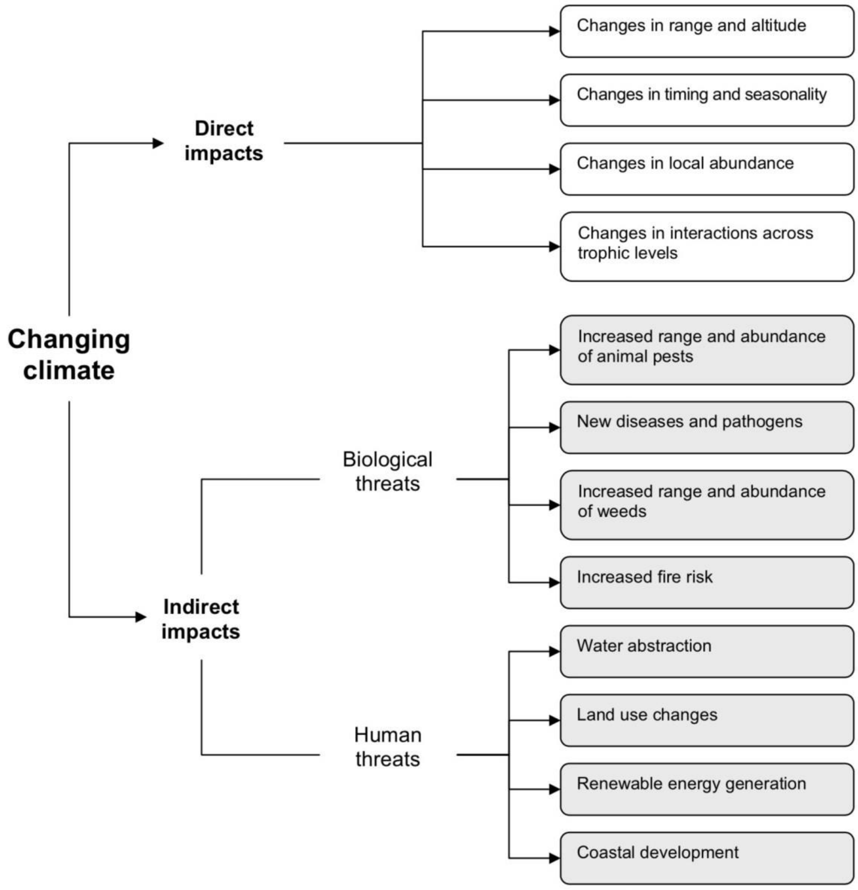

Figure 10- *How climate change directly and indirectly impacts biodiversity. Sourced from (Climate & Nature New Zealand, n.d.)*

In Aotearoa New Zealand, the impacts of climate change are no longer hypothetical; they are already occurring. Rising sea levels, increasing droughts, and changing rainfall patterns are directly impacting land use, water resources, and primary production systems, including the dairy industry. According to the Department of Conservation (2020), these changes are heightening pressures on biodiversity and endangering species and ecosystems already affected by habitat loss, invasive pests, and climatic variability. The effects are extensive, from altered reproduction and survival of native fauna to notable shifts in freshwater, alpine, coastal, and marine environments. These pressures also increase risks to culturally significant taonga.

The New Zealand Government has responded through the Climate Change Response Act, which sets clear emissions targets and supports the transition to a low-carbon economy. At the local level, councils are developing climate adaptation plans to help communities prepare for and manage these impacts. Aligning with these initiatives not only supports environmental outcomes but also strengthens public trust and reinforces a farm's social licence to operate.

For Canterbury dairy farmers, climate change is already affecting pasture growth, water resources, animal welfare and overall farm productivity. Improving biodiversity through native plantings, riparian restoration, and habitat creation can help mitigate these impacts by enhancing soil health, increasing water retention, and stabilising habitats. In this way, biodiversity becomes both an environmental stewardship commitment and a practical climate adaptation strategy, protecting long-term farm viability.

Climate change brings new pressures through regulation and shifting weather patterns, but it also creates opportunities. Biodiversity restoration allows farms to demonstrate leadership, maintain social licence, meet regulatory goals, and strengthen ties with communities and consumers.

4.5.2 Environmental regulations

Environmental limits on nitrogen use, effluent management, and water allocation are tightening across New Zealand, especially in Canterbury. These regulations aim to protect water quality and ecosystem health, aligning with national guidelines under the Resource Management Act 1991, the Essential Freshwater Reforms (Ministry for the Environment [MfE], 2019), and the National Policy Statement for Freshwater Management.

Farmers now face a complex regulatory landscape that includes:

- Nitrogen use limits (e.g., 190 kg/ha/year on grazed land)
- Effluent discharge regulations and resource consent requirements under regional plans
- Greenhouse gas emission reduction targets within national climate policy
- Water use and allocation restrictions, particularly in Canterbury's irrigation areas
- Climate adaptation and mitigation expectations within emerging climate strategies
- Export and marketing compliance standards linked to environmental performance

These pressures collectively raise expectations on farmers to demonstrate responsible land and water management. Biodiversity initiatives are increasingly used not only to comply with regulations but to offset or mitigate environmental impacts and to demonstrate environmental stewardship.

Actions such as native planting, establishing riparian zones, and wetland restoration help reduce sediment and nutrient runoff, improve freshwater quality, and boost landscape resilience. These visible actions contribute directly to meeting regulatory goals while also building trust with communities and customers (Dodd et al., 2020).

In many ways, biodiversity enhancement has become a vital part of how farms demonstrate progress by linking regulatory compliance with social licence to operate. It signifies a shift from reactive compliance to proactive environmental management, positioning biodiversity as both a regulatory and reputational tool.

4.6 Legal

New Zealand faces considerable uncertainty as the government has proposed a plan to reform the Resource Management Act 1991 (RMA), the country's key environmental law. The primary purpose of the Act was to encourage sustainable management of natural and physical resources. This involves utilizing resources in ways that meet current needs while maintaining the environment's ability to meet the needs of future generations.

However, the RMA has undergone ongoing reform for more than twenty years. The report from the Expert Advisory Group on Resource Management Reform (2025) highlights the shortcomings of the RMA, including:

- Poor development outcomes, including ongoing shortages of developable land.
- Poor outcomes for the natural environment, including inadequate management of cumulative

environmental effects.

- Some poorly designed regulatory interventions – from national guidance to plans and consents – contribute to an overly complex system.
- Slow, litigious and costly processes.
- Deficient implementation, including compliance and enforcement and system monitoring, and given this, a need to consider changes in the approach, institutional arrangements, and building capability in both central and local government

The government's aim to replace the RMA involves two new legislations under two separate Acts.

i. A Planning Act (PA) focused on regulating the use, development and enjoyment of land.

ii. The Natural Environment Act (NEA) focused on the use, protection and enhancement of the natural environment.

The report from the Expert Advisory Group on Resource Management Reform (2025) highlighted the need for stronger measures such as clear environmental limits, heavier penalties for non-compliance, and resource use charges because outcomes for the natural environment have continued to deteriorate. In response to these concerns, the NEA Act aims to establish environmental limits to safeguard human health and the life-supporting capacity of the natural environment.

By clearly defining and enforcing these boundaries, New Zealand can better protect ecosystems, ensuring that biodiversity is maintained and species can thrive. For this report, we need to consider our international free trade and environmental agreements that require the government to protect the country's biodiversity.

Although these conventions cannot be directly enforced in New Zealand courts unless incorporated into national law, they still influence legal interpretation and hold moral significance. Examples of international agreements include (Environment Guide, 2018).

- Convention on International Trade in Endangered Species of Wild Fauna and Flora (1975)
- Convention on the Conservation of Migratory Species of Wild Animals (1979)
- Convention on Biological Diversity (1992)
- New Zealand's Free Trade Agreement with the United Kingdom and the European Union

International agreements have helped shape New Zealand's Biodiversity Strategy 2020, 'Te Mana o te Taiao', launched in August 2020, see section 4.1 of this report. The National Policy Statement for Indigenous Biodiversity 2023 (NPS-IB) which came into force in July 2023. Their goal is to preserve indigenous biodiversity so that there is "at least no overall loss in indigenous biodiversity".

The main way the NPS-IB achieves this is by requiring the identification and protection of areas with significant indigenous vegetation or habitats of native fauna, known as Significant Natural Areas (SNAs), as well as encouraging the restoration of indigenous biodiversity (Environment Guide, 2018).

Bringing together both the evidence from the literature and the voices of farmers and industry stakeholders, this research highlights how biodiversity, social licence, and community expectations are deeply interconnected on Canterbury dairy farms. The findings show that while farmers recognise the value of biodiversity, their ability to act is shaped by economic pressures, regulatory uncertainty, social expectations, and the strength of local relationships.

These insights underscore the importance of understanding not only *what* farmers think, but *why*, and how different influences shape their decisions. The following section outlines the methodology used to gather these perspectives, including how the interviews were conducted and analysed to form the basis of the themes and recommendations presented in this report.

5.0 - Methodology

5.1 Data Collection

5.1.1 Semi-structured interview

Fifteen semi-structured interviews were conducted with landowners to gather qualitative data on biodiversity, its value, barriers, and community influence within the dairy sector. The interview questions (provided in Appendix 1) were designed to explore four main areas.
The first focused on scale questions, asking participants to rate the importance of biodiversity on-farm, within the dairy sector, and in the Mid-Canterbury community.

The second set examined barriers to improving biodiversity, both on-farm and more broadly across the sector and region.
The third area explored community impacts, including participants' understanding of social licence to operate, community drivers for biodiversity, and the potential benefits biodiversity could bring.

The fourth set of questions addressed awareness of support and incentives, asking what assistance, resources, or science-based information would help farmers enhance biodiversity. Finally, questions were asked about community influence, farm planning, and potential mechanisms, such as biodiversity credits.

The interviews concluded with an invitation to provide additional comments. All 15 interviews were conducted across a wide group of farmers and rural professionals. Each participant viewed and signed the Kellogg Rural Leaders Interviewee consent form.

5.1.2 Data Analysis

This report recognizes the use of artificial intelligence tools, including Microsoft Copilot, ChatGPT, and Grammarly, to assist with thematic analysis and the synthesis of qualitative interview data. The research approach was qualitative, which means it focused on gathering rich, descriptive insights from participants rather than numerical data.

This approach is especially useful when investigating complex, context-dependent issues like biodiversity and social licence within the dairy industry. By conducting in-depth interviews, the study aimed to grasp farmers lived experiences, perceptions, and motivations, capturing subtleties that quantitative data often miss. Qualitative research offers flexibility, allowing the researcher to explore emerging ideas more thoroughly and adjust questions based on responses.

Through thematic analysis, a method used to identify, analyze, and report patterns (themes) within qualitative data, five key themes emerged from the interviews. These themes were refined with the assistance of Microsoft Copilot to aid in coding, summarization, and comparison across responses. Table 5 summarizes stakeholder groups in a way that maintains anonymity while highlighting patterns across different farming backgrounds and levels of experience. Interviews were conducted face-to-face, each lasting approximately one hour. Including years of farming experience provides additional context to understand how perspectives may vary across groups.

The use of AI enabled efficient processing of large volumes of text and helped highlight subtle differences between participants' perspectives. While traditional manual coding remains valuable, AI tools such as Microsoft Copilot provide a complementary approach that enhances rigour, consistency, and speed in qualitative research, especially when examining complex topics like biodiversity, social licence, and farmer decision-making.

Table 5: Summary of stakeholder interview participants by category

Category	Stakeholders	# interviews	Total	Years Farming (Range)
Farmers			8	
	Family-owned farm (Dairy) Corporate Groups	4 2		20+yrs 5-10yrs
	Contract-milkers (Dairy) Arable	1 1		5-10yrs 5-10yrs
Other Stakeholder			4	
	Government	2		
	Rural Professional	2		5yrs
Dairy Processor			2	
	Dairy Processor	2		10yrs
Research Institute			1	
	Non-Governmental Organizations	1		

5.2 Limitations to Research

The findings from this research project, *Enhancing Biodiversity on Canterbury Dairy Farms to Improve Our Social Licence to Operate*, can be affected by several key limitations. The most significant is the small sample size of fifteen semi-structured interviews. This method was chosen to enable deeper, more nuanced discussions and to gather authentic insights into farmers' perspectives, while also including views from other relevant stakeholder groups.

Building on my experience leading Synlait Milk's biodiversity programme, Whakāpauawai, I could identify key gaps and deepen my understanding of the barriers to biodiversity adoption and improvement on Canterbury farms. However, as with all qualitative research, the results reflect the experiences and perspectives of participants rather than providing a statistically representative view of the entire sector.

The regional focus on Canterbury means these findings are specific to that context and may not directly apply to other regions with different environmental, cultural, or regulatory conditions. Moreover, the current broader sociopolitical environment, including ongoing debates about environmental regulation, biodiversity conservation, and social licence to farm, likely influenced the opinions expressed during interviews.

By recognising these limitations, this research aims to provide a transparent and balanced understanding of the factors shaping farmers' perceptions and actions. Future studies could address these limitations by including a larger and more diverse participant pool, employing mixed methods approaches (e.g., surveys and focus groups), and integrating additional data sources to enhance the robustness and generalisability of the findings.

6.1 Analysis and Results

6.1.1 - Overview

A total of 15 semi-structured interviews were conducted with Canterbury dairy farmers, catchment group leaders, consultants, and industry professionals. The interviews examined farmer attitudes, barriers, and enablers concerning biodiversity enhancement, as well as how these actions support maintaining a social licence to operate (SLO). Data were analyzed thematically, revealing six main themes: values-driven biodiversity, economic barriers, education and awareness, community engagement and social licence, incentives and support, and the role of regulation.

Since the interviews collected both qualitative and quantitative data, the findings are organized around the main themes of the interview questions. The results blend thematic insights with quantitative analysis to offer a balanced understanding of farmer perspectives.

6.1.2 – Understanding of Biodiversity

Many farmers saw biodiversity mainly as “tree planting” or “fencing waterways.” While they generally recognised its environmental benefits, several participants felt uncertain about what biodiversity genuinely means on a working dairy farm. One farmer summed it up nicely: *“We’ve done planting around drains, but I’m not sure what else counts as biodiversity on the farm.”*

The interviews revealed that the length of time that farmers have been in the industry significantly influences biodiversity outcomes. This was highlighted early in the discussions, particularly regarding the values farmers assign to biodiversity. For some, long-term experience was linked to more traditional, compliance-driven approaches. At the same time, younger or newer farmers tended to be more open to innovation and displayed a greater interest in environmental responsibility. However, they often sought practical advice and support to turn these values into action.

From the interviewees, it was clear that biodiversity conservation is driven more by personal values and social responsibility than by financial incentives. Several participants emphasised that biodiversity reflects their beliefs, long-term stewardship, and the importance of maintaining trust within their communities. One interviewee stated, *“We’ve got to be seen to be acting in the best interest of the community.”* Another noted, *“Seeing can create a bow-wave effect, and everyone takes notice.”* This demonstrates how visible actions by a few can influence wider farming communities and shape perceptions of what matters.

Interestingly, when farmers rated the importance of biodiversity on their own farms (Figure 11), it scored highly on the 1–5 scale overall, emphasizing that although understanding and approaches may differ, the value placed on biodiversity is generally recognized. However, there was one outlier who rated biodiversity as 1, reflecting a more skeptical or traditional view that contrasts with the broader trend.

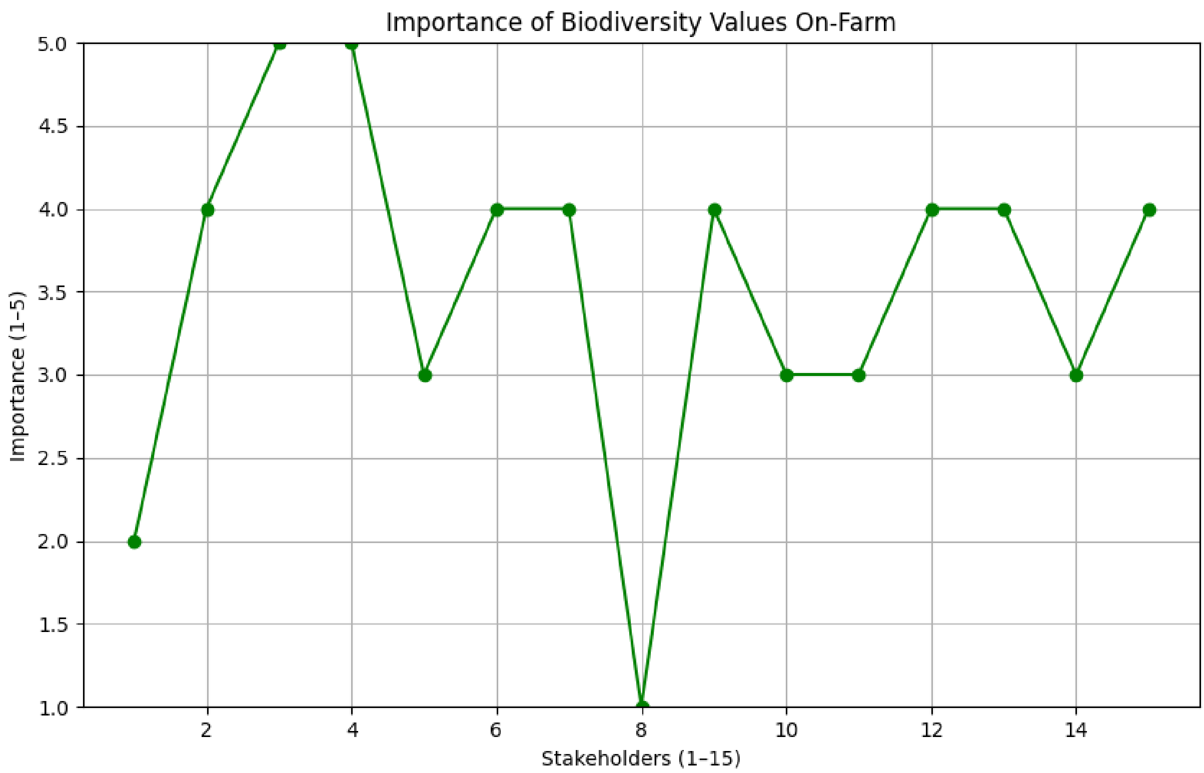

Figure 11 - *Line graph illustrating scaling rating (1 = Not important, 5 = Extremely important) for the question "Is biodiversity one of your values for your farm?" based on interview responses.*

Most respondents highlighted the significance of biodiversity for the broader dairy sector. However, compared with responses from Mid-Canterbury, the results were more diverse, emphasising regional variations in how biodiversity is valued. As illustrated in Figure 12, most interviewees rated biodiversity between 3 and 5 on the importance scale, demonstrating strong acknowledgement of its sector-wide importance.

When asked to consider biodiversity at a regional level, however, responses were more varied. Figure 13 shows greater differences in how biodiversity is valued in Mid-Canterbury, with ratings spanning from 1 to 4. While most respondents still regarded biodiversity as important, the presence of lower scores indicates that some farmers see biodiversity as less of a priority compared to other operational pressures. This contrast suggests that while biodiversity is generally seen as vital for the dairy sector, its perceived importance can be shaped by local context, farm system pressures, and individual viewpoints.

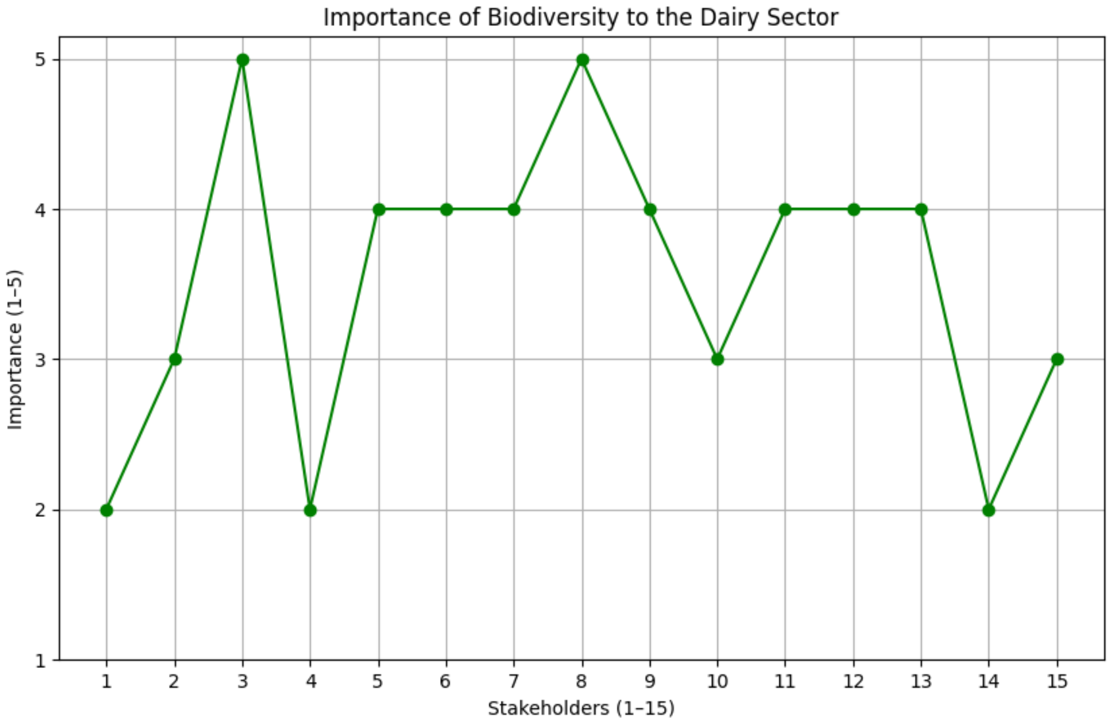

***Figure 12 -** Line graph showing scaling rating (1 = Not important, 5 = Extremely important) for the question "how important does biodiversity sit within the Dairy Sector (wider primary sector) -?" based on interview responses.*

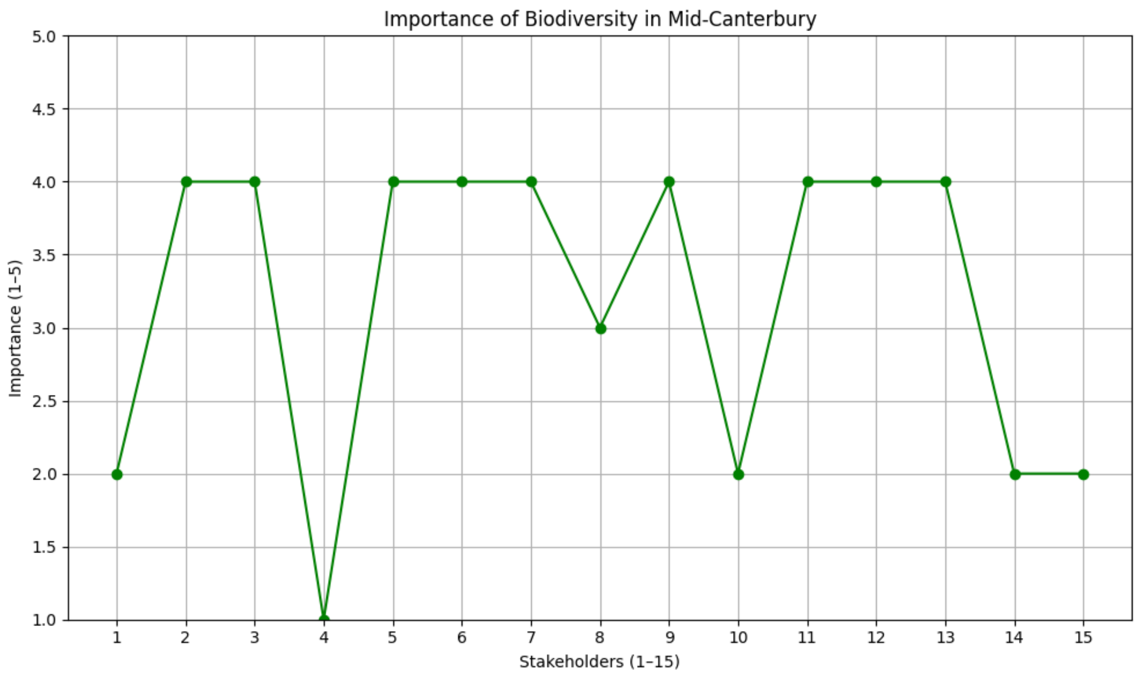

***Figure 13 -** Line graph illustrating scaling ratings (1 = Not important, 5 = Extremely important) for the question "How important is biodiversity to the Mid-Canterbury Community," based on interview responses.*

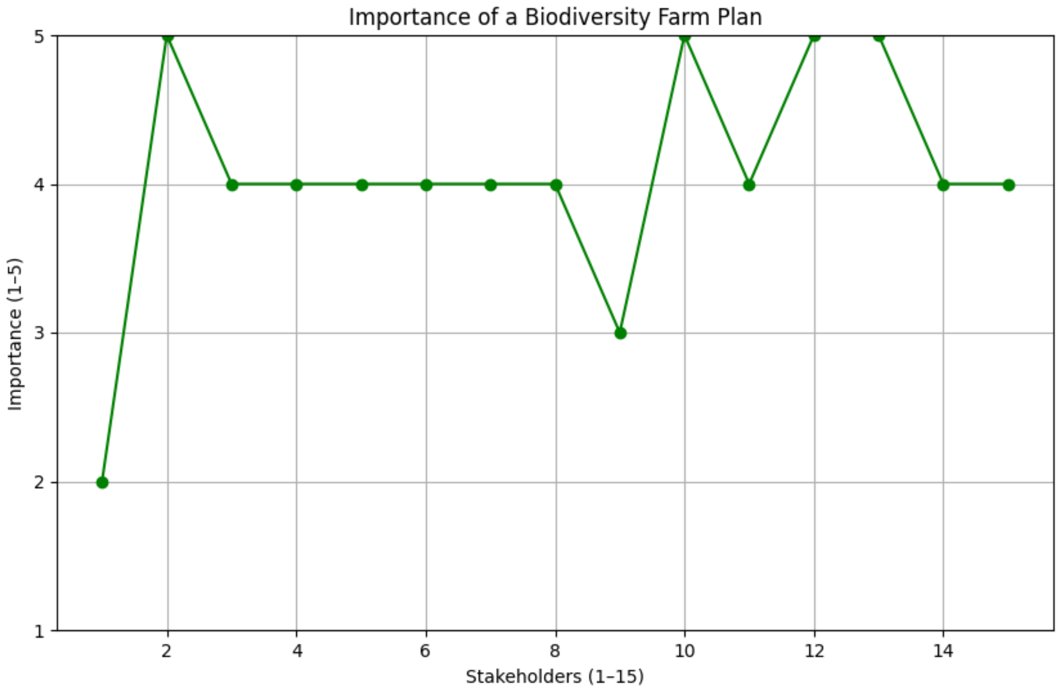

Figure 14 - *Line graph showing scaling rating (1 = Not important, 5 = Extremely important) for the question "How important is Biodiversity Farm Plan," based on interview responses.*

This perception becomes clearer when examining the role of biodiversity farm planning.

Figure 14 shows high scores for the importance of having a biodiversity farm plan, with most respondents rating it between 4 and 5. This indicates that even among those less certain about biodiversity as a broad sector priority, there is strong support for practical, on-farm planning to turn values into tangible actions. This aligns with interview findings, where many farmers expressed a preference for "clear, achievable steps" over broad or aspirational goals.

Taken together, these findings highlight a clear pattern: biodiversity is valued both at sector and farm levels, but its importance is more evident when linked to tangible, farm-specific actions and planning. This offers a strong foundation for future efforts that link biodiversity objectives with practical, farmer-led implementation strategies.

6.1.3 – Barriers to the adoption of biodiversity

One of the most prominent themes emerging from the interviews was the cost barrier to biodiversity adoption. Figure 15 presents a flow diagram of the key themes identified through thematic analysis, illustrating how cost is interconnected with other barriers, such as infrastructure constraints, a lack of clear vision, regulatory uncertainty, and limited access to expertise. Farmers and rural professionals consistently highlighted that biodiversity enhancements are expensive, not only for planting but for fencing, infrastructural upgrades, and ongoing maintenance.

As one farmer said, *"Every hectare has to pay."* In a system where dairy can produce revenue of over $8,000 per hectare, it is difficult to justify taking land out of production for biodiversity, especially when the financial benefits are unclear or absent.

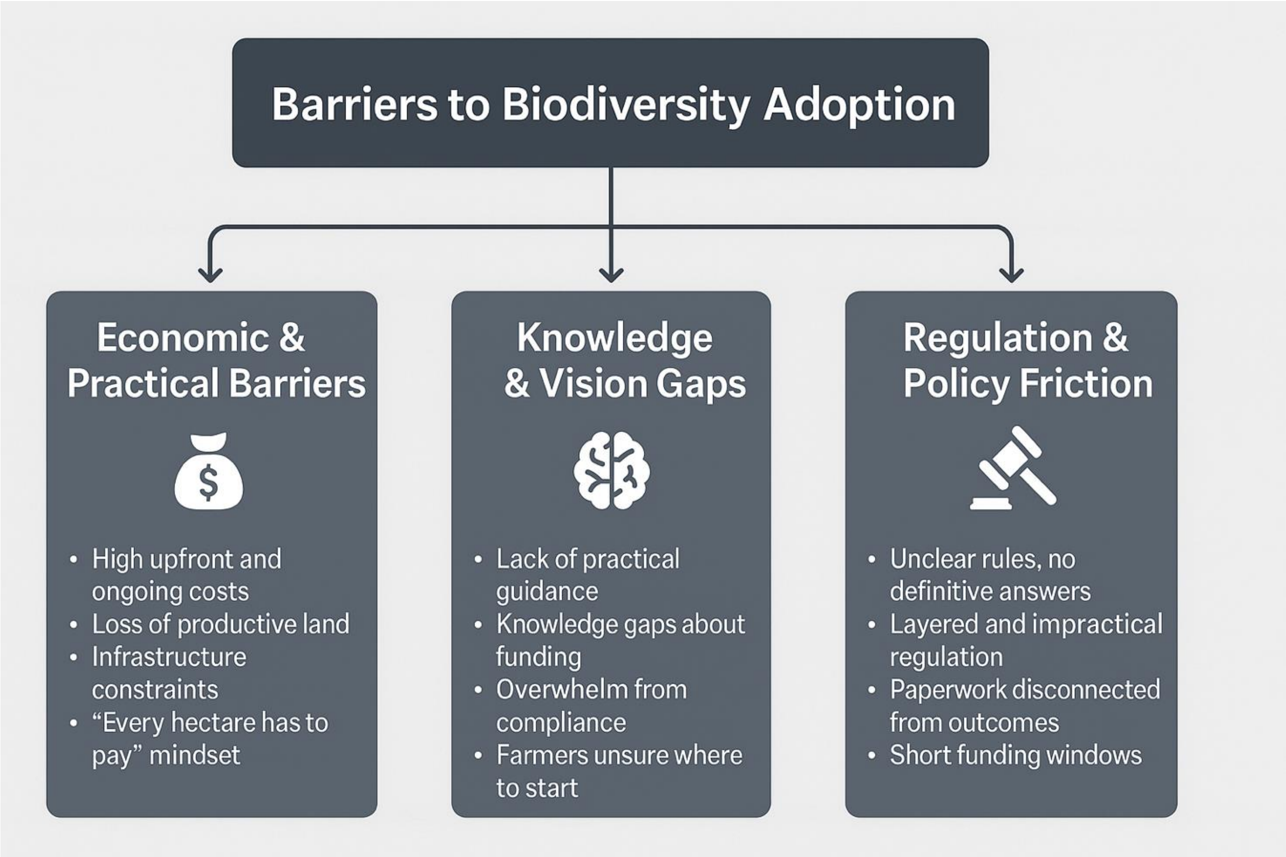

Figure 15 *-Key themes generated from stakeholders' responses to a series of questions on barriers to adopting Biodiversity on-farm.*

Biodiversity projects are often regarded as a "nice-to-have" rather than an essential part of farm operations, especially in high-performing dairy systems where margins are tight. Infrastructure, such as pivot irrigation systems, fencing layouts, and drainage networks, are frequently cited as barriers to the location and implementation of biodiversity initiatives. Many farmers noted that infrastructure investments designed to improve efficiency have unintentionally reduced opportunities for planting trees and shelterbelts. In practice, this often means farm development has expanded productive area to the point where there is no marginal land left available for planting.

It was clear that biodiversity spending is closely tied to the farm's financial cycle. In low-payout years, it is often one of the first costs to be cut, and because investments are typically "lumpy," progress can be irregular. Farmers consistently reported that when profitability is strong, they are far more likely to invest in planting, fencing, and restoration. In short, good financial years enable biodiversity; tough years limit it.

Debt and financial pressure were significant constraints. Several participants noted that banks and lenders tend to prioritise production returns over environmental performance, making it difficult to justify spending on biodiversity conservation. Farmers remarked that while banks promote "green loans" or sustainability-linked finance, these are often poorly understood or not easily accessible at the farm level.

A recurring theme was the absence of clear financial incentives or long-term funding options. Participants voiced frustration at brief funding periods, extensive compliance paperwork, and complicated application processes. While support from processors like Synlait through initiatives such as the free native plants under *Lead with Pride* was valued, farmers felt these incentives were often too short-term or limited in scope to foster meaningful change.

Another key theme identified across the interviews was a lack of vision and clarity about how biodiversity fits into existing farm systems. Many farmers shared uncertainty about where to start, alongside worries about losing productive land. For some, visualising how biodiversity can be effectively integrated into their operations in a way that complements rather than conflicts with production proved difficult.

This uncertainty is closely linked to a lack of accessible expertise. Farmers often must choose between hiring expensive ecological consultants or managing their own projects, which can lead to delays or poorly executed projects. Several interviewees emphasised the need for trusted, practical advisors who can provide clear, farm-specific guidance and build confidence in taking the first steps.

Several interviewees emphasised that biodiversity must demonstrate tangible economic benefits to encourage wider adoption. Farmers are more encouraged when they can clearly observe returns, such as improved shelter that enhances pasture growth, helps with animal welfare, reduces input costs, or increases resilience to extreme weather. As one farmer remarked, *"Planting is the easy part; it's the maintenance and proving the value that's hard."*

Past experiences with unsuccessful or poorly supported planting projects have fostered lingering scepticism, with some farmers hesitant to reinvest after "*burnt fingers*" (**legacy failures**). Added to this is a persistent knowledge gap and the absence of simple, reliable tools to measure outcomes. Farmers consistently expressed the need for stronger, science-backed evidence linking biodiversity to productivity, water quality, and animal welfare. This would help shift biodiversity from a "nice-to-have" to a central component of long-term farm business planning.

6.1.4 – Role of regulations and incentives

Stakeholders held mixed views on both local and central government involvement. While Environment Canterbury (ECAN) was seen as both a regulatory "stick" and a supportive partner, central government was criticised for offering rhetoric rather than meaningful action.

There is a strong preference for funding connected to environmental outcomes rather than broad funding programmes, with scepticism towards government support, especially biodiversity grants, due to concerns about the taxpayer burden. Many believe that regulations and paperwork are disconnected from real-world effects and express frustration over cuts to catchment group funding. Farmers are annoyed by vague rules, when no one wants to give definitive answers, which hampers progress. As one farmer said, *"No one wants the accountability of giving the wrong advice."*

Practical, outcome-oriented support was preferred over regulation-heavy approaches. There was a strong desire for the government to promote progress by providing resources and stepping back, rather than hindering efforts with excessive rules. Voluntary biodiversity credits were seen as unlikely to succeed without stronger mechanisms such as grants or offset schemes. As one farmer remarked: *"Let us get on with it and leave the local and government out of it. Government needs to enable, not obstruct, with rules."*

Farmers consistently preferred practical, outcome-oriented incentives over heavily regulated approaches. Existing programmes, such as *Lead with Pride* and Synlait's free plant supply, were seen as helpful facilitators; however, awareness of other options, like discounted plants through catchment groups or green loans, was limited. Many found the funding procedures to be complex, poorly explained, and hindered by short application periods.

There was strong interest in mechanisms that reward biodiversity through tangible benefits like lower interest rates, bulk purchasing schemes, or offset models such as those in NSW, Australia. It was very clear that most stakeholders adopted these ideas after seeing neighbours *"get it done"* or the wider community doing good.

Farmers emphasized the importance of trusted guidance, regional advisory support, and clear, staged biodiversity plans. Financial incentives were most effective when linked to tangible economic benefits, such as carbon credits, ecosystem services, or long-term productivity gains. A common theme was the call for government and industry to support the retirement of marginal land and the restoration of existing wetlands, with funding acting as the key driver.

6.1.5 – Community perception and social licence

Community engagement has become a crucial driver of biodiversity initiatives and a vital aspect of maintaining farming's social licence to operate. Farmers consistently acknowledge that visible environmental efforts, such as native planting, riparian restoration, and community events, help demonstrate care for the land and bolster public trust.

Many acknowledge that social licence depends on perception: when biodiversity visibly enhances the landscape, it reassures local communities and consumers alike that farming is sustainable and responsible. Figure 16 demonstrates the key themes identified through thematic analysis, emphasising the importance of community engagement, trust, peer influence, and public perception in shaping social licence.

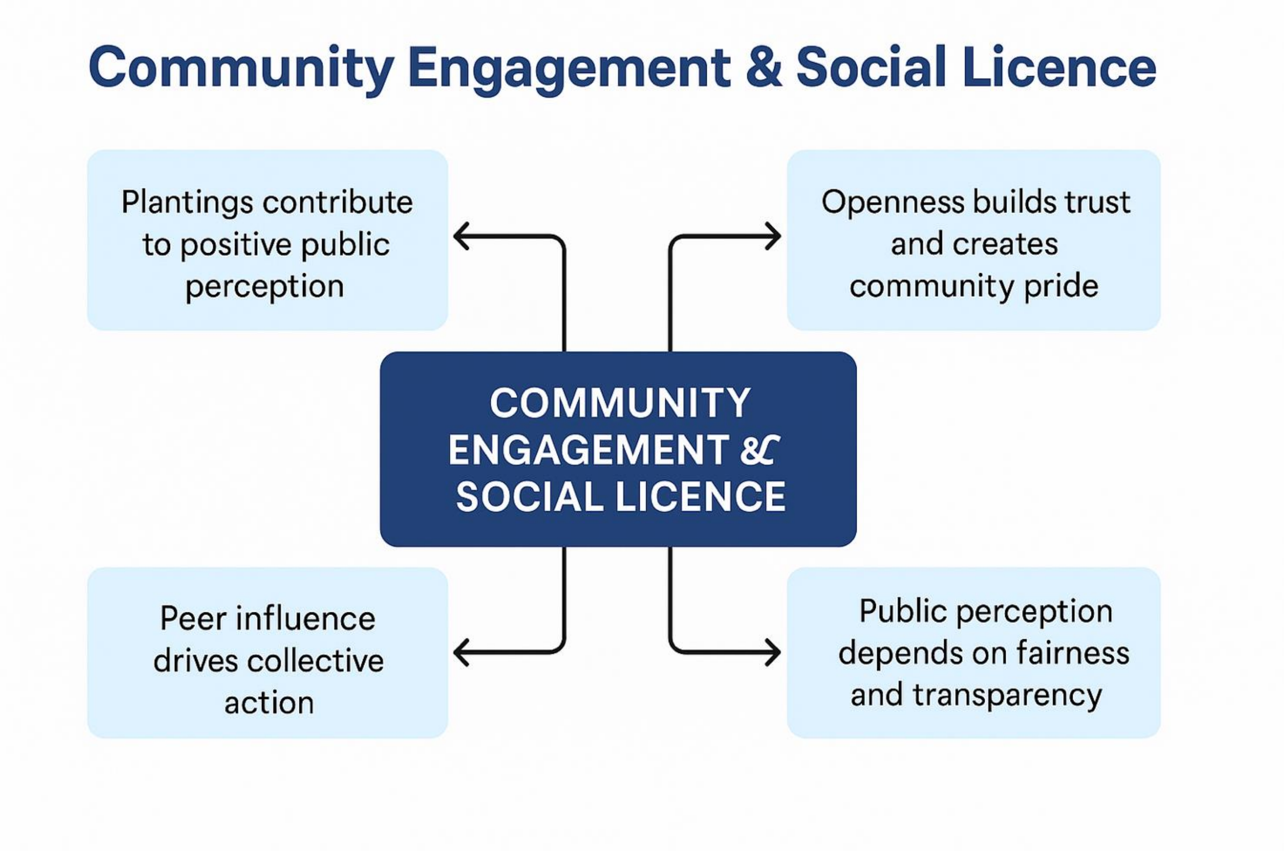

Figure 16 *- Key themes generated from stakeholders' responses to a series of questions about the community's impact on biodiversity and social licence.*

Farm appearance is crucial for building community trust, reputation, and property value. Actions such as double fencing, planting tree lines, improving signage, and preventing livestock from wandering through town are often motivated by local perceptions of farms. As one farmer remarked, "*We've got to be seen to be acting in the best interest of the community,"* while another commented, *"Valuation goes up when the valuer sees the sign."*

Catchment groups, schools, councils, and community trusts such as the Kānuka Trust are recognised as vital enablers, linking farmers with practical support, organising planting initiatives, and promoting shared ownership of outcomes. Farmers appreciate involvement from local schools, rugby clubs, and community planting days, which are described as fostering pride and long-term engagement across generations. Peer influence and visibility are essential: seeing neighbours' plant or take part in projects often motivates others to follow, creating what some refer to as *"pub chat pressure."* Early adopters and local role models are considered crucial for inspiring broader participation.

Several participants recognised that community perception is influenced not only by visible factors but by cultural values, such as kaitiakitanga (guardianship), which connects farming to intergenerational responsibility and the stewardship of the land. Farmers further described social licence as something that can be earned but not assured, a moving target that demands ongoing, tangible commitment.

However, farmers expressed frustration that positive biodiversity stories are not shared widely enough and that public perception can be fragile; one negative image or incident can quickly damage trust. Many emphasised that they want to be seen as responsible stewards rather than profit-driven operators. Biodiversity was viewed not only as an environmental asset but as a strategic tool for building legitimacy and safeguarding the sector's long-term freedom to operate. While some favoured processor-led initiatives (such as Synlait's programmes) over council involvement, all agreed that transparency, collaboration, and fairness are essential for maintaining community trust.

Overall, improving biodiversity was regarded as a practical and visible way to show environmental care, build community relationships, and protect the dairy sector's social licence, especially in Canterbury, where public scrutiny and expectations remain high.

6.1.6 – Opportunities through technology and collaboration

Stakeholders shared a common view that collaborative efforts among catchment groups, suppliers, schools, councils, and trusts like the Kānuka Trust are vital for promoting meaningful biodiversity action.

Technology and visibility, supported by practical tools, accessible data, and "seeing is believing" approaches, can help scale impact and build momentum. Farms benefit from increased amenity and ecological value, while community-led initiatives strengthen long-term sustainability and social licence. Although sometimes dismissed as "warm fuzzies," these community benefits are closely linked to farming's future, with older generations currently leading much of the biodiversity stewardship.

6.1.7 – Outside themes

A strong theme across the interviews was the need for generational vision, practical support, and accountability to sustain biodiversity action. Many farmers highlighted a clear contrast between older generations, who can be more resistant to change ("old man syndrome"), and younger farmers, who tend to view biodiversity more positively. Younger farmers were often described as more open to new ideas, eager to adopt environmental practices, and aware of the long-term importance of biodiversity. However, they emphasized the need for practical guidance, ongoing support, and a clearer vision to turn this willingness into sustained action on farms.

While planting was widely seen as the easy part, maintenance over the first two to three years emerged as the real challenge, often limited by time and labour. Successful projects typically relied on community networks, third-party involvement, or shared maintenance through neighbours and catchment groups.

Many farmers emphasized the value of starting small and scaling up, which builds confidence and increases survival rates. They identified practical sector actions, such as training farmer-facing staff to better engage with biodiversity, and integrating single, long-term biodiversity plans within farm environmental plans to ensure consistency and accountability. Mental health and well-being benefits were also highlighted, with biodiversity activities providing meaningful breaks from the daily pressures of farming.

Accountability through audits was generally welcomed, with farmers appreciating fair, constructive feedback. Measurement and motivation drew mixed reactions; some farmers embraced benchmarking, while others resisted it. There was strong interest in integrating biodiversity into farm systems through maps, shelter belts, and underutilised areas, supported by better data sharing and GIS-based planning. Ultimately, long-term success depends on linking biodiversity to profitability, ensuring maintenance, and reducing regulatory friction.

7.0 - Findings and Discussion

The project's purpose was to emphasize the vital importance of social licence to operate as a key factor in promoting biodiversity across Canterbury dairy farms. The findings and discussion section consolidates insights from the literature review and the perspectives, beliefs, and experiences shared during the semi-structured interviews.

7.1- Biodiversity Social Licence: Stakeholder Perceptions

The interviews and literature strongly reinforced a clear message: visible, place-based biodiversity action is essential for earning and maintaining social licence to operate (SLO) in Canterbury. Social licence is not a formal permit; it involves building community trust and acceptance over time. This aligns with the widely accepted SLO theory, which posits that trust, credibility, and performance form the foundation for lasting community approval (Thomson & Boutilier, 2011). Farmers repeatedly linked what people see on farms, such as riparian plantings, tidy gateways, double fencing, and tree lines, to how the community perceives farming. These actions foster credibility and trust, which are just as vital as meeting regulatory requirements (Williams & Martin, 2011).

Farmers highly valued biodiversity at both the farm and sector levels; however, noticeable differences appeared across the region. In some areas, particularly those near waterways or sensitive environments, as well as where infrastructure constraints such as pivots and drainage exist, the opportunities and urgency for action were affected. Generational differences also played a role. Younger farmers often showed strong potential to lead biodiversity initiatives, but expressed a need for more precise guidance, mentorship, and sustained support to take meaningful action.

These local differences help explain why peer visibility is so influential. When farmers see their neighbours planting, improving signage, or restoring frontage, it creates a "bow-wave effect" that normalises biodiversity efforts and encourages others to follow (Blackstock et al., 2010).

Biodiversity was consistently presented as both environmental stewardship and relationship building. Farmers discussed how appearance and transparency influence the community's view of farming. Avoiding stock movements through town, keeping farm entrances tidy, or organising planting days with local schools and catchment groups are practical ways farmers demonstrate responsibility and care. These visible actions help foster trust and strengthen the bond between farmers and their communities (OECD, 2021).

At the same time, farmers are very conscious of how fragile public perception can be. A single negative image, such as drone footage of winter grazing, can quickly erode trust built over years. That is why many have highlighted the importance of simple, credible actions that start small, develop gradually, and incorporate biodiversity into existing farm environmental plans, ensuring that efforts are not lost when milk prices fall or staff change.

Consistent with the social aspect of my PESTEL review, stakeholders viewed biodiversity as both an environmental stewardship and a relationship-building strategy, using it to signal responsibility, reduce socio-political risk, and maintain market legitimacy with processors and consumers. Farmers highlighted appearance and transparency as practical tools: avoiding stock movements through town, maintaining well-designed entrances, and demonstrating progress through community planting days and catchment-led initiatives (e.g., Kānuka Trust).

Community infrastructure plays a vital role in this. Catchment groups, schools, clubs, and trusted processors provide the support and momentum that help farmers translate good intentions into tangible results. When early adopters take the lead, peer pressure and role-model effects follow, encouraging more farms to act. Overall, these insights show that boosting biodiversity is not just about planting trees or fencing waterways; it is a way for farmers to demonstrate care, strengthen relationships within their communities, and safeguard their long-term ability to farm (Harmsworth & Awatere, 2013; Thomson & Boutilier, 2011).

7.2 - Barriers, enablers to biodiversity action

One of the strongest themes that came through the interviews was that cost remains the single biggest barrier to biodiversity action. Farmers consistently described biodiversity work as expensive, not just the planting itself, but the fencing, infrastructure changes, and ongoing maintenance required to make it successful. As one farmer put it, *"Every hectare has to pay."* In a high-value dairy system, the opportunity cost of taking land out of production can be challenging to justify, especially when financial returns from biodiversity investments are unclear or non-existent. This finding aligns with broader research indicating that economic constraints are a significant limiting factor in voluntary environmental action (Blackstock et al., 2010; Elliot et al., 2024).

Beyond cost, time and capacity were other significant barriers. Many farmers said planting was the easy part, but keeping plants alive during the first two to three years was the real challenge. Limited labour and competing operational demands meant maintenance often fell by the wayside, resulting in low survival rates. This aligns with case studies highlighting the importance of ongoing management in ensuring successful environmental restoration on farms (Edwards & Trafford, 2016). For some, past failures or abandoned projects created hesitation about future investments.

Regulation stood out as another major pressure point. Farmers expressed frustration over unclear rules, inconsistent advice, and a lack of accountability from agencies, which hindered progress and sometimes discouraged action entirely. This was often referred to as *"everyone passing the buck."* Although some appreciated the purpose of regulation, they felt that the compliance processes were detached from practical on-farm realities. This tension between regulation and voluntary action is well recognised in the literature, especially in agricultural catchments, where trust and relationships are key to environmental change (Blackstock et al., 2010; Williams & Martin, 2011).

These findings align closely with recent research by Elliot Noe et al. (2024)**,** which identifies four interconnected dimensions shaping biodiversity barriers on New Zealand farms. These dimensions mirror many of the themes that emerged in stakeholder interviews for this project:

- **Economic** — The pressure to maximise milk production limits land availability for biodiversity initiatives, making opportunity costs a key barrier.
- **Cultural** — Native vegetation is often confined to "marginal" land, reinforcing traditional land-use patterns and perceptions of what productive land should be used for.
- **Practical** — Costs associated with planting, maintenance, and infrastructure conflicts (such as irrigation systems) create operational challenges for farmers.
- **Symbolic** — A "good farm" is still widely associated with productivity indicators, rather than visible biodiversity gains, shaping both farmer identity and external perceptions.

This framework provides a useful lens to interpret the interview results, reinforcing that barriers to biodiversity adoption are multifaceted**,** operating at economic, social, and cultural levels. It supports the need for integrated strategies combining incentives, practical support, and cultural shifts to drive meaningful and lasting biodiversity outcomes.

Despite these barriers, clear enablers made a significant difference. Farmers emphasised the importance of community support mechanisms, neighbours assisting with maintenance, catchment groups organising planting efforts, and local schools or clubs taking part. These partnerships lessen the load on individual farmers and help generate momentum. Peer influence played a crucial role. Seeing neighbouring farms make visible improvements often created a healthy pressure to follow suit. As one farmer put it, *"You don't want to be the one holding the community back."* This peer-to-peer effect supports earlier findings that social norms and early adopters can accelerate environmental action (Blackstock et al., 2010; Williams & Martin, 2011).

Starting small and scaling up is another facilitator. Farmers who begin with manageable projects are more likely to sustain them, discover what works, and expand gradually. This practical, step-by-step approach helps build confidence and improves success rates. Farmers emphasised the importance of trusted intermediaries, particularly processors, catchment groups, and sometimes consultants, who provide support without the regulatory "stick." Processor-led initiatives were generally preferred over council-led programmes because they felt more supportive and less punitive.

Finally, technology and accountability tools were seen with a mix of caution and opportunity. Many farmers recognised the value of audits and monitoring systems when they were fair and practical, noting that *"a bit of accountability sharpens things up."* However, others were cautious of the added complexity and the potential for compliance fatigue. This varied response reflects broader discussions in the literature about balancing voluntary and regulatory approaches to promote environmental change (OECD, 2021; Thomson & Boutilier, 2011). Overall, the barriers and enablers farmers mentioned highlight that practicality, trust, and visible leadership are crucial for progress. Economic pressures and regulatory uncertainty can slow momentum, but strong community networks, peer influence, and credible support can make biodiversity actions achievable and sustainable.

7.3 - Stakeholder engagement and future opportunities

Throughout this project, it became clear that stakeholder engagement is central to how biodiversity initiatives and new technologies are adopted on Canterbury dairy farms. Farmers consistently discussed how engagement, or its absence, influences trust, momentum, and long-term results. When people feel involved in the process, and when communication is clear and practical, projects are far more likely to succeed. This reinforces what the social licence literature has been saying for years: trust and credibility develop when stakeholders are actively involved, not just informed (Thomson & Boutilier, 2011; Williams & Martin, 2011).

Farmers were particularly vocal about preferring to work with trusted intermediaries such as milk processors, catchment groups, and community partners rather than relying on top-down council approaches. Processor-led programmes were seen as more collaborative and supportive, while regulatory agencies were often viewed as inflexible or reactive. This preference is not about rejecting regulation altogether; it is about how engagement occurs. When relationships are strong and communication is two-way, there is a greater willingness to invest time, money, and energy in biodiversity.

Another powerful message was the importance of involving a wider range of people and perspectives in these discussions. Farmers highlighted that community engagement cannot only rely on *"the usual suspects."* Expanding participation by including schools, local clubs, iwi, and early adopters helps build stronger networks and shared ownership.

Farmers drew clear parallels between biodiversity initiatives and technology adoption: success relies on establishing trust early, keeping the messaging practical, and ensuring the benefits are visible. There is a real opportunity here to connect technology with environmental action. Tools that support biodiversity monitoring, automate reporting, or help integrate biodiversity goals into farm environmental plans could lessen pressure on farmers and make it easier to sustain progress.

However, for these tools to be practical, farmers must be involved from the beginning, helping to shape the design, testing usability, and trusting the results. This aligns with broader findings from innovation adoption research, which show that adoption is highest when end-users are actively involved in the development and rollout (OECD, 2021).

Accountability mechanisms emerged as a key area for future opportunity. Farmers made it clear that they do not object to being held accountable; in fact, many said audits and checks *"keep us sharp",* but the process must be fair, transparent, and practical. There is potential to use technology to improve accountability in a constructive way, for example, through shared monitoring platforms or simplified biodiversity reporting, rather than adding more bureaucratic compliance requirements. Such co-designed accountability could help build trust among farmers, processors, regulators, and communities.

Looking ahead, the greatest opportunity lies in developing a collective, partnership-based approach to biodiversity and technology adoption. Farmers are already showing environmental leadership locally, but lasting change depends on ongoing engagement, visible support from trusted partners, and practical pathways that facilitate action rather than penalise.

As Thomson and Boutilier (2011) point out, strong social licence grows where trust and shared responsibility are present. If stakeholder engagement is genuine and well-structured, it can turn biodiversity from a regulatory burden into a shared opportunity for environmental and social value.

8.0 - Conclusion

This project emphasises that enhancing biodiversity on Canterbury dairy farms is more than just an environmental measure; it is a strategic way to bolster farming's social licence to operate. The communities that view the land influence their perceptions of farming, and visible environmental care builds trust and credibility over time.

Farmers are motivated to protect and restore biodiversity, but they face significant barriers, including financial constraints, time constraints, capacity limitations, and regulatory uncertainty. At the same time, strong community networks, peer influence, and trusted intermediaries create conditions that make action achievable and lasting.

The future lies in genuine stakeholder engagement, where farmers, communities, processors, and regulators collaborate to co-design solutions. Technology can facilitate this process, but only if it is built on trust, practicality, and shared responsibility. By investing in biodiversity and the relationships that uphold it, the dairy sector can enhance resilience, bolster its social licence, and safeguard its long-term freedom to operate.

Recommendations

- **Create practical biodiversity resources**
  Develop visual guides highlighting the benefits of key native species (e.g., cabbage trees, flax, tōtara). Produce at least three species profiles and distribute to five Canterbury catchment groups by June 2026, with annual updates.

- **Upskill farmer-facing teams**
  Deliver biodiversity engagement training to 100% of processor reps and advisors, building confidence to lead practical on-farm conversations. Training embedded in seasonal programmes from 2026 onwards.

- **Showcase farmer-led success stories**
  Publish five relevant farmer biodiversity stories each year across sector platforms to highlight impact at any scale. The first campaign launches in Summer 2026 and is reviewed annually.

- **Strengthen community partnerships**
  Partner with eight plus active catchment groups, schools, and local organisations annually to co-deliver planting and restoration projects, reinforcing community connection and trust.

- **Promote 'start small, scale up' projects**
  Support at least 30 new on-farm biodiversity projects per year through templates, guides, and Milk processor representative support, with initial targets met by Spring 2026.

- **Integrate biodiversity into FEPs**
  Embed biodiversity actions and maintenance plans into FEP templates. Begin with key Synlait Suppliers linked back to the Whakapuāwai Programme, who have a 3–5-year planting plan.

- **Use technology as an enabler**
  Pilot the use of CarbonCrop's simple digital tools to track and report on-farm biodiversity as a value-added feature. Priorities ease of use and clear benefits for farmers, to scale implementation across the whole supplier base.

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Appendix 1 – Semi-structured interview layout

Research Project –
"Enhancing biodiversity on Canterbury dairy farms to improve our social license to operate"

Biodiversity Interview Questions for Landowners
Scale Question:

- On a scale of 1 to 5, is biodiversity one of your values for on-farm -
- *On a scale of 1 to 5,* how important does biodiversity sit within the Dairy Sector (wider primary sector) -
- *On a scale of 1 to 5, how important is biodiversity to the Mid-Canterbury Community?*

1 = **Not important**
2 = **Slightly important**
3 = **Important**
4 = **Very important**
5 = **Extremely important**

Barriers to Increasing Biodiversity

- What do you think is the biggest barrier for the Dairy Sector to improve biodiversity for the Dairy Sector?
- What is the biggest barrier to Mid-Canterbury Dairying in improving biodiversity –
- What is the biggest barrier to improving biodiversity on your farm?

Community Impact

- What is your understanding of social license to operate –
- Do you see that there is a community drive in your area to enhance biodiversity? What have the drivers been?
- How do you see the dairy sector working with the community to improve biodiversity?
- What benefits do you think improving biodiversity could bring to your local community – tourism, less use of pesticides, etc., animal welfare, community pride

Awareness of Support or Incentives

- What incentives are you aware of that enhance your biodiversity on-farm.
- What sort of central and/or local government support would you like to see to enhance biodiversity – flooding support, get out of the way, offsetting to allow movement of waterways, etc. if biodiversity is improved, etc.

- What kind of extra assistance, resources, or incentives would help you feel empowered to begin or expand your biodiversity efforts? – data/science around the benefits

Community Influence

- Have you noticed any positive or negative impacts from how your community manage (or doesn't manage) native vegetation or biodiversity? Flaxes block creeks/waterways, positive – it looks good in the community, suitable for social licence.

Biodiversity in Dairy

- What's one action the dairy sector could take to accelerate biodiversity enhancement

- How important on a scale of 1 -5 would a Farm Plan be for biodiversity
- On a scale of 1-5, would the volunteer biodiversity credits improve the biodiversity outcome on your farm?

- Do you have any other comments?