Reputation versus Reality in NZ: Searching for Our North Star

By Jon Pemberton
2025 Nuffield Scholar
March 2026

I wish to thank the Investing Partners of the New Zealand Rural Leadership Trust for their support during and beyond my scholarship period.

Scholar Contact Details Name: Jon Pemberton Phone: +64 0274924219 Email: lowburnag@gmail.com

Nuffield New Zealand PO Box 85084, Lincoln 7647 Nuffield@ruralleaders.co.nz +64 21 1396 881

Contents

Executive Summary

New Zealand's farming sector operates on the strength of a powerful national identity: clean rivers, productive land, and export products that carry with them an implicit promise of environmental stewardship. That identity has delivered real commercial value. It has justified price premiums in overseas markets and insulated domestic farming from the level of public scrutiny applied in comparable countries. However, the identity has now decoupled from the evidence.

This research project began with a practical question: Could a market mechanism for nature-based solutions, specifically commercial wetlands and nutrient offsetting, be developed at the catchment scale in New Zealand? During the course of the 2025 Nuffield Scholarship, visits to the United Kingdom, Ireland, the Netherlands, Poland, Brazil, Chesapeake Bay in the United States, and Canada led to a firmer and more important conclusion. New Zealand does not lack the technology, science, or willingness of farmers to improve its freshwater supply. What is lacking are the institutional conditions needed.

Three international examples support this conclusion.

First, the Chesapeake Bay watershed in the United States has demonstrated that intensive agricultural production and improved water quality can coexist, but only when specific institutional conditions are in place: an independent science and extension institution acting as an honest broker, mandatory nutrient management plans with independent compliance checking, public cost-sharing that makes compliance economically viable, sector-neutral regulation with no permanent exemptions, and a unifying governance framework that transcends political boundaries. New Zealand currently has none of these at the necessary scale.

Second, Brazil's mandatory native vegetation requirements, that 20% of property in most farming regions, enforced by satellite monitoring, demonstrate that blunt, legible, sector-neutral rules applied consistently can maintain farming communities in good environmental standing without destroying the industry. New Zealand's regulatory culture has historically preferred voluntary guidelines, long phase-in periods, and industry exemptions. The Brazilian comparison suggests that this culture of accommodation has cost New Zealand more than it has protected us.

Third, the United Kingdom's experience, in which farmers are effectively paid through subsidies to farm differently rather than required to meet environmental standards from their own returns, provides a cautionary example of what happens when environmental improvement depends on perpetual public financial support rather than structural change. New Zealand should not replicate this model.

The critical domestic evidence is equally clear. A systematic national assessment found that almost every region in New Zealand exceeded NPSFM 2020 bottom-line thresholds in at least one key contaminant across nitrogen, phosphorus, Escherichia coli, and sediment, and that in many regions, including Southland and Canterbury, the required reductions are not marginal adjustments (Snelder et al., 2023).

Southland-specific modelling commissioned by Environment Southland found that achieving NPSFM bottom lines alone requires a 47% regional reduction in total nitrogen loading and a 21% reduction in total phosphorus loading. To meet Southland's own community-agreed freshwater objectives, total phosphorus reductions of 69–70%, *E. coli* reductions of approximately 90%, and sediment reductions of 24–32% would be required (Snelder, 2021; Snelder & Fraser, 2021). Canterbury faces a 44% total nitrogen reduction requirement under national standards (Snelder et al., 2023). A 2020 review of New Zealand's Primary Industry Advisory Services (PIAS) system, commissioned by the Ministry for Primary Industries, concluded that the system was well suited to providing advice that delivered private benefits, productivity, efficiency, and profit, but that environmental management advice was inadequately provided (Duncan & Kirk, 2020). The dismantlement of the Ministry of Agriculture and Fisheries (MAF) extension service in the 1980s and 1990s left a vacuum that commercial advisers with conflicting incentives have never adequately filled.

New Zealand's catchment groups are the most valuable environmental governance asset developed in the past decade. The Edendale Aquifer Group (EAG) in Southland, which the author is a member of, is one of more than 220 such groups nationally. These groups are building the peer-to-peer trust and community ownership that can make practice change possible in farming communities resistant to top-down direction. However, they cannot substitute for the institutional architecture that durable improvement requires.

This report concludes with four specific proposals: establishing a land-grant-equivalent institution at Lincoln University; creating a national cost-share programme for on-farm freshwater works; resourcing and partner catchment groups with professional coordination and independent science access; and committing to sector-neutral environmental regulation with no permanent agricultural exemptions. These are not radical proposals. These are the minimum institutional changes the international evidence suggests are necessary to move New Zealand from its current trajectory–incremental voluntary action against a background of continued systemic deterioration–to a position where nature-based trading mechanisms can function.

However, farming and clean water use are not mutually exclusive. The question is whether New Zealand has the institutional courage to build structures that make both possible.

Acknowledgements

First of all, I want to acknowledge my wife Birgit and our three children. Without their support, I would not have been able to undertake this research.

I would like to thank everyone involved in making this possible. There are far too many people to name individually.

The research trips occurred in two parts. The first part involved visiting the United Kingdom, including Cornwall, the River Wye, Irish dairy farms, Polish farming practices, and then travelling to the Netherlands and returning to the UK. The second part involved visiting Brazil, the Chesapeake Bay in the USA. In the Global Focus Programme (GFP) I was privileged to visit Canada, Scotland, Italy and Australia, which allowed me to learn a lot about other peoples' cultures, myself and other Nuffielders. The GFP allows scholar to experience a broad range of agricultural systems, in very different political and social environments visiting multiple countries with 11 other scholars from all around the world.

It was invaluable to tap into networks of friends, former colleagues, and fellow Nuffield scholars who took the time to show me the realities behind the reputations of many of these countries. In the USA, I was delighted to be hosted by the former Secretary of Agriculture for the State of Delaware, Walter 'Ed' Kee. These are people with decades of knowledge who were always willing to openly share their experiences.

Those conversations, frank, generous, and sometimes uncomfortable, shaped this report more than any single piece of published research.

Jon standing on the bank of the Mataura River that boarders his Brydone farm in Southland.

Objectives

The following objectives guided this research. They took some time to refine and carried an element of aspiration alongside the practical, reflecting how much this topic matters to farming communities in New Zealand.

1. What is the potential for developing emissions trading schemes at the catchment scale, and what are the potential pitfalls/barriers?

2. Assess the current New Zealand biodiversity credit market: a stocktake of initiatives currently available in New Zealand

3. What are the roles of catchment groups in the agricultural ecosystem, and what are their advantages and limitations?

4. What international examples of nature-based solutions as a trading tool initiative exist in the UK, Europe, and North and South America?

5. Analyse the best of these and compare and contrast them with New Zealand conditions.

6. Assess next steps needed to ensure that the right policies and organisational structures are in place to allow the type of trading system originally envisaged to be developed.

These objectives set out with a clear destination in mind. As the research progressed, that destination shifted; however, the journey turned out to be more instructive than the original map.

Background

This research originated from a practical question on our own farm near Gore, on the banks of the Mataura River.

How can wetlands be used for water cleaning? Can we harness the water-retaining qualities of land that poses farming challenges, is poorly drained, or is it less suitable for its current use and turn it into something of value?

Could a market for commercial wetlands be developed, with more intensive farmers upstream, who could help maintain potentially increasing fish stocks?

We are in the process of establishing a 7.5 ha wetland on our Brydone farm, near Gore, and this further spurred on the thought about commercialising the likes of wetlands and other nutrient cleansing biodiversity. Wetland that cleans water for the community. This is a completely different business scenario.

Or an inset in your farm, being a wetland, so you are cleaning water. Could that be monetised, such that what you are farming is nutrient-rich water into cleaner water downstream?

Farms with challenging soil profiles or locations may have vast potential.

We need to develop a mechanism that recognises the value in reverting developed areas back to their natural state. Land that was considered of low value, such as a “bog, ” that needed draining. Similar to the situation in the Netherlands, maintaining such land as farmland incurs significant expenses. Although there are initiatives along these lines, they need to be scalable and provide landowners with confidence that their land will remain ‘productive’ and profitable.

These issues are critical to my family and me, and one of the driving forces of our dairy farm at Brydone. We are midway through a significant upgrade of the farm, including a new solar-powered milk shed, feed-pad and 7.5ha of wetlands. Walking the talk is important, and there is no better place to do that than in your own backyard.

An aerial image of the larger of two wetlands being developed on the Pemberton Brydone farm

That was the simplicity of what the project wanted to look at; however, nothing is simple in this complex ecosystem.

What began as a practical question about wetland markets became something larger. As international visits unfolded, from the River Wye in England to the Chesapeake Bay in the United States to farms in Brazil, it became clear that the obstacle was not technical. New Zealand already has the science, farmers, and land. What it lacks are the institutional conditions to deploy them coherently. That shift in framing, from how do we build a trading mechanism to why don't we have the conditions to support one, is what this report ultimately addresses

New Zealand's North Star

What is our north star when it comes to farming in New Zealand?

This is a question that began to neatly frame all the issues that arose as I embarked on this research project. What started out, some might say naively, as an investigation into the potential for nature-based solutions as a trading tool for farmers has hit a brick wall regarding our social licence to farm in New Zealand, the structures we have in place that are supposed to be helping us do what we do, and the leadership, or lack of it, in the rural sector, and indeed at central government level.

Do we have a strategy for the future of farming, or are we simply hoping that if we continue to do what we have always done, we will remain successful?

The delivery of agricultural science in New Zealand has been captured to some degree by industry and commodified, commercialised in a seemingly unending array of products, some of questionable benefit. Extension services may not hit the mark needed in an ever-changing world. A 2020 review of New Zealand's Primary Industry Advisory Services (PIAS) system found that it was well suited to providing advice to producers that delivers private benefits, productivity, efficiency, and profit, but that environmental management advice was inadequately provided. The review found that "as imperatives for sustainable as well as productive land use are increasingly recognised, it will be important to understand what criteria producers might use for PIAS across a broader range of other topics, and who they will be looking to for the help they need (Duncan & Kirk, 2020, p. 3)." Critically, the review also found that PIAS provided resource management and regulatory advice in a specialised area, but that "the ethic of collaboration between advice providers working for one client was raised as crucial, but it was conceded that this was not always put into practice, as some firms wanted to protect their own interests (Duncan & Kirk, 2020, p. 5)." Over the years, agriculture has been accused of getting a free ride on its emissions. This pattern is reflected in the advisory system.

From the many meetings and conversations undertaken during this research, it appears that New Zealand is not yet mature enough as a country to achieve a resource trading scheme of this nature. Trust in the media is dropping at a time when mature conversations are needed to gain traction. Listening to those conversations around agricultural value chains and considering the upcoming resource management changes, it becomes apparent that there is a way to make progress, but not along the current path.

Groundwater issues in Southland, as documented in early 2026 (Rodway, 2026), are undoubtedly difficult for those who do not want to look outside their farm boundary. Yet catchment groups in Southland, numbering at least 37 by early 2026, are doing exactly that, and what they are finding gives us cause for optimism. With this in mind, I set out to look at what existing mechanisms existed in New Zealand and what good practice could be found in international examples.

Introduction: When Reputation Outpaces Reality

Almost every region in New Zealand exceeds the minimum freshwater quality thresholds under the National Policy Statement for Freshwater Management 2020, and the problem is not confined to nitrogen. A national assessment of four contaminants across New Zealand's rivers, lakes, and estuaries found that reductions in nitrogen, phosphorus, *Escherichia coli*, and sediment loads are required across the vast majority of the country's land area (Snelder et al., 2023). Southland-specific modelling commissioned by Environment Southland found that achieving NPSFM bottom lines alone requires a 47% regional reduction in total nitrogen loading and a 21% reduction in total phosphorus loading; to meet Southland's own community-agreed freshwater objectives, phosphorus reductions of 69–70%, *E. coli* reductions of approximately 90%, and sediment reductions of 24–32% would be required (Snelder, 2021; Snelder & Fraser, 2021). Canterbury faces a 44% nitrogen reduction requirement under national standards (Snelder et al., 2023). These are not projections or modelled scenarios — they are the measured gap between where New Zealand's freshwater currently sits and where the law requires it to be. New Zealand's food and fibre sector has, for decades, operated on the strength of a powerful national identity: clean rivers, green pastures, and export products that carry with them the implicit promise of environmental stewardship. That identity has delivered real commercial value. It has justified price premiums in overseas markets and insulated domestic farming from the level of public scrutiny applied in comparable countries. The problem is that the identity has now decoupled from the evidence.

The empirical record on New Zealand's freshwater quality is unambiguous. It has been accumulating for more than two decades. New Zealand's agricultural sector contributes approximately 48% of the country's total greenhouse gas emissions, the highest agricultural share among all Organisation for Economic Co-operation and Development (OECD) member states (OECD, 2017). The sector is the principal driver of freshwater quality decline in lowland rivers, lakes, and coastal waters, through nutrient loading, sediment loss, and microbial contamination (Larned et al., 2016; Snelder et al., 2021). A systematic national assessment against the bottom-line standards established under the National Policy Statement for Freshwater Management 2020 found that almost every region in New Zealand exceeded minimum thresholds in at least one key contaminant. For example, Southland is required to reduce nitrate-nitrogen loading by 41%, and Canterbury by 44%, to meet national standards (Ministry for the Environment & Statistics New Zealand, 2022).

These are not contested numbers. They are the product of more than 800 long-term water quality monitoring sites operated by regional councils over the past three decades, the National Institute of Water and Atmospheric Research (NIWA), and the Our Land and Water National Science Challenge. What is contested is whether New Zealand has the institutional architecture, the political will, and the sectoral honesty to respond to them.

When I talk to people at the heart of agriculture across the UK, Europe, Brazil, and the United States, the same observation surfaces, in different accents. They say New Zealand is where they were 30 or 40 years ago. A country that knows the science, has the monitoring,

can see the trajectory, but has not yet found a way to move collectively in response to it. That observation is uncomfortable. It is also, I think, correct.

In 2013, the Parliamentary Commissioner for the Environment described New Zealand's freshwater quality as a problem of diffuse contamination that is inherently difficult to regulate under existing frameworks but straightforward to understand scientifically. Nutrients, sediment, and pathogens enter waterways because the land uses generating them are proximate to those waterways, and in many catchments, there is no effective barrier between the production system and the receiving environment (Parliamentary Commissioner for the Environment, 2012). This assessment has not materially changed in the past 12 years. What has changed is the accumulation of monitoring data, which now makes the gap between regulatory intent and environmental outcome impossible to attribute to scientific uncertainty.

This research began with a practical question: could a market mechanism for nature-based solutions, specifically commercial wetlands and nutrient offsetting, be developed at the catchment scale in New Zealand? After visiting the United Kingdom, Europe, Brazil, and the Chesapeake Bay watershed in the United States, this question resolved into a more challenging one. Why has New Zealand, despite possessing both the scientific knowledge and economic incentives to improve its freshwater, made little durable progress?

I believe the answer does not primarily reside within the farming sector itself. Many farmers are ahead of the institutional curve. The catchment group movement across Southland and beyond is evidence of a genuine grassroots appetite for change. The answer lies in the institutional environment in which farmers operate. New Zealand's primary industry advisory system has been optimised through decades of policy and market signals to deliver production advice. The independent, publicly funded science and extension infrastructure that once existed and continues to underpin environmental progress in comparable countries was dismantled during the reform periods of the 1980s and 1990s and has never been coherently replaced (Duncan & Kirk, 2020). What remains is a fragmented system. Those who sell inputs have the most reliable access to farm gates. Those who bear the cost of environmental outcomes, downstream communities, ratepayers, urban consumers, and future generations have no equivalent presence.

A 2020 review of New Zealand's Primary Industry Advisory Services (PIAS) system, commissioned by the Ministry for Primary Industries, concluded that the system was well suited to providing advice, delivering private benefits, productivity, efficiency, and profit; however, "when it came to environmental management advice and the outlines of benefits, there was potential for improvement (Duncan & Kirk, 2020, p. 3)." That is a careful formulation. The more direct reading of the evidence is that farmers who want independent environmental guidance frequently cannot obtain it from the commercial advisory sector, because the commercial advisory sector does not profit from providing it.

This report does not argue that farming and clean water are incompatible. International evidence, in particular evidence from the Chesapeake Bay watershed, demonstrates that intensive agricultural production and improved water quality can co-exist, provided the appropriate institutional conditions are in place. This report argues that these conditions

do not currently exist in New Zealand, that specific and identifiable structural failures are responsible for their absence, and that a credible pathway to remediation is available if the political and sectoral will to pursue it can be found.

Farming is integral to the fabric of New Zealand's society. The question is not whether we farm, but whether we farm in a way that the country and the world can endorse sustainably.

Chapter 1: Current NZ Biodiversity Credit Market Initiatives

There have been attempts to establish nature-based trading or credit schemes in New Zealand. The government is supporting the expansion of a voluntary nature credit market through the implementation of pilot projects across New Zealand.

Establishing a market that is durable, measurable, and transparent will help farmers, landowners, iwi, and conservation groups unlock new income streams for looking after nature on their land. The purpose of biodiversity credit markets is to create economic incentives for the conservation and sustainable management of ecosystems, aligning environmental goals with business interests.

Waituna Lagoon, Southland is one of the pilot areas for restoration with 400 ha of farmland at lagoon margins to lowland forest and wetlands (RAMSAR-protected site).

Other aspects of the program in other locations include the following.

1. Nature positive credit programme pilot Led by Silver Fern Farms. Testing a processor-led programme for market attraction, and potentially third-party investment, in on-farm nature restoration and enhancement activities that support commercial 'nature positive' claims.

2. Nature-based markets pilots for rural landowners Led by Pāmu Farms. Exploring pathways to make nature-based markets accessible to a range of New Zealand farmers and landholders.

These initiatives are welcome and have undoubted potential. The question remains: how can these be implemented on a larger scale and developed as a widescale trading scheme?

Chapter 2: The Edendale Aquifer Group

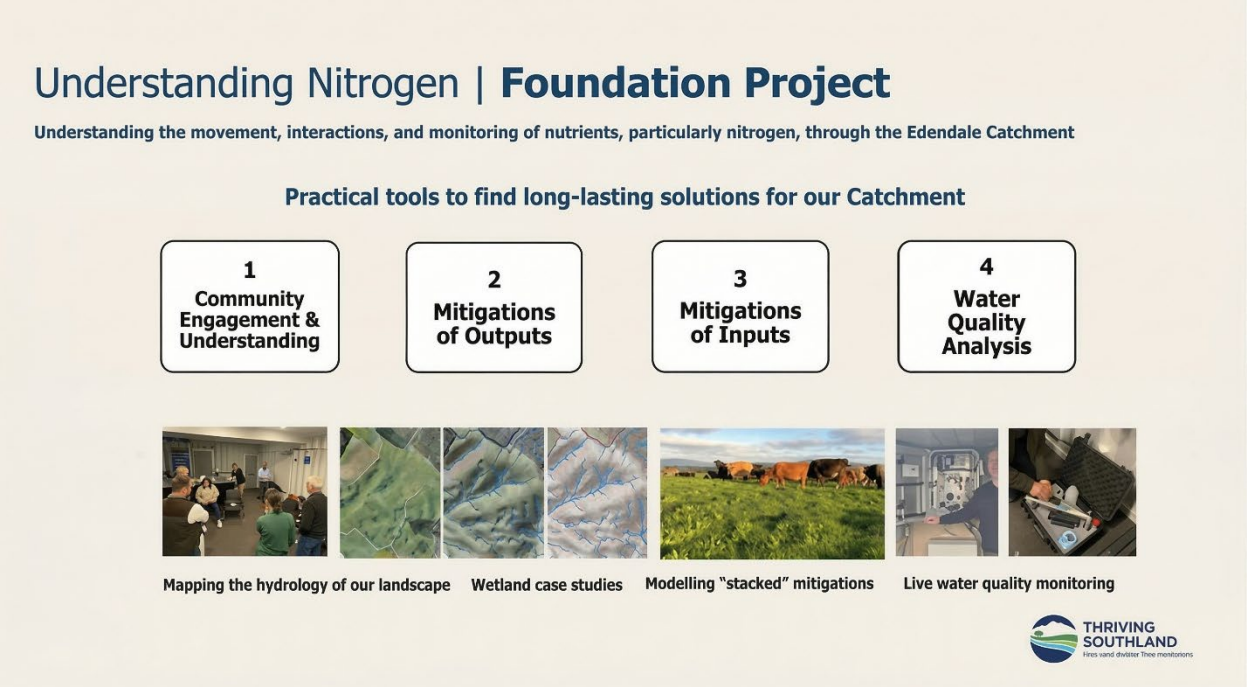
The Edendale Aquifer Group (EAG) formed in 2024 as part of the Three Rivers Catchment Group, which Jon chairs, was established to address high levels in the local aquifer and Mataura River. These challenges stem from seepage along the 42 km Edendale Terrace, where shallow soils and complex hydrology make nitrogen management difficult.

The group comprises local people focused on practical, evidence-based solutions. Work includes water testing, modelling different "stacked" mitigation options for farm inputs (such as fertiliser changes, stocking rate adjustments, and the use of plantain), and investigating edge-of-field mitigations, such as wetlands, to treat seepage before it enters the river. EAG also hosts community events to share knowledge and tools. With strong support from industry and science partners, the group is actively working to improve water quality and protect the long-term health of the catchment.

EAG Local Solutions for Local Nutrient Issues, field day and BBQ, May 2025

The Edendale Catchment is approximately 24,000 ha in area and extends over both sides of the Mataura River. The catchment comprises dairy, sheep, and beef farms, as well as dairy grazing, along with some major industry landholdings and two townships.

The Edendale Aquifer Group has launched the Understanding Nitrogen Project to help the community gain a clearer understanding of how nitrogen moves through the Edendale aquifer and into the Mataura River, and what actions can be taken.



The work being done can be confronting; however, it is an open and no-blame environment, and ultimately, everyone is trying to achieve the same outcomes, regardless of their motivations.

Instead of driving up people's drives and saying, here's a map, telling them they have a problem, EAG got funding for a mobile testing kit. They get together once a month on a Friday at the local hall and test drinking water; from that, people might say, “Oh that's a bit higher than I'd expect, or why is that creek so low but that bore's so high?”.

Individuals do not feel singled out.

Now, the group is talking about nitrogen, trying to own it. They are looking for solutions to get ahead of regulations. People always lose land to the likes of wetlands, but if they stand back, they usually give away very little to gain so much.

This is a concept concerning the commercialisation of the environment in a way that is a win-win for farmers and the land– the environment being a key to making money–but not in the ways we have looked at it in the past.

It should be noted that catchment groups cannot solve all problems. They need to focus on education and engagement; they are run largely on a volunteer basis, so asking them to be involved in policy development or politicising them would be a step too far.

What examples exist in the countries being visited that could be adapted in New Zealand?

Chapter 2a: The Architecture of Inertia — Structural Barriers to Reform

Any honest account of New Zealand's water quality trajectory must grapple with an uncomfortable fact. The knowledge needed to improve it has existed for at least two decades. Political mechanisms to require improvement have been legislated and re-legislated in successive iterations of the Resource Management Act and its successors. Yet, substantive, nationally scaled improvements have not occurred. Why?

Why scientific knowledge and legislative intent have repeatedly failed to translate into environmental outcomes is not a mystery. This has a traceable institutional explanation.

The Advisory System and Commercial Capture

New Zealand's primary industry advisory services underwent fundamental structural changes in the 1980s and 1990s when the publicly funded Ministry of Agriculture and Fisheries (MAF) extension service was progressively dismantled. At its peak, MAF employed field officers operating in every significant agricultural district. The logic of dismantlement was consistent with the broader economic reform programme of that period: private markets would deliver advisory services more efficiently than public institutions.

However, the advisory system became financially dependent on commercial interests, which it was supposed to advise impartially.

Duncan and Kirk (2020) found that the current PIAS system is well suited to providing advice that delivers private benefits, productivity, efficiency, profit, but that independent environmental guidance is inadequately provided. A subsequent peer-reviewed analysis published in Frontiers in Agronomy found that traditional modes of extension "are based on the erroneous assumption that the reason why producers do not adopt recommended land use practices is a lack of knowledge (Kirk et al., 2022, p. 4)." An advisory system that does not systematically address these barriers can not overcome them.

This is not an accident of market design. Fertiliser companies, irrigation consultants, farm management firms, and rural professional service providers all operate within a business model structurally aligned with maintaining or increasing inputs. An advisor who recommends lower nitrogen application, a reduced stocking rate, or wetland restoration at the cost of production is recommending a reduction in a client's spending. The incentive structure does not prevent good advice from being given. It ensures that good advice is given less reliably, less systematically, and less universally than the environmental situation warrants.

In this context, there is a meaningful distinction between the interests of farmers, the environment, and New Zealand's international marketing claims, and the interests of the commercial agricultural sector. This is not a comfortable point to make, but it is an important one. PIAS research consistently shows that many producers want independent advice and are frustrated by the limitations of commercially motivated guidance (Duncan &

Kirk, 2020). The catchment group movement, discussed in Chapter 2, is partly a response to that frustration, a self-organised attempt by farmers to access peer knowledge and independent science that the commercial system does not reliably supply.

Lobby organisations and commercial interests that claim to represent farmers frequently have divergent interests from those of farmers themselves. This divergence has, over decades, been one of the principal structural barriers to institutional change in New Zealand.

The Fragmentation of Independent Science

New Zealand's research institutions underwent parallel restructuring during the same reform period. The Department of Scientific and Industrial Research (DSIR) and related crown research capacities were reorganised into a system of Crown Research Institutes structured as competitive commercial entities required to generate revenue from contracted research. This model delivered genuine scientific capability in commercially valuable areas, such as animal genetics, dairy nutrition, and pasture science. However, it was less effective at sustaining long-term, independent environmental monitoring and extension science, which does not have a ready commercial client.

The consequences for water quality science are visible in the monitoring record. Larned et al. (2016), reporting on water quality state and trends across New Zealand's river network, found that water quality in pastoral lowland rivers had deteriorated significantly since the 1980s and that the proportion of pastoral agricultural land in upstream catchments was the strongest predictor of poor water quality. Snelder et al. (2021) conducted the most rigorous national-scale attribution of river water quality trends to date, finding that land use intensification explained a significant proportion of observed water quality declines across New Zealand's major pastoral catchments. The science is clear. What has been missing is an institutional mechanism to deliver this science credibly to farming communities, and a political environment willing to act on it.

The seven Crown Research Institutes (CRIs) are now being consolidated into three public research organisations (PROs), which are arguably positioned toward a greater commercial focus. Whether this reorganisation will increase or decrease the independence of environmental science from commercial agricultural interests remains to be determined. This concern is well-founded, given the trajectory of the previous restructuring: investment-driven research priorities will continue to favour commercially saleable outputs over the independent environmental monitoring and extension functions that New Zealand critically requires (OECD, 2017).

The Pattern of Regulatory Exclusion

The exclusion of agriculture from New Zealand's Emissions Trading Scheme (ETS) represents the clearest documented case of sectoral interests overriding both scientific recommendations and stated government policy intent. Agriculture accounts for approximately 48% of New Zealand's gross greenhouse gas emissions (Ministry for the Environment, 2024), the highest agricultural share in the OECD, yet has remained largely excluded from the ETS despite repeated policy commitments to include it. Climate advisory

bodies have consistently recommended pricing agricultural emissions. These recommendations have consistently been deferred.

This report's central concern is water quality rather than climate. However, the ETS pattern is instructive because it reveals the operating mechanisms of sectoral resistance: sustained political lobbying, the framing of environmental regulation as an existential threat to rural communities and national food security, and the selective deployment of economic modelling to emphasise costs while suppressing benefits. These mechanisms operate with equal force in the freshwater domain, as the history of regional plan development across Canterbury, Southland, Waikato, and Manawatu demonstrates. Long phase-in periods, weak auditing provisions, and persistent industry exemptions are the legislative expressions of the same political economy that has kept agriculture outside the ETS.

This argument is not directed at farmers. Farmers bear the personal financial and reputational risks associated with water quality problems. Many have already determined that incremental changes are both necessary and commercially viable. The Edendale Aquifer Group, examined in Chapter 2, demonstrates what farmers can accomplish when provided with credible science and a no-blame institutional environment. This argument is directed at institutional and commercial interests that have systematically used the rhetoric of farmer welfare to defend outcomes that serve input suppliers and processing companies, rather than farmers themselves.

The Social Licence Gap

Social licence, the informal permission granted by communities to businesses to operate, has become central to agricultural sector communications in New Zealand. The concept is useful. It has also, in the environmental context, been deployed as much to forestall regulatory action as to motivate genuine change. The implicit argument has been: "Farmers are already working on it; regulation would undermine the goodwill we are building." However, the monitoring record does not support this argument.

A 2023 national survey by Manaaki Whenua Landcare Research, comparing farmers' self-assessment of their environmental performance against public perception of that performance, found a significant gap between the two (Beban et al., 2024). Farmers consistently rated their own environmental performance higher than the public did. Urban respondents were considerably more sceptical of farming's environmental record than rural respondents.

This matters commercially because New Zealand's principal export markets are overwhelmingly urban, increasingly informed, and increasingly capable of independently verifying environmental claims against monitoring data. The international reputation that generates export price premiums is not immune to domestic monitoring records. It is, over time, entirely contingent on it.

As Canadian spud farmer Paul Adriaansen, who owns Spud Plain Farms Ltd, put it to me during this research: **"I don't have a brand, I have a reputation.**" This distinction matters.

A brand can be managed. Reputation, in the end, is simply a description of what you actually do.

Julian et al. (2017), examining river water quality changes across New Zealand over 26 years in response to land use intensity, found that the rate of water quality deterioration in dairy-intensified catchments accelerated significantly in the period of greatest production growth. The social licence argument cannot survive indefinitely in the face of this trend. At some point, the gap between claimed performance and measured reality becomes a reputational crisis that this report and the broader sector are trying to prevent.

Chapter 3: Chesapeake Bay, USA — A Diagnostic, Not Just an Inspiration

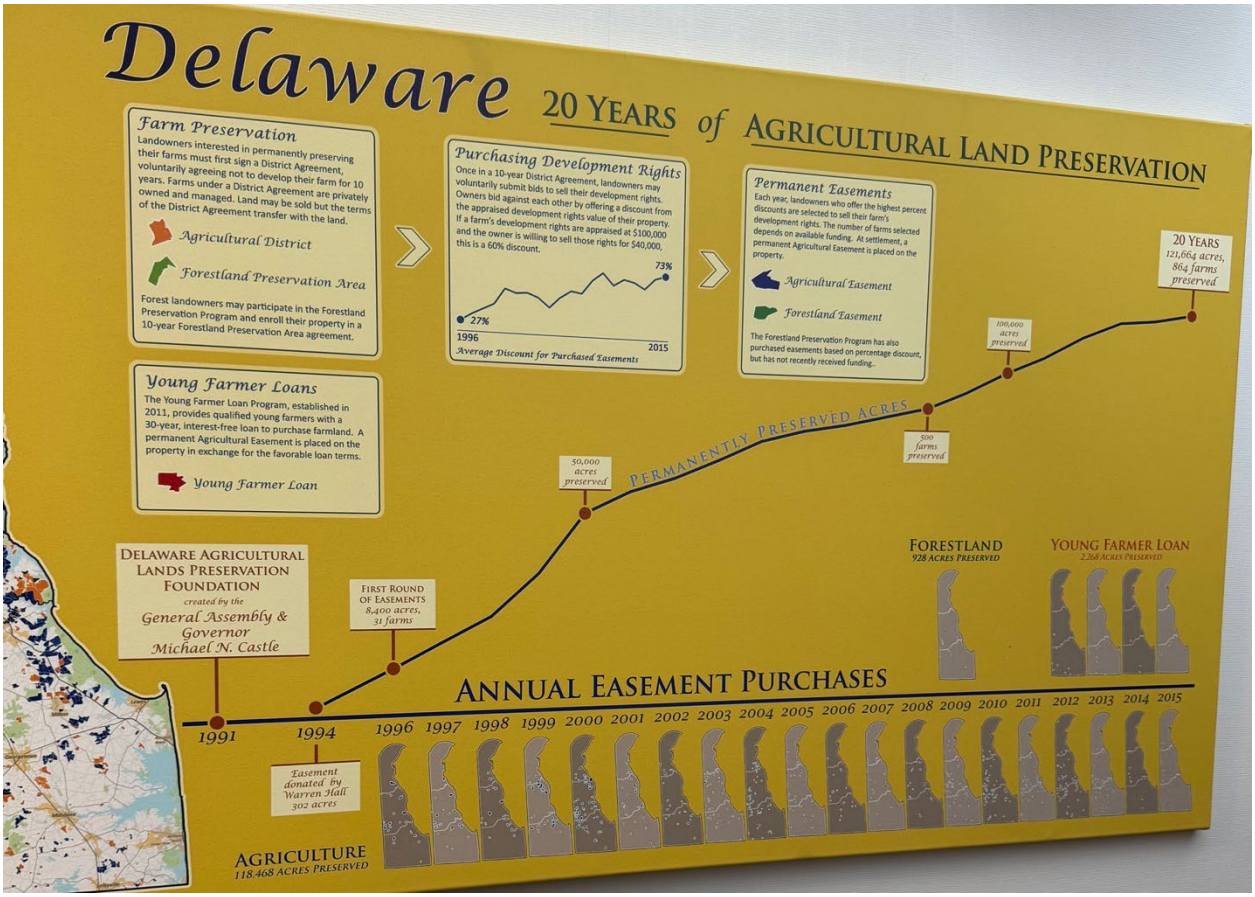
The Chesapeake Bay case is frequently cited in New Zealand environmental policy discussions as an inspiring example of what is possible. It deserves to be cited more precisely, as a diagnostic instrument that reveals exactly where New Zealand's current institutional architecture falls short and what specific changes would address those shortfalls (Table 1).

The restoration of the Chesapeake Bay is among the most thoroughly documented environmental recovery programmes in the world. From 1985 to 2020, total nitrogen loads to the Bay declined across nearly all major tributaries, and positive ecological responses, such as increases in submerged aquatic vegetation, reductions in summertime hypoxic extent, and improvements in water clarity, have been documented in the peer-reviewed literature (Zhang et al., 2018). These improvements did not occur because of public relations campaigns, voluntary guidelines, or market signals alone. This occurred because a specific set of institutional conditions was created and sustained across multiple political cycles. These conditions can be precisely described and compared directly with those in New Zealand (Table 1).

While sitting with former Delaware Secretary of Agriculture, Walter 'Ed' Kee, a man who spent 30 years working with the University of Delaware Cooperative Extension before leading the state's agriculture policy, I was struck by how recognisable his story was. He reminded me of a MAF officer from the 1970s. He commanded the respect of farmers. Not one farmer I saw him interact with showed mistrust or anything close to it. That relationship, built over decades between an independent science institution (the University of Delaware) and the farming community it served, is something that New Zealand is missing. Moreover, it is specific enough to be rebuilt. The conditions that enabled the improvement in the water quality outcomes of Chesapeake Bay are outlined as below.

Condition 1: A Trusted, Independent Science Institution

In the Chesapeake watershed, the University of Delaware Cooperative Extension Service and equivalent land-grant universities in Maryland, Virginia, and Pennsylvania functioned as honest brokers. They delivered science to farmers, regulators, environmental advocates, and state governments without a commercial stake in any particular outcome. Their authority derived from scientific credibility and institutional independence, not from product sales or levy income. When the university extension service said that nitrogen applications needed to be reduced, farmers listened. Not because they were legally compelled to, but because the source of that advice was not trying to sell them nitrogen.



The achievements of the Delaware Agricultural Lands Preservation Foundation, one of a suite of initiatives supporting farmers in the State.

In New Zealand, there is no direct equivalent at the necessary scale. While Lincoln University, Massey University, and the University of Waikato have genuine agricultural science capabilities, none currently operate a cooperative extension function that reaches farming communities across all regions, and none is publicly funded and mandated to provide independent environmental advice free from commercial entanglement. This role is, by default, occupied by commercial advisers with the structural incentives described in the previous chapter.

Condition 2: Mandatory Nutrient Management with Independent Compliance

In Maryland, the Water Quality Improvement Act of 1998 established mandatory nutrient management plans for all farms above a minimum threshold, with independent compliance verification conducted by state conservation inspectors (National Research Council, 2011). Plans required farmers to demonstrate that nutrient applications did not exceed agronomically justified crop uptake needs. This was not a voluntary best-practice guideline. It was a legal requirement, applied consistently, with consequences for non-compliance.

As the Maryland Department of Agriculture's Hans Schmidt put it to me: "I think farmers recognise the benefits economically to having a plan and applying only the nutrients that

are necessary to that, so in support of that legislation and just the commitment to Chesapeake Bay restoration as a whole, the state has invested a lot of money into ensuring the success of both nutrient management and Bay restoration efforts."

In New Zealand, freshwater farm plans represent a partial equivalent, but with critical weaknesses: slow regional rollout, variable substantive requirements across regional plans, and an audit framework that is still being established.

Condition 3: Cost-Sharing that Makes Compliance Economically Viable

From the early 1980s onwards, Maryland established a cost-sharing program under which farmers could access grants covering up to 87.5% of the cost of conservation practices required to meet water quality standards (National Research Council, 2011). This had two effects. It made compliance economically manageable for farmers, who would otherwise face prohibitive capital costs. It also built cooperative relationships between the farming sector and public agencies, which proved durable through subsequent periods of political change.

New Zealand has no equivalent national cost-sharing programme for freshwater-related on-farm capital works. Some regional councils and industry bodies provide partial funding assistance; however, there is no systematic national mechanism to ensure that farmers are not asked to bear the entire cost of addressing environmental outcomes that public policy has long permitted to accumulate. Asking farmers to pay entirely for the remediation of catchment-wide problems is both inequitable and strategically counterproductive. It positions the regulator as an adversary rather than a partner and generates political resistance that has slowed progress for decades.

Condition 4: Sector-Neutral Regulation

The Chesapeake Bay Total Maximum Daily Load established load allocations for nitrogen, phosphorus, and sediment across agricultural, wastewater, municipal stormwater, and other sectors simultaneously, with no sector receiving a blanket exemption (United States Environmental Protection Agency, 2010). Farmers were not singled out, but neither were they shielded. The principle was that the environmental problem was catchment-wide, and the regulatory response would be catchment-wide, regardless of whether the discharge came from a dairy farm, a sewage treatment plant, or a suburban stormwater drain.

As I found in Brazil, where best practice is regulated without caveats or protected sectors, blunt sector-neutral rules can hold farming in good environmental stead without destroying the industry. New Zealand's freshwater regulatory history has consistently applied lighter requirements, longer phase-in periods, and greater reliance on voluntary mechanisms to the agricultural sector than to other discharge sectors. This differential treatment is not defensible on scientific grounds. A kilogram of nitrogen entering a river from a farm has the same environmental effect as a kilogram from a municipal treatment plant. Its sole justification is political.

Condition 5: A Unifying Institutional Framework Across Political Boundaries

The Chesapeake Bay Programme, established formally in 1983, created a multi-state, multi-agency institutional framework that transcended individual political jurisdictions, involving the United States Environmental Protection Agency (EPA), six states, and the District of Columbia (Chesapeake Bay Program, 2020; National Research Council, 2011). This is not incidental to its success. No single state could have addressed the Bay's problems alone, and the absence of a coordinating institution would have produced exactly the kind of jurisdictional blame-shifting that characterises New Zealand's cross-regional water quality challenges today, across the Waikato River system, the Canterbury plain aquifers, and the Southland flatland catchments.

Where NZ Currently Stands

New Zealand is not where Chesapeake Bay was in 1983, it is somewhere between 1983 and 1997. In other words, the Chesapeake Bay Programme's history can be mapped as a timeline: 1983 is roughly when the science became established and monitoring began, but institutional reform had not yet crystallised. 1997 is roughly when mandatory nutrient management and cost-sharing programmes started producing measurable results. The argument is that New Zealand today sits somewhere in between, the science is solid, the water quality signals are clear, but the political will to convert that evidence into durable institutional change has not yet appeared.

Table 1: Institutional conditions for catchment-scale environmental reform — Chesapeake Bay versus New Zealand

Institutional condition	Chesapeake Bay (1990s to present)	New Zealand (current)
Independent science and extension institution	Land-grant university system; no commercial conflicts	Fragmented CRI/PRO system; commercially funded advisory services dominant; no land-grant equivalent
Mandatory nutrient management plans	Water Quality Improvement Act 1998; all farms above threshold; state-verified compliance	Freshwater Farm Plans; slow rollout; variable standards; limited independent audit
Public cost-sharing for on-farm works	Up to 87.5% cost-share grants for conservation practices	No national cost-share programme; ad hoc regional and industry contributions only
Sector-neutral regulation	TMDL applies to all sectors; no agriculture exemption	Agriculture consistently receives lighter requirements and longer phase-in periods than other sectors
Cross-jurisdictional coordination	Chesapeake Bay Programme; formal multi-state agreement with EPA oversight	No equivalent mechanism; significant regulatory divergence across regional councils
Political catalyst event	1997 fish kills; public attribution to agriculture; legislative response within one year	Multiple events including Havelock North 2016 and Southland nitrate 2026; no equivalent legislative crystallisation yet

Meeting with Walter 'Ed' Kee (left) Delaware Senator Timothy D Dukes (2nd left), and Delaware State Representative Jesse Vanderwende (to my right) and Charles S. Postles Jr.

Chapter 4: The United Kingdom and Europe

England: When Environmental Management Depends on Subsidies

It is commonly understood that English farmers are regulated; however, they are simply paid to farm differently. For more than four decades, the EU Common Agricultural Policy (CAP) has underpinned English farming through direct payments based on the area of land farmed, payments that bear no direct relationship to environmental outcomes. In the peak year of 2019–20, farmers in England received over £1.8 billion in direct payment subsidies (UK Parliament, 2021). The structural consequence was a farming sector shaped less by market signals than by subsidy architecture: what was funded, got done, and what was not funded, rarely happened.

Post-Brexit England is attempting to break free from this dependency. The Agriculture Act 2020 established a new Environmental Land Management (ELM) scheme operating on the principle of 'public money for public goods,' replacing area-based payments with payments for measurable environmental outcomes: biodiversity improvement, clean water, carbon sequestration, and soil health (Department for Environment, Food and Rural Affairs [Defra], 2021). The farming budget remains substantial at £2.4 billion per year; however, the logic has been inverted: farmers are no longer paid to own or farmland but to manage it in ways that benefit the public (House of Lords Library, 2024). The transition period runs from 2021 to 2028.

Visits to English farms revealed how the old system had shaped behaviour in ways that would take years to unwind. Grants had been spent on half-finished barns and incomplete farm projects not because the farmers were poor managers, but because the business model was to chase subsidies rather than the underlying agricultural opportunity. These were competent farming operations distorted by four decades of incentive misalignment.

The lesson for New Zealand is not that subsidies are bad. Rather, environmental improvement contingent on perpetual public subsidy rather than structural change, mandatory standards, independent science, and cost-neutral compliance will last only as long as the political will to fund it. When English government reviews create funding uncertainty, as the Environment Agency's own communications acknowledge, environmental programs stall (Environment Agency, 2024). This is not a model that New Zealand should replicate.

England has produced one genuinely useful institutional innovation. Biodiversity Net Gain (BNG) became mandatory from 12 February 2024 under Schedule 14 of the Environment Act 2021, requiring most new developments to deliver a minimum 10% increase in biodiversity value (UK Government, 2024). Developers must either enhance biodiversity on-site or purchase registered biodiversity credits from landholders who create and maintain habitats for a minimum of 30 years. This creates a legally mandated, sector-neutral obligation on developers and opens a genuine income stream for farmers who restore marginal land. Visiting a UK catchment group, I found the mechanism frustrating in its complexity — it risks placing the best farmland under biodiversity obligations rather than the marginal land for which the incentive was designed. However, the underlying

principle is sound. If New Zealand is serious about biodiversity credit markets, BNG provides a statutory template worth examining closely.

The River Wye: Cross-Jurisdictional Failure as a Mirror for New Zealand

The River Wye is England's fourth-largest river, stretching 155 miles long, with much of its length forming the border between England and Wales. It is designated a Special Area of Conservation (SAC), meaning it carries the highest tier of ecological protection available under law. It is also failing. Environment Agency source apportionment modelling attributes 60%–70% of the total phosphate loading in the Wye catchment to diffuse agricultural pollution, principally from livestock manure application and intensive poultry operations in Herefordshire and Powys (Environment Agency, as cited in Friends of the Upper Wye, 2022). More than 60% of the river's SAC sections fail to meet phosphorus targets (Natural Resources Wales, 2021). By 2023, the river's condition was formally assessed as 'Unfavourable — Declining' (UK Government, 2024).

The phosphate problem in the Wye is not new. A Nutrient Management Plan for the catchment has been in operation since the early 2010s, and the science has been clear for longer than that. Research from Lancaster University documented that the annual phosphate surplus accumulating in agricultural soils in parts of Herefordshire has reached approximately 3,000 metric tons per year, which is enough legacy phosphate in the soil to render additional applications unnecessary for the next five to 12 years (Withers et al., 2022). The institutional failure is in the response: two separate regulatory jurisdictions, England's Environment Agency and Wales' Natural Resources Wales, with different subsidy regimes, different enforcement cultures, and different planning frameworks, govern a single catchment that does not recognise the border.

The parallel with New Zealand is precise. The Waikato River system, Canterbury plain aquifer network, and Southland flatland catchments all span multiple regional council jurisdictions. In each case, the absence of a coordinating institutional framework produces exactly the regulatory fragmentation and jurisdictional blame-shifting that the Wye demonstrates. The critical lesson is not just what the Wye catchment looks like when cross-jurisdictional coordination fails. It is that the failure was predictable from the institutional design. The people involved wanted to fix the problem. However, the architecture made it very difficult to do so.

One of the projects I learned about was the Cornwall Catchment Partnership, which has many similarities to the Waituna Lagoon in Southland. Loe, also known as Loe Pool, is the largest natural freshwater lake in Cornwall (50 ha), and I was fortunate to meet with Jon Neville from the Cornwall Wildlife Trust to discuss the partnership's approach. The partnership, funded by the Environment Agency and involving 21 organisations, focuses on reducing flood risk, improving water quality, and enhancing drought resilience. However, its catchment-based approach is reactive to available funding, with specific projects linked to funding streams that change with each government review cycle. The importance of having a long-term institutional mandate, rather than project-by-project funding, was a recurring theme of the conversation — something that also applies to Waituna.

Loe Pool, Cornwall, UK. (pic: Discover Helston)

Farmers in New Zealand face real pressures to continue operating around nitrogen, as they have in the past; however, this is a short-term view. Farmers need to consider whether the current trajectory will shut down their businesses in fifteen years. The Wye experience reinforces the honest-broker argument. What the catchment lacked was not goodwill or science. What the catchment lacked was not goodwill or science; it was a single trusted institution delivering the same evidence to every stakeholder, a function that the Chesapeake Bay Programme's land-grant university extension model provides.

Ireland: A Warning About the Gap Between Rhetoric and Record

A visit to an Irish dairy farming area sharpened the comparison in ways that are directly relevant to New Zealand. Ireland and New Zealand share a structural profile: both are temperate, pastoral, export-oriented dairy economies with a strong cultural identity built around farming, significant political influence wielded by the agricultural sector, and water quality trajectories that diverge from the environmental claims made in export markets.

Ireland operates under a nitrates derogation from the EU Nitrates Directive, allowing farms in qualifying regions to apply up to 250 kg of livestock manure nitrogen per hectare per year, compared with the Directive's standard limit of 170 kg/ha/year (Environmental Protection Agency Ireland, 2022). The derogation is periodically renewed on the condition that water quality improves. Ireland's dairy herd has grown by approximately 40% over the past decade, with milk production increasing by 36.9% between 2015 and 2021 (EPA Ireland, 2023). The water quality response has been direct: nitrogen levels are too high at 40% of Irish river monitoring sites nationally, and 52% of Irish surface waterbodies fail to achieve good or high ecological status (EPA Ireland, 2022, 2023). The European Commission, in a 2022 observation letter on Ireland's Common Agricultural Policy Strategic Plan, formally questioned whether Ireland's Water Framework Directive obligations were being adequately addressed (Water News Europe, 2023).

Public rhetoric from government and farming organisations describes Irish agriculture as a leader in sustainable intensification. However, the EPA's monitoring record describes a

different situation. This is the social licence gap operating at a national scale, with an institutional structure that has systematically prioritised sector growth over the regulatory settings required to deliver the environmental outcomes being claimed. The parallel with New Zealand is not exact, but it is uncomfortable. New Zealand's monitoring infrastructure is more established. However, the trajectory, a sector whose institutional architecture is optimised for production advice rather than independent environmental guidance, runs in the same direction.

The EU is currently pressing Ireland. The nitrates derogation was renewed in 2022 only with a two-year review requirement rather than the standard four years, a clear signal that the Commission regards Ireland's water quality trajectory as inadequate (Water News Europe, 2023). New Zealand faces no equivalent external constraint. This is both an advantage and a vulnerability: the absence of an external accountability mechanism means that regulatory deferral can continue for longer. When the day comes, and the NPSFM monitoring data suggest that it is coming, the institutional failure will be entirely domestic and attributable to identifiable decisions.

The Netherlands: The Political Cost of Inaction

Since World War II, the Netherlands and New Zealand have followed parallel trajectories, with both countries expanding intensive livestock production and encountering environmental consequences in their waterways over the past two decades. The Dutch experience is a case study in what happens when a government defers action on a known environmental problem out of fear of antagonising a politically organised sector.

Agriculture accounts for approximately 61% of the Netherlands' nitrogen emissions, the highest agricultural nitrogen intensity per hectare in the European Union (Netherlands Organisation for Applied Scientific Research, as cited in Wikipedia, 2024). By 2018, 78% of the Netherlands' Natura 2000 protected nature areas exceeded nitrogen critical deposition values (Spheres of Influence, 2024). The government's response, the Programma Aanpak Stikstof (PAS), granted development permits on the basis of anticipated future emissions reductions that had not yet materialised. On May 29, 2019, the Administrative Jurisdiction Division of the Council of State ruled the PAS incompatible with the EU Habitats Directive and declared it null and void (Raad van State, 2019). The ruling immediately suspended an estimated 18,000 construction projects, housing developments, infrastructure works, and farm expansions, triggering a constitutional and political crisis from which the Netherlands has not yet fully recovered (Wikipedia, 2024).

The political consequences were severe. The Farmer–Citizen Movement (Boer–Burger Beweging, BBB) was founded in October 2019 in direct response to the ruling, with farmers blockading highways and targeting ministers' homes (Wikipedia, 2024). The BBB became the largest party in the Dutch Senate at the 2023 elections, fundamentally reshaping the country's political landscape. The government's response, a €24.3 billion transition fund for farm buyouts, innovation, and nitrogen reduction measures, represented one of the most expensive agricultural policy corrections in the world (Library of Congress, 2025). The Dutch experience demonstrates that the cost of deferring structural reform is not eliminated; it compounds.

A visit to Wageningen University and Research (WUR) confirmed that the monitoring infrastructure existed well before the crisis. A Dutch government-commissioned monitoring programme tracking nitrogen and phosphorus levels showed stabilisation but no improvement in water quality for years before the PAS ruling (RIVM, 2021). Science was not the constraint. What was missing was the institutional mechanism to translate that science into regulatory action before the legal system forced the issue. New Zealand should note that the Dutch government had a monitoring infrastructure, a scientific consensus, and a publicly stated policy intent to reduce agricultural nitrogen emissions. None of these were sufficient without the institutional architecture to act on the evidence.

I was inspired by the examples of innovation during my visit. Ruben Exterkate, a Dutch pig farmer and fellow Nuffield scholar, had farmed 750 sows and was planning to expand to 3,000. After further due diligence, he decided instead to scale down to 250 sows farmed organically, and was generating as much income as when he had farmed 750. Much of this came down to the comparative ease and cost of disposing of organic effluent. He redesigned the piggery and, using Dutch government funds, built a conference room with a glass window through which visitors could view sows during farrowing. This is how social licence is built in practice: through transparency, through the willingness to be seen, and through business models that align environmental performance with commercial viability rather than treating them as competing constraints.

A conference room with a difference in Holland... with a glass window through which people can view sows during farrowing.

A common message across all conversations in the Netherlands was the need for collaboration between the government and the sector within a comprehensive policy

framework, and the political cost, measured in billions of euros and a fractured rural–urban social contract, of failing to establish that framework before the courts imposed it.

Poland: What New Zealand Has That Others Don't

Poland presents a different kind of lesson. Visiting Polish farming operations and research institutions, I encountered sophisticated agricultural science capacity, a well-resourced Ministry of Agriculture with 12 specialist research institutes covering soil science, climate adaptation, organic systems, and nutrient management, and individual farms practicing no-till cultivation and integrated crop and livestock systems with a rigour that would not look out of place in any advanced agricultural economy. I was fortunate to meet researchers from the Institute of Eco-Hydrology at the Polish Academy of Sciences, where the discussion covered nature-based solutions for water management, nutrient cycling in the Vistula catchment, and ecosystem restoration. The state-owned farm I visited spanned 8,500 ha and produced 47 million litres of milk annually while practicing no-till cultivation and structured manure management.

We canvassed challenges, such as nutrient management, soil testing, and the roles of the government and private sector in agricultural policies. The challenges of implementing long-term solutions in Poland due to the lease system and the lack of financial incentives also featured.

Poland conspicuously lacked a mechanism for connecting scientific knowledge to farm-level practice across the broader agricultural community. When I raised the question of how research reached the country's 1.3 million individual farm holdings, the answer was honest: it largely did not. Poland has information; however, it does not yet have the community-based infrastructure to reach the farmers who need it.

This is precisely the gap that New Zealand's catchment group movement fills, and a gap that is easy to overlook from the inside. Talking to Polish researchers about the Edendale Aquifer Group model, monthly water testing at the local hall, no-blame operating philosophy, farmer ownership of the problem, it became clear that the model's strength is not the science, which Poland also has, but the community architecture that makes the science actionable at the farm level. I connected the researchers I met with Thriving Southland.

The lesson for New Zealand is this: the catchment group model is not a consolation prize for a country that lacks institutional resources. It is an institutional innovation that countries with more resources than New Zealand do not have and are beginning to recognise that they need. That recognition should strengthen New Zealand's resolve to resource, federate, and protect what has been built, rather than treat it as a substitute for the institutional architecture proposed in Chapter 6.

What England, Ireland, the Netherlands, and Poland share is a variation of the same institutional failure: the knowledge exists, the monitoring exists, and the will exists in farming communities, but the architecture to translate them into durable change does not. England has learned this through subsidy dependency. Ireland and the Netherlands have learned this, or are learning it, through the political cost of deferral. Poland has the science but not the community infrastructure. New Zealand has catchment groups. What it still lacks is the institutional architecture that would allow those groups to function at the necessary scale

Chapter 5: Brazil

Brazil has developed some unexpected and impressive methods for complementing farming and the environment.

It is a land of opportunity because the growing environment can achieve much. In Brazil, all the rainfall occurs in half a year.

The country seems to be unfairly stigmatised, as there is a big problem with illegal land clearance, but that is not because of farming, and it needs to be dealt with. The farms I saw included massive buffers around waterways, no diggers in rivers–they did not have sediment issues**,** and massive vertically integrated systems (e.g., ethanol production, which comes back as a protein to cattle).

This is regen in a nutshell: full incorporation of vertical integration of livestock and crops.

If farming generally, 20% of the property needs to be in native plants, 35% in the Pantanal, and 80% in the Amazon. They use satellite enforcement and photos captured regularly to monitor changes in the landscape. We drove approximately 5000 km and probably observed only 10% of the farmed areas. They are the largest exporters (or near to) of sugarcane, coffee, soy, citrus, blue gum (cellulose), and eucalyptus for tissues. Brazil is the world's largest exporter of beef and its second-largest producer, and domestic consumption is also high; for example, São Paulo residents are estimated to consume 50 kg of beef per person per year.

View from Aquidauana looking towards the Pantanal in Brazil

Brazilian farms lack rich organic matter and have sand. They can sequester significantly more carbon. Not protein quality, but quantity–four to five times the volume.

Brazilian farmers demonstrated resilience, continuing to maintain production levels without jeopardising their resources.

In terms of governance, the Brazilian Agriculture and Livestock Confederation (CNA) has consolidated itself in the past few years as the main forum for discussions and decisions in Brazilian agribusiness.

The CNA System comprises 27 agriculture and livestock federations that operate in the states and the Federal District, and more than 2, 000 rural unions, which are responsible for providing direct support actions for rural producers in the municipalities. They aim to be an institution of excellence that contributes to Brazilian producers and rural workers becoming global examples of sustainable and innovative agricultural production.

A large, 24/7 air conditioned cow barn in Brazil where cows at the peak of their lactation are housed.

There is potential to develop a trading scheme around the percentages of natives on land with other farmers. Best practice is regulated; there are no caveats or protected sectors. They appear to be blunt rules, but they have served them well.

Jon Pemberton mustering Brazilian style on Senator

Chapter 6: Conclusions

This has been quite a journey. I have gone from an idea about building a solution to realising that the most value I can add is through working alongside those who have the drive to see real change. However, I have also come to understand that goodwill and hard work at the catchment level, as genuinely impressive as it is across Southland and beyond, will not be enough on its own.

The international evidence reviewed during the 2025 Nuffield Scholarship points to a consistent pattern across every successful case of catchment-scale environmental improvement. Progress does not occur through exhortation, voluntary guidelines, or public relations programmes. It occurs when specific institutional conditions are created: independent science delivery, mandatory planning supported by fair cost-sharing, sector-neutral regulation, and a trusted honest broker between farming communities and the wider public. These conditions must be sustained across political cycles rather than abandoned when they become inconvenient.

New Zealand does not currently have such conditions. Creating them is a work in progress.

The following proposals are not a comprehensive policy programme. They are the minimum institutional changes that international evidence suggests are necessary to move New Zealand from the current situation, where incremental voluntary action is occurring against a background of continued systemic deterioration, to a position where the trading mechanisms and nature-based solutions this research originally investigated can function.

Proposal 1: Establish a Land-Grant Equivalent Institution

Lincoln University is the natural institutional home for the co-operative extension function advocated in this report. The model is the University of Delaware: delivering independent science to all catchment stakeholders, farmers, regional councils, environmental advocates, and communities, without commercial entanglement. This requires dedicated, ring-fenced Crown funding for an extension and independent science function, protected from commercial research contracting pressures; a formal mandate to operate in partnership with regional councils and catchment groups across all significant agricultural regions; and sufficient institutional scale to provide consistent, scientifically credible guidance to farming communities who currently receive that guidance, if at all, from commercially interested advisers.

This is not a new institution. It is a restored function for an existing institution, modelled on an international example with a multi-decade track record of success in circumstances directly comparable to those in New Zealand.

It would be valuable to bring a team from the Chesapeake Bay Programme to New Zealand to describe how they had to make sacrifices to resolve their situation. These farmers received input into fixing it, the science was delivered, and no sector was protected. That story would resonate here.

Proposal 2: Establish a National Cost-Share Programme for Freshwater Works

No farmer should be asked to bear entirely the cost of remedying environmental problems that accumulated under regulatory conditions created and maintained by the public sector. A national cost-sharing programme, co-funded by the Crown, industry levies, and regional councils, for freshwater-related on-farm capital works, wetland construction, riparian fencing, and cover cropping would remove the financial barrier that prevents willing farmers from implementing scientifically validated mitigations and create cooperative relationships between farming communities and public agencies, which are a precondition for any voluntary compliance culture.

The Chesapeake experience consistently demonstrates that cost-sharing, when sustained over multiple years, generates environmental outcomes and sectoral goodwill that make subsequent mandatory requirements politically achievable (National Research Council, 2011). The sequence matters. First, cost-sharing builds cooperative trust. Second, mandatory requirements are applied to a sector that has been treated as a partner rather than an adversary.

Proposal 3: Resource and Federate Catchment Groups

New Zealand's catchment groups represent the most valuable environmental governance asset developed in the past decade. The New Zealand Landcare Trust currently identifies more than 220 groups nationally, with Thriving Southland coordinating 30+ catchment groups covering 90% of the Southland region (Kirk & Kannemeyer, 2024). These groups are demonstrably effective at building peer-to-peer trust, which makes practice change possible in farming communities resistant to top-down direction.

However, catchment groups cannot substitute for the institutional architecture this report advocates. They are not substitutes for independent science delivery, mandatory planning, or cost-sharing. They are community infrastructure through which all these functions can be effectively delivered at the scale of the individual farm and catchment.

Three specific factors would substantially increase their effectiveness. First, dedicated funding for professional co-ordination in each group. The current volunteer-led model is a strength because community ownership is essential to legitimacy; however, it is also a structural fragility. A professional co-ordinator, even part-time, stabilises administrative capacity and maintains momentum through inevitable periods when farming demands crowd out volunteer attention. Co-ordinators would need a direct line of sight back to the land-grant institution (honest broker).

Second, consistent access to independent science translation. Catchment groups need scientists who can explain what the monitoring data mean for their specific catchment, free from commercial interests. The land-grant institution proposed above is a natural mechanism for this. Third, a national federation structure that enables cross-group learning. The Edendale Aquifer Group 's (EAG) approach to monthly water testing at the local hall, the no-blame operating philosophy, and the focus on community ownership of the problem are transferable innovations that should not require each new group to rediscover them independently.

Proposal 4: Sector-Neutral Environmental Regulation

The case for treating agriculture differently under environmental regulations has been rehearsed consistently for 40 years and has consistently produced slower progress than the environmental situation warrants. New Zealand requires a public commitment, at the level of central government, industry bodies, and regional councils, that no sector will be permanently exempted from the requirements necessary to meet nationally agreed environmental standards.

That commitment does not require any particular regulatory mechanism and does not require that all sectors face identical rules. It requires only that the chosen mechanism be applied consistently, transparently, and without permanent exemption for the most politically organised sector.

The sequence in which these proposals are pursued matters as much as the proposals themselves. The Chesapeake experience points to a consistent order: co-operative infrastructure first, followed by mandatory requirements. Cost-sharing treats farmers as partners in solving a shared problem rather than as its source. Independent science, delivered without commercial entanglement, builds the credibility that makes regulatory requirements legible and legitimate rather than arbitrary. When the University of Delaware Extension and Maryland's cost-share programme had been operating for a decade, the mandatory nutrient management plans that followed encountered a sector that had been treated fairly and was largely ready to comply. New Zealand should pursue the same sequence. Resourcing catchment groups and establishing the Lincoln University extension function creates cooperative infrastructure. A national cost-share programme removes the financial barrier for willing farmers and builds the goodwill that makes subsequent requirements achievable. Sector-neutral regulation then applies to a sector that has been engaged as a partner, not confronted as a defendant. That sequence is not idealistic; it is what the evidence from the most successful comparable restoration programme in the world consistently demonstrates. The question is not whether New Zealand has the knowledge to proceed. It is whether we have the institutional courage to follow the evidence.

The Cost of Continuing as We Are

The argument that New Zealand cannot afford the institutional changes proposed in this report is, on examination, an argument about who pays. The costs of water quality deterioration are already being paid: in increased capital costs for rural communities drawing from contaminated aquifers; in remediation costs faced by regional councils managing impaired waterbodies; and in the compounding difficulty of remediating problems deferred.

The Havelock North Campylobacter outbreak of 2016, in which contaminated drinking water caused the largest recorded outbreak of waterborne disease in New Zealand's history, sickening approximately 5,500 people and contributing to at least three deaths, was a direct consequence of the institutional failures this report documents: the absence of independent monitoring, the failure to apply precautionary standards to agricultural

catchments, and a regulatory culture that treats farming as a protected sector (Government Enquiry into Havelock North Drinking Water, 2017). The Government Inquiry documented direct costs to the Crown, regional councils, and affected households running to tens of millions of dollars, with the subsequent infrastructure remediation programme for Hawke's Bay's water supply alone costing in excess of $100 million. Legal proceedings, lost productivity, and ongoing health consequences extend these costs further. Institutional failures that produced Havelock North have not been comprehensively remedied. The same regulatory culture that allowed a known contamination risk to go unaddressed for years operates across catchments nationwide.

Reputational risk deserves equal attention. New Zealand's primary sector exports generate approximately $46 billion annually, with premium pricing in key markets, Europe, North America, East Asia, underpinned by the clean-green brand. That premium is not guaranteed. It is contingent on the environmental credibility that generates it. A 2024 study found a significant and widening gap between how farmers rate their own environmental performance and how the public rates it (Beban et al., 2024). International markets are not more generous in their assessment than domestic urban consumers. Environmental monitoring data is increasingly accessible to offshore buyers, institutional investors, and the due diligence processes of major retail chains. New Zealand's export models for dairy, beef, lamb, and horticulture all carry implicit environmental claims that the current freshwater trajectory places at risk. Even a 5 per cent erosion of premium pricing across primary exports would represent losses exceeding $2 billion annually, a figure that dwarfs the cost of the institutional changes proposed in this report.

The cost of doing something is far less than the cost of litigation, consenting, and eventual reckoning with a degraded environment.

I strongly believe that we can maintain food production, grow our farming sector, and have clean water. I have been to places that have done so. I met the farmers who got through the difficult years and came out on the other side with better businesses and cleaner rivers. It is not a fantasy. However, it requires the honest admission that we have work to do and the institutional courage to build structures that can see that work across multiple political cycles.

NZ has arguably been negatively affected by some rural lobby groups which have pushed the country backwards by not accepting that we need to change, we need to do things differently, we need to do things better. Sometimes Kiwis can be their own worst enemies.

We like to think that all Kiwis are equal and deserve equal rights and opportunities - but the reality is a bit different. Our national character is a bit polite - in general Kiwis don't like to rock the boat, at least not directly to peoples' faces.

We need admit there's a problem - and be able to have a mature conversation nationally about what is needed to make change. It cannot be a finger-pointing exercise - we have wasted decades doing this already. The same rules need to be developed across the board - rural or urban - and an acknowledgement that our issues won't be solved quickly, but that incremental improvement is better than standing still.

Rather than driving tractors to Wellington and going around in circles, let us consider how to fix this. I think this report is a good start.

Bibliography

Beban, A., Korson, C., Reid, J., Procter, J., Halley, J., & Mackenzie, K. (2024). *Building a place-based social licence to operate*. AgResearch. https://doi.org/10.57935/AGR.26001745.v1

Chesapeake Bay Program. (2020). *Chesapeake Bay watershed progress: 2020 report*. United States Environmental Protection Agency Chesapeake Bay Program.

Duncan, R., & Kirk, N. (2020). *Understanding producers' perspectives on primary industry advisory services in New Zealand: A literature review* (Ministry for Primary Industries (MPI) Technical Paper No. 2020/03). Ministry for Primary Industries.

Kirk, N., Duncan, R., Booth, P., & Robson-Williams, M. (2022). Shifting knowledge practices for sustainable land use: Insights from producers of Aotearoa New Zealand. *Frontiers in Agronomy*, *4*, Article 991853. https://doi.org/10.3389/fagro.2022.991853

Government Inquiry into Havelock North Drinking Water. (2017). *Report of the Havelock North drinking water inquiry: Stage 2 report*. Department of Internal Affairs.

Julian, J. P., de Beurs, K. M., Owsley, B., Davies-Colley, R. J., & Ausseil, A.-G. E. (2017). River water quality changes in New Zealand over 26 years: Response to land use intensity. *Hydrology and Earth System Sciences*, *21*(2), 1149–1171. https://doi.org/10.5194/hess-21-1149-2017

Kirk, N., & Kannemeyer, R. (2024). *Catchment-scale collective action to improve ecosystem health: A literature review* (Manaaki Whenua – Landcare Research Contract Report LC4443). DairyNZ.

Larned, S. T., Snelder, T., Unwin, M. J., & McBride, G. B. (2016). Water quality in New Zealand rivers: Current state and trends. *New Zealand Journal of Marine and Freshwater Research*, *50*(3), 389–417. https://doi.org/10.1080/00288330.2016.1150309

Ministry for the Environment. (2020). *National Policy Statement for Freshwater Management 2020*. Ministry for the Environment.

Ministry for the Environment. (2024). *New Zealand's greenhouse gas inventory 1990–2022: Key findings*. Ministry for the Environment.

Ministry for the Environment & Statistics, New Zealand. (2022). *New Zealand's environmental reporting series: Our freshwater 2022*. Ministry for the Environment and Statistics, New Zealand.

National Research Council. (2011). *Achieving nutrient and sediment reduction goals in the Chesapeake Bay: An evaluation of program strategies and implementation*. The National Academies Press. https://doi.org/10.17226/13131

OECD. (2017). *OECD environmental performance reviews: New Zealand 2017*. OECD Publishing. https://doi.org/10.1787/9789264268203-en

Parliamentary Commissioner for the Environment. (2012). *Water quality in New Zealand: Understanding the science*. Parliamentary Commissioner for the Environment.

Rodway, E. (2026, January). *Nitrogen contamination in Southland groundwater*. Environment Southland (Southland Regional Council).

Snelder, T. H. (2021). *Assessment of nutrient load reductions to achieve freshwater objectives in the rivers, lakes and estuaries of Southland: Including uncertainties.* LWP Client Report. Environment Southland (Southland Regional Council). https://www.es.govt.nz/environment/water/whats-in-our-waterways

Snelder, T. H., & Fraser, C. (2021). *Assessment of Escherichia coli load reductions to achieve freshwater objectives in the rivers of Southland.* LWP Client Report. Environment Southland (Southland Regional Council). https://www.es.govt.nz/environment/water/whats-in-our-waterways/e-coli

Snelder, T. H., Smith, H., Plew, D., & Fraser, C. (2023). *Nitrogen, phosphorus, sediment and Escherichia coli in New Zealand's aquatic receiving environments: Comparison of current state to national bottom lines* (LWP Client Report 2023-06). Our Land and Water National Science Challenge. https://ourlandandwater.nz/outputs/comparison-of-current-state-to-nbls/

United States Environmental Protection Agency. (2010). *Chesapeake Bay total maximum daily load for nitrogen, phosphorus, and sediment*. United States Environmental Protection Agency.

World Resources Institute (2010). *How nutrient trading could help restore the Chesapeake Bay*. World Resources Institute,

Zhang, Q., Murphy, R. R., Tian, R., Forsyth, M. K., Trentacoste, E. M., Keisman, J., & Tango, P. J. (2018). Chesapeake Bay's water quality condition has been recovering: Insights from a multimetric indicator assessment of thirty years of tidal monitoring data. *Science of the Total Environment*, *637–638*, 1617–1625. https://doi.org/10.1016/j.scitotenv.2018.05.025

Council of State of the Netherlands [Raad van State]. (2019, May 29). Ruling on the Programma Aanpak Stikstof (PAS). Administrative Jurisdiction Division. https://www.raadvanstate.nl/uitspraken/@115651/201600614-1-r2/

Department for Environment, Food, and Rural Affairs [Defra]. (2021). Environmental land management update: How the government will pay for land-based environment and climate goods and services. UK Government. https://www.gov.uk/government/publications/environmental-land-management-update-how-government-will-pay-for-land-based-environment-and-climate-goods-and-services

Environmental Protection Agency Ireland. (2022). Water quality monitoring report on nitrogen and phosphorous concentrations in Irish waters 2022. EPA Ireland. https://www.epa.ie/publications/monitoring--assessment/freshwater--marine/water-quality-monitoring-report-on-nitrogen-and-phosphorous-concentrations-in-irish-waters-2022.php

Environmental Protection Agency Ireland. (2023). Water quality in 2022: An indicators report. EPA Ireland. https://www.epa.ie/news-releases/news-releases-2023/epa-finds-no-significant-improvement-in-the-water-quality-of-rivers-and-lakes.php

House of Lords Library. (2024, January 19). Environmental land management: Recent changes to the sustainable farming incentive and countryside stewardship schemes. UK Parliament. https://lordslibrary.parliament.uk/environmental-land-management-recent-changes-to-the-sustainable-farming-incentive-and-countryside-stewardship-schemes/

Library of Congress. (February 5, 2025). Netherlands: District court orders government to adhere to 2030 nitrogen reduction targets. Global Legal Monitor. https://www.loc.gov/item/global-legal-monitor/2025-02-05/netherlands-district-court-orders-government-to-adhere-to-2030-nitrogen-reduction-targets/

Rijksinstituut voor Volksgezondheid en Milieu [RIVM]. (2021). Water quality in the Netherlands: State and trends [Waterkwaliteit in Nederland: toestand en trend]. National Institute for Public Health and the Environment. https://www.rivm.nl/en/soil-and-water

UK Government. (2024). Understanding biodiversity net gain. Department for Environment, Food and Rural Affairs. https://www.gov.uk/guidance/understanding-biodiversity-net-gain

UK Parliament. (2021). Environmental Land Management Scheme inquiry. Environmental Audit Committee. https://committees.parliament.uk/work/1472/environmental-land-management-scheme/

Withers, P. J. A., Rodrigues, M., Soltangheisi, A., Kondron, L., Bhullar, G. S., Banwart, S. A., Haygarth, P. M., & MacDonald, G. K. (2022). Re-focusing phosphorus use in the Wye catchment (RePhoKUs Project Report 1). Lancaster University. https://councillors.herefordshire.gov.uk/documents/s50101856/RePhoKUs_Wye_Report_

310522.pdf

Plain English Compendium Summary

Reputation versus Reality in NZ: Searching for Our North Star

Name: Jon Pemberton

Phone: +64 0274924219

Email: lowburnag@gmail.com

Nuffield Australia Project No:

Objectives

1. What is the potential for developing emissions trading schemes at the catchment scale, and what are the potential pitfalls/barriers?

2. Assess the current New Zealand biodiversity credit market: a stocktake of initiatives currently available in New Zealand

3. What are the roles of catchment groups in the agricultural ecosystem, and what are their advantages and limitations?

4. What international examples of nature-based solutions as a trading tool initiative exist in the UK, Europe, and North and South America?

5. Analyse the best of these and compare and contrast them with New Zealand conditions.

6. Assess next steps needed to ensure that the right policies and organisational structures are in place to allow the type of trading system originally envisaged to be developed.

These objectives set out with a clear destination in mind. As the research progressed, that destination shifted; however, the journey turned out to be more instructive than the original map.

Research

This research project began with a practical question: Could a market mechanism for nature-based solutions, specifically commercial wetlands and nutrient offsetting, be developed at the catchment scale in New Zealand? During the course of the 2025 Nuffield Scholarship, visits to the United Kingdom, Ireland, the Netherlands, Poland, Brazil, Chesapeake Bay in the United States, and Canada led to a firmer and more important conclusion. New Zealand does not lack the technology, science, or willingness of farmers to improve its freshwater supply. What is lacking are the institutional conditions needed.

Outcomes/Proposals

Proposal 1: Establish a Land-Grant Equivalent Institution

Proposal 2: Establish a National Cost-Share Programme for Freshwater Works

Proposal 3: Resource and Federate Catchment Groups

Proposal 4: Sector-Neutral Environmental Regulation

Implications

The international evidence reviewed during the 2025 Nuffield Scholarship points to a consistent pattern across every successful case of catchment-scale environmental improvement. Progress does not occur through exhortation, voluntary guidelines, or public relations programmes. It occurs when specific institutional conditions are created: independent science delivery, mandatory planning supported by fair cost-sharing, sector-neutral regulation, and a trusted honest broker between farming communities and the wider public. These conditions must be sustained across political cycles rather than abandoned when they become inconvenient.

New Zealand does not currently have such conditions. Creating them is a work in progress.