

THE

JOURNAL

The Official Publication of the New Zealand Institute of Primary Industry Management Incorporated



FUTURE ROLE & OPPORTUNITIES FOR RURAL PROFESSIONALS ADAPTING TO CHANGING NZ WEATHER PATTERNS
A VISION TO IMPROVE FRESHWATER QUALITY **NATIONAL POLICY STATEMENT FOR INDIGENOUS BIODIVERSITY**
MENTAL HEALTH CHALLENGES FOR YOUNG FARMERS SHIFTING TRENDS IN LAND USE CHANGE



NZ Institute of
Primary Industry
Management

THE JOURNAL

The Official Publication of
The New Zealand Institute of Primary
Industry Management Incorporated

Volume 26
Number 1
March 2022
ISSN 2463-3011

The Journal is published quarterly and provided free of charge to NZIPIM's members from across the rural profession including farm management advisors, rural bankers, farm accountants, fertiliser consultants, rural valuers, specialised service providers, farm managers, representatives from industry good organisations, CRIs and universities.

The Journal is a quality assured publication for rural professionals providing professional services within New Zealand's primary industries. The articles do not constitute advice. The Institute takes no responsibility for any decisions made based on the material in this publication. The opinions of the contributors are their own and not necessarily those of NZIPIM or the Editor. The whole of the literary matter of *The Journal* is the copyright of NZIPIM.

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Annual Subscription Rates

\$75+GST (NZ)
\$100 (Australia)
\$120 (other countries)

Front cover photo courtesy of
Alison Bailey, Lincoln University

Contents

Julian Gaffaney
From the Board Chair 2

Feature articles

Dan Smith
Addressing mental health challenges
in young farmers 3

Lee Matheson
Redefining the future role and opportunities
for rural professionals 7

David Janett
Shifting trends in land use change –
economic, social and political 12

Anita Wreford
Adapting to changing New Zealand
weather patterns 18

Kingi Smiler
A vision to improve freshwater quality 23

Doug Drysdale
Lucerne/Clover Action Network group –
improving agricultural extension and farmer
confidence to make future farm system change 27

Kim Robinson
Extra milk leads to more work –
but not necessarily more profit 32

Alison Bailey
The importance of biodiverse agricultural
ecosystems – the role and implications of the
National Policy Statement for
Indigenous Biodiversity 38

Profile

Lycinda Lett 43



Gaining global perspective



At a time of unparalleled challenge and coming change for our primary production sector I am optimistic and excited about the opportunities we have ahead – opportunities which I think every rural professional needs to be considering and assessing for how they will respond and leverage the future from. Influence and control are concepts that are a bit foreign in the current context of a pending Omicron surge, new regulatory settings, long forgotten levels of inflation and operating in a ‘post-COVID’ – or should that be a ‘neo-COVID’? – world.

There is so much that is uncertain in these times that it is important currently to focus on what we *can* control within our sphere of influence. Once we are on the other side of the pandemic, we need to be expanding our viewpoint.

Internationalise your viewpoint

It is very difficult to get a real understanding of how New Zealand’s primary food production systems fit into the global food system with a viewpoint from the inside looking out. Despite the ability to share and review some information relating to offshore agri-food production systems, nothing can compare to the learning and knowledge development that comes from physically being immersed in those food production systems and questioning and sharing knowledge and ideas with the people involved. There are opportunities out there through entities, including AGMARDT and rural leaders who support individuals to do just this, building knowledge and leadership for the primary sector.

As we move through the phases of border re-opening and see quarantine measures reducing to hopefully minimal self-quarantining by later in 2022, the timing for re-engaging with the global agri-food producing sector will be upon us. Those who have themselves prepared to re-engage, learn and explore opportunities will therefore get a head start in equipping themselves for 2023 and beyond.

For me personally, travel and attendance at international farm management conferences, as well as UK and Europe-based learning, has been instrumental in gaining first a more global perspective of agri-food production systems, but secondly a much better understanding of how New Zealand fits into the global picture – a viewpoint that is difficult to achieve by looking outwards from home. Learnings have included understanding that New Zealand agriculture doesn’t necessarily lead the world in everything, as my

internal and somewhat insular viewpoint (pre-travel) struggled to comprehend!

Another really important reason we need to get our mindsets out of just the New Zealand space is that basically all of the environmental, climatic and social standards that are being reset here through new regulatory settings are being challenged and reset for agri-food production systems globally (the ‘global reset’), but with varying degrees of intensity as well as government support for those sectors.

One good example of this is for instance in Wales, where there has been widespread industry debate and pushback against government policy settings that allow afforestation of broad swathes of countryside enabled by subsidy for industrial polluters to offset their emissions – sounds familiar. In reality, understanding and direct learning of how these present and future challenges are being addressed and managed in other parts of the world helps to shift our lens and framing of the problems and should support more diversity and creative thinking around solutions.

All of this comes under the banner of leadership and learning – I firmly believe professional development as a rural professional is your key to growth and to future-proofing your human capital. For the future success of New Zealand’s primary sector on the global stage as we traverse through this ‘global reset of food production systems’, we need to develop the relevant experience and knowledge of rural professionals to provide the leadership to support the sector in achieving this success.

Ahead for NZIPIM

2022 is an exciting year for the Institute as we welcome our new CEO, Jo Finer, who brings wide-ranging rural sector and commercial experience to the role including as General Manager Policy and Industry Affairs at Fonterra, as well as agri-sector directorship roles. The Board is looking forward to working with Jo as we undertake our three-yearly review of NZIPIM’s strategy and anticipate being able to reconnect with our members in person at events, as well as a national two-day conference later in the year. One of my own objectives as Chair of NZIPIM is to ensure we redefine our international connections and linkages and support leadership and knowledge development of rural professionals from both a national and global perspective, because I see this as essential for our primary sector to meet the needs of the future **■**

ADDRESSING MENTAL HEALTH CHALLENGES IN YOUNG FARMERS

This article provides some insight into the conditions and stressors that lead to rural mental health challenges in New Zealand and highlights some key strategies for combating the upward trend.

Rising numbers with mental health issues

Mental health challenges, including loneliness, depression and anxiety, are common across the country, with four in five New Zealand adults reporting experiences with these either in themselves or in people they know. The stigma around this topic has been challenged over recent decades by mental health champions such as Sir John Kirwan, comedian Mike King and organisations such as the Mental Health Foundation, ACC, Voices of Hope and Farmstrong. With good reason, the topic continues to be prominent in public conversation, in the media and in academic research.

In 2018, the Mental Health Monitor reported the percentage of New Zealanders experiencing mental health challenges continues to increase and that 22% of adults personally experience medium or high levels of mental distress. The report further shows that while mental health issues appear across all age groups, 15 to 24-year-olds are overwhelmingly more likely to experience this – more than all other age groups combined. Also, in 2021, the World Health Organisation (WHO) predicted that all countries affected by the COVID-19 pandemic would see an increase in the previously reported numbers of people affected by mental health issues. The topic therefore deserves continued attention as there are few predictors for a decrease in New Zealand's mental health challenges.

Mental health challenges for farmers

Farming presents a multitude of health risks and stressors stemming from factors such as the range of hard work (often in challenging conditions), commodity prices, debt, climate change, weather, workload, labour, regulations and isolation. The challenge to mental health is another major health risk in farming, and this issue is more common in farming and rural communities than in the general public and urban communities. In 2014, ACC reported that farmer mental health challenges range from factors within their control (such as workload, finances and physical health) to those out of their control (such as weather, disease and regulation). These factors are what causes farming to be reported as one of the 10 most stressful occupations in the world.

Given the scale and location of many farms in New Zealand, and the country's low population, isolation is common. Isolation (both social and geographic) has a strong correlation to depression, anxiety and other mental health challenges. It takes the form of social isolation caused by stigma, silence and stoicism, and physical isolation caused by geography, population and production conditions.

While mental health challenges across New Zealand continue to increase, with further rises predicted by the WHO, some indicators suggest that farmers' mental health issues may increase at an even higher rate than other professions. Also, Statistics NZ reported in 2021 that the make-up of New Zealand farmland continues to evolve and the average farm size continues to increase. Some of

Farming presents a multitude of health risks and stressors stemming from factors such as the range of hard work (often in challenging conditions), commodity prices, debt, climate change, weather, workload, labour, regulations and isolation.

these changes may appear innocuous to mental health, but an increase in farm size is another factor that has been correlated with a rise in farmer mental health challenges. This is driven by the need for increased supervision, management of more diverse workforces and the challenge of finding skilled workers.

Both young people and farmers are more likely than the general public to experience mental health challenges. It therefore follows that young people on farms in New Zealand are a particularly high-risk group. A 2018 Farmstrong study found 64% of young farming men and 77% of young farming women reported at least one mental health challenge that had a large, or greater, negative impact on their wellbeing:

- Young farming men reported workload, relationship stressors, lack of sleep, and limited leisure time or downtime as leading causes of mental distress
- Young farming women reported the same causes, but added that fatigue is a leading factor.

The mental health challenges present for farmers are also evident across the wider agricultural industry because baseline factors (such as isolation, workload, seasonality and weather challenges) permeate across the whole rural profession.

Mental health challenges induce a range of negative factors, not only for the people directly experiencing them, but also for those close to them. The Ministry of Health reported in 2021 that common symptoms of these challenges include tiredness, poor sleep, lack of self-worth, low energy, loss of appetite, loss of pleasure and thoughts of death.

The sensitive topic of suicide

The worst potential outcome for a person experiencing mental health challenges is thoughts of suicide and suicide itself. While a sensitive subject that requires careful management, suicide needs to be part of the conversation as rural people are more likely to commit suicide than urban dwellers. Statistics NZ reports suicide rates in rural areas are 16 per 100,000 people compared with 11.2 per 100,000 people living in cities. In 2014, ACC reported that high rates of farmer suicide compared with the general population is an international problem.

Farmer suicide in New Zealand is driven by underlying mental health challenges, which are triggered by sudden farm challenges such as floods or drought, or plant or animal

disease outbreaks, or personal challenges such as personal relationship breakdowns. Major farming disasters or major traumatic events have the potential to have substantial impacts on farmer suicide risk. A raw example is that during the 2001 foot and mouth outbreak in the UK the farmer suicide rate increased 10-fold.

More recent research in New Zealand demonstrated the adverse effect that the *Mycoplasma bovis* outbreak had on farmers' levels of anxiety and depression, as feelings of isolation, loneliness, financial and production stress were significantly increased. The anxiety in this situation also permeated out across rural communities, impacting other farmers, industry officials and members of government. The 2021 winter floods in Canterbury, Marlborough and Westland are yet another illustration of unexpected and unplanned adverse events that can send a shock through (and add to the mental distress of) farmers and rural communities.

As with mental health challenges, when it comes to suicide, young rural people are again proportionately over-represented. Between 2007 and 2015, one-third of farm suicides were those under 30 years of age, and those under 40 accounted for half of farm suicides. According to the New Zealand Coroner's Office, farmer suicide in New Zealand typically sits between 15-25 people annually. Suicide affects people from all farm types, including orchardists, dry stock farmers, crop and vegetable growers, and dairy farmers. Between 2007 and 2011, 24 suicides were associated with dairy farming, and ACC estimated in 2014 that suicide attempt rates in this industry could have been as much as 20-30 times higher than this number during that period.

The topic of rural mental health therefore deserves the continued attention it receives, and it is clear why the topic continues to be prominent in public conversations, the media and in academic research. This situation also highlights the ongoing need for rural people to have a toolbox of strategies to deploy in times of mental distress.

Strategies to address mental health challenges

Mental health challenges are being addressed across New Zealand, with advocates becoming commonplace. Advocacy is present at an organisational level, with the topic of wellbeing promoted by ACC, the Mental Health Foundation, the Ministry of Health, the Rural Support Trust and a plethora of others. Advocacy is also coming from individuals, such as sporting professionals, media personalities, the medical profession, social media influencers and entertainers.



Lincoln farmers and students on a field trip

In rural New Zealand, the most recognised mental wellness organisation is Farmstrong, with 71% of all farmers and 85% of young farmers having some awareness of its existence. Farmstrong is a nationwide wellbeing initiative that helps farmers and growers increase their wellbeing so they can 'live well and farm well'. It achieves this level of recognition and makes progress addressing mental health challenges by being present at rural events and in rural channels to share farmer-to-farmer tips and scientifically-informed resources.

The Resilient Farmer (founded by farmer Doug Avery) is another well-known advocacy organisation for rural mental health, and it develops awareness, literacy and management tools for farmers facing mental health challenges. The Resilient Farmer achieves this through publications, radio interviews, speaking engagements, group sessions and online tools.

When it comes to addressing mental health challenges the Mental Health Foundation and Farmstrong both propose the 'Five Ways to Wellbeing', which are:

- Connect with others
- Be active
- Take notice
- Keep learning, and
- Give.

Younger farming men and women have added to this list, with both groups expressing getting better sleep and more time off-farm as helpful ways to improve mental health. Young farming men also reported through the 2018 Farmstrong study that people skills and self-thinking strategies are areas where improvements in mental health could be made. Other effective strategies include:

- Maintaining good physical health
- Keeping up a strong social network
- Enjoying leisure.

Despite a thorough list and a widening understanding of ways to improve mental health, the leading barrier for individuals (both in New Zealand and globally) to begin to address mental health challenges continues to be the perceived stigma or potential discrimination associated with this topic. This means people are reluctant to discuss this topic with others, and more so with those who they work with.

New Zealanders experiencing mental health challenges are not only the least likely to discuss the topic with work colleagues, but the Mental Health Monitor survey found that they are also the least likely to recognise these challenges being present for their colleagues. People are more likely to both discuss mental health challenges with, and recognise these challenges in, their close friends, family and those they live with. The importance of maintaining healthy close personal relationships is well recognised and is why many advocate individuals and organisations promote these.

Both the general New Zealand public and young farming New Zealanders are increasingly aware of their mental health, and both groups want to employ strategies to improve it. In 2018, Farmstrong reported 74% of younger farming men and 84% of younger farming women expressed moderate or high interest in improving their mental wellbeing. Awareness of mental health challenges and positive attitudes towards mental health improvement, and supporting people with mental health challenges, is strongly correlated with improvements in general mental health.

Reducing stigma around mental health challenges, maintaining a healthy lifestyle, managing stress and workloads, being aware of friends' wellbeing and having a positive attitude towards supporting people with mental health challenges are the key drivers for improving rural mental health in New Zealand.

Role of universities in addressing mental health challenges

New Zealand farming has been identified as being a particularly high-risk industry for mental health challenges. Lincoln University has been preparing young people for this industry for 144 years, so it follows that it carries a responsibility for addressing mental health. The structure of mental health support at Lincoln represents that of the wider community, with advocacy and support coming from groups such as faculties, departments, Student Health Services and the Students Association. Advocacy and support also comes from individuals such as doctors, nurses, academic staff, sports coaches, support staff and student peers.

In addition to preparing young people for a high-risk industry, the university also represents another group that is continually over-represented in negative mental health challenges globally. University students across disciplines have reported these challenges associated with their studies and living situations and are more likely than the general population to report levels of mental distress.

Common characteristics of university study are workload and time pressures, academic challenges, stressed living situations and various social forces. As noted earlier, the leading barrier to improving mental health is silence and stoicism (because of stigma) caused by a fear of discrimination around mental health challenges, and this is no different on university campuses. This highlights the responsibility of addressing mental health at universities. Regarding effective strategies for improving this on campuses, students recommended increasing mental health literacy, implementing empathy programmes and the creation of a culture that addresses mental health.

Universities are responsible for a large group of high-risk young people, and educational institutions such as Lincoln are preparing many students for a career in a high-risk industry, in a high-risk country. It is due to all the reasons discussed that mental health advocates should continue to increase the discussion, learning and awareness initiatives around the mental health challenges students face.

All agricultural programmes at Lincoln claim to expose students to the majority of situations they are likely to encounter in their chosen agricultural careers. This means the university must provide students with tools and awareness around social challenges as much as it is responsible for providing management, science and husbandry education. Strategies for addressing this situation at the classroom level have been developed with, and continue to be developed and supported by, Student Health Services, the Students Association, academic research and Farmstrong.

Initiatives are built around proven strategies for reducing mental health challenges, both in current students and future young rural professionals. Classroom activities include educational presentations, group activities, guest speakers, discussions, assignments and website familiarity. These activities aim to increase literacy around mental health.

Role of RPs in addressing mental health challenges

Numerous members of, and organisations within, the rural community (including and beyond those already mentioned) do outstanding work in addressing the mental health challenges inherent in the primary industries. Rural professionals need to continue the great work being done in this area as young people graduate and move beyond the university's influence. Having graduated and entered the rural workforce these young people remain in the high-risk categories of being aged 15-24 years and being in a primary industry.

Members of rural communities and workplaces should continue to increase mental health literacy, maintain healthy relationships and reduce stigma, silence and stoicism around mental health challenges. Rural professionals must not forget, as they are involved in New Zealand's rural communities, that they are also in an at-risk group and need to manage their own mental health as well as that of their family and close friends. Rural professionals therefore need to be aware of the 'Five Ways to Wellbeing':

1. Connect, me whakawhanaungha
2. Give, tukua
3. Take notice, me aro tonu
4. Keep learning, me ako tonu
5. Be active, me kori tonu.

Rural professionals also need to be aware of the range of educational material, support services (such as the Rural Support Trust, Mental Health Foundation and Farmstrong), as well as help networks available. Rural professionals should also be aware of any mental health champions in their area, and help them to continue to break down barriers to reduce stigma and create a culture of acceptance and support for mental health challenges.

It is this group approach from organisations and individuals across the country, and champions within rural communities and professions, which will help make further progress in this area so all members of New Zealand's primary industries can live well and farm well.

Where to get help



- Farmstrong.co.nz
- Rural Support Trust (0800 787 254)
- Lifeline – open 24/7 (0800 543 354)
- Depression Helpline – open 24/7 (0800 111 757)
- Suicide Crisis Helpline – open 24/7 (0508 828 865)

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REDEFINING THE FUTURE ROLE AND OPPORTUNITIES FOR RURAL PROFESSIONALS

This article follows on from 'The Future of the Generalist Farm Consultant' by Julian Gaffaney and Nico Mouton that featured in the December 2021 edition of *The Journal*.

Farming's current reality

It should be apparent to anyone involved in New Zealand's primary sectors that the environment that existed when most of us came into the industry is significantly different to the one we operate in today. For those of us who were already working with farmers and growers during the tumult of the reforms of the fourth Labour Government, the reality of disruptive change is not new.

But those of us who can barely remember the 'Mother of all Budgets' potentially have a very different perspective. We've experienced close to a generation of stable or falling interest rates, contained inflation and reducing trade barriers. There has been an almost unconstrained movement of people and capital and a seemingly unfettered access to information has been enabled by the digitisation of our lives. It is not surprising that for many farmers and their advisors, it might feel like the trajectory of our reality has abruptly changed over the last 18 months.

Of course, any argument that suggests this extent of change was unexpected or unprecedented is a tad disingenuous. The concept of the 'wicked' problem or our 'VUCA' (volatility, uncertainty, complexity and ambiguity) world has been around for many years and been the subject

of many a think-tank report, keynote speaker, Kellogg or Nuffield dissertation, or industry white paper. In the food and fibre sectors, plant-based proteins, lab-grown meats, decarbonisation, AI, vertical farming, robotics and the like have been casting a long shadow over our conventional paradigms for many years.

However, what seems to be causing much of the angst and disquiet is the additional, rapid and potentially unconsidered change that our economies and communities are having to deal with. Many of the physical and legal infrastructures we took for granted have been upended, disrupted and in some cases devastated by a combination of politics, climate change and a global human pandemic – ever-present factors that most people seem to have erroneously discounted the associated risks from.

Irrespective of whether the current challenges faced by our farmers should have been expected or not, the reality is that not only is change ever-present, but it is probably more visible, tangible and confronting than it may have seemed in recent decades.

So what does this all mean for rural professionals assisting farmers and growers today?

Many of the physical and legal infrastructures we took for granted have been upended, disrupted and in some cases devastated by a combination of politics, climate change and a global human pandemic.

Where have we come from?

The term 'rural professional' has managed to enter and embed itself in our industry lexicon without ever actually being clearly defined. Kellogg recipient Adam Duker's succinct description in 2019 that 'rural professionals help farmers become better farmers' presents the opportunity for a widely inclusive definition that places the farmer at its centre and captures the so-called 'broad church' of professionals that make up the current membership of the NZIPIM.

As a Registered Member of the Institute and having operated as a private farm management consultant for over 15 years, I have, at times, wrestled with such a broad definition that encompasses people who I once felt 'belonged' somewhere else (like accountants, veterinarians and valuers who have their own exclusive professional bodies).

However, we have seen the increasing complexity around farm businesses that has occurred as a result of additional compliance, greater connectivity to the consumer, new financial instruments, diversity of land use and intensification. As a result, it seems highly unlikely that a single professional role – not even the specialist generalist – can adequately help farmers 'become better' in isolation today.

While generalisations are always dangerous to propose (and even more so write down), I would hypothesise that the rural professional's currency with farmers has historically been based on either technical knowledge or an ability to provide access to resources. Until the late 1990s, farm management consultants providing the former would have considered the rural profession their sole domain, as the NZIPIM's precursor organisation (the NZ Society of Farm Management) would suggest.

Even today, the ability of a rural professional to provide certainty to farmers through knowledge (advice) or resources (inputs, credit, consents etc) still seems the primary reason for engagement. But this appears to be starting to change.

What is shaping the rural profession today?

The idea of farmers in an uncertain world no longer primarily engaging rural professionals to provide certainty might seem counterintuitive. This is particularly so when it seems that more of the farmers who have historically not engaged with rural professionals who offer 'discretionary' services (like business advice) are 'taking the plunge' and seeking out independent input for their businesses. In many cases this will be to get answers or to secure resources.

But in our increasingly interconnected and digitised world, the change that farmers are seeking support to navigate through is outpacing the ability of our traditional frameworks and knowledge transfer systems to deliver on.

Practice change on farms is increasingly driven by consumer preference or consideration of social licence, as much as from (if not more so) science-led extension programmes underpinned by institutional research. Policies to address the over-allocation of contaminants are sometimes being enacted (and given legal effect) before the accompanying regulations, tools and legal precedents or rulings have been fully developed, creating a veritable minefield of planning uncertainty and amplified financial risks.

Novel, re-imagined or re-discovered agricultural practices are displacing established techniques, often accompanied by potentially polarising or confronting value systems and conversations. The net result is that farmers are increasingly posing questions to their traditional advisors that many rural professionals are either not equipped to or want to answer, or for which definitive answers do not actually exist.

Does this mean our existing rural professionals aren't up to the job? Also, does this mean that farmers will be best served by those promoting ideas instead of science?

Our challenge as a profession

The men and women professionals who support farming today are well placed to rise to the challenges our industries are facing, but our traditional roles and currencies need to evolve alongside our clients' needs. **Figure 1** presents a framework of how our existing approach to working with farmers might need to evolve moving into the future.

As proposed in Figure 1, much of today's rural professional activity in making our farmers better tends to be focused to the left of what is described as the 'innovation frontier'. These are the interactions and engagements that are supported by existing knowledge and (western) science and our established commercial and legal frameworks. They are typically focused on incremental or continuous improvement and the rural professionals involved would tend to claim or be credited with technical expertise. Even where these professionals are at the forefront of leading or supporting innovation, such activity tends to be operationally focused and vested in technical knowledge.

This reality is likely to be a function of a number of factors. Our industry and tertiary training systems tend to focus on hard skills and our societies tend to place higher (monetary) value on them. Our rural professionals and their

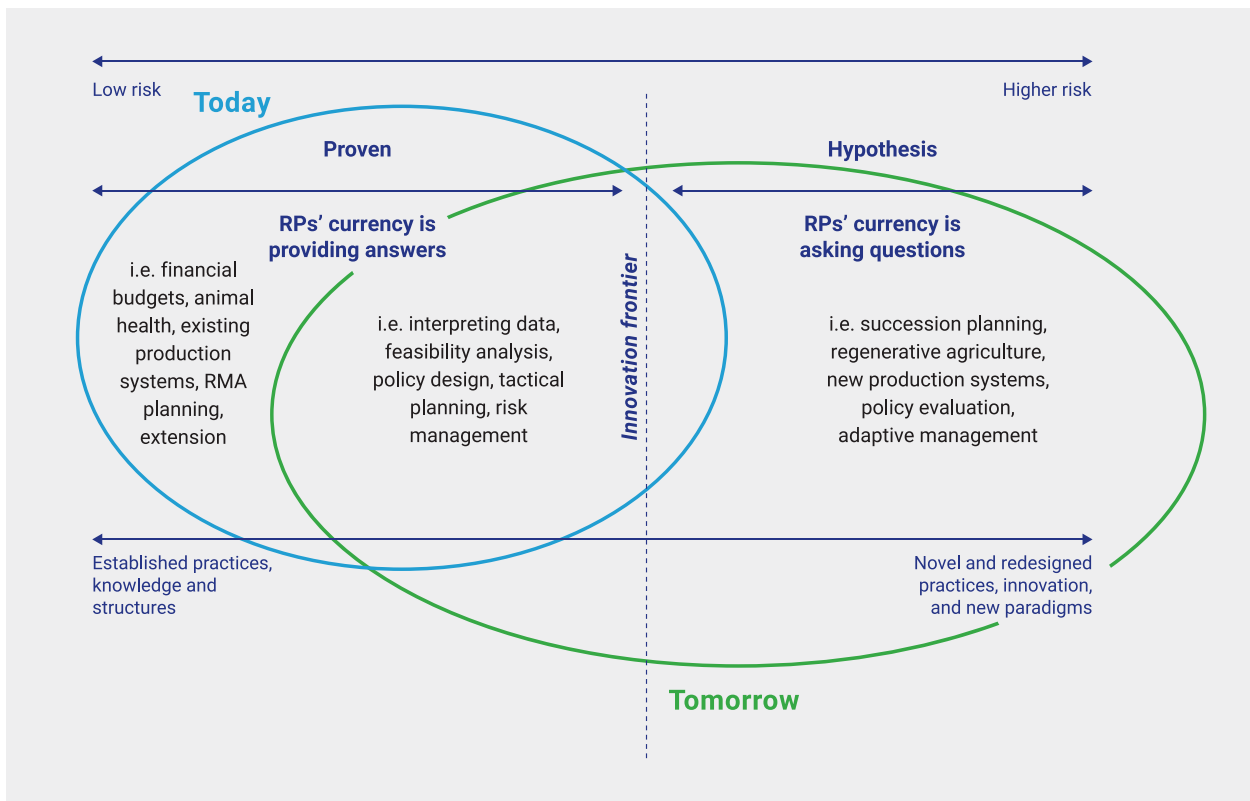


Figure 1: Primary industry advisory framework (Matheson, 2021)

In this more fluid and less certain environment, the role of the rural professional needs to be able to move from expert to coach, from teacher to facilitator, from providing answers to asking questions, and then back again, depending on the situation.

clients tend to be conservative and see knowledge as a key means of mitigating risk. Until now, while change in our sectors has at times been sudden and disruptive, it has tended to be singularly faceted and occurred in the context of everything else staying the same. As such, it felt like we had time to understand and adapt.

Tomorrow's landscape will still rely heavily on the knowledge provided by rural professionals, but this knowledge will need to be applied in more dynamic and uncertain environments. The need to pivot and rapidly respond to market signals will mean farmers might have to be prepared to make change without the safety net of established and proven science, secure markets or reliable supply chains.

Parallel knowledge frameworks, like Mātauranga Māori, may have increased relevance for farmers and defensible expertise in these disciplines might be harder to identify or acquire. There is likely to be more diversity in ideas between farmers and rural professionals, which might strain or break client relationships. In this more fluid and less certain environment, the role of the rural professional needs

to be able to move from expert to coach, from teacher to facilitator, from providing answers to asking questions, and then back again, depending on the situation.

Rural professionals, especially farm management consultants, need to become comfortable with the value of being able to operate on both sides of the dotted line, even if they aren't personally able to do so. Our farmers also need to be able to see the significant value of working with rural professionals beyond the innovation frontier, even when the 'answer' is 'I don't know – let's find out together.'

Of course, the innovation frontier is never static. Today's novel and unproven ideas can quickly become yesterday's conventions. It wasn't so long ago that plantain was considered a novelty at best, a weed at worst, yet today this herb potentially provides a basis for increasing pasture diversity that could significantly reduce losses of nitrogen from urine patches from our pastoral dairy systems. We need to be open-minded to different ways of helping our clients achieve their goals and aspirations and be prepared to have our thinking stretched and our paradigms challenged.

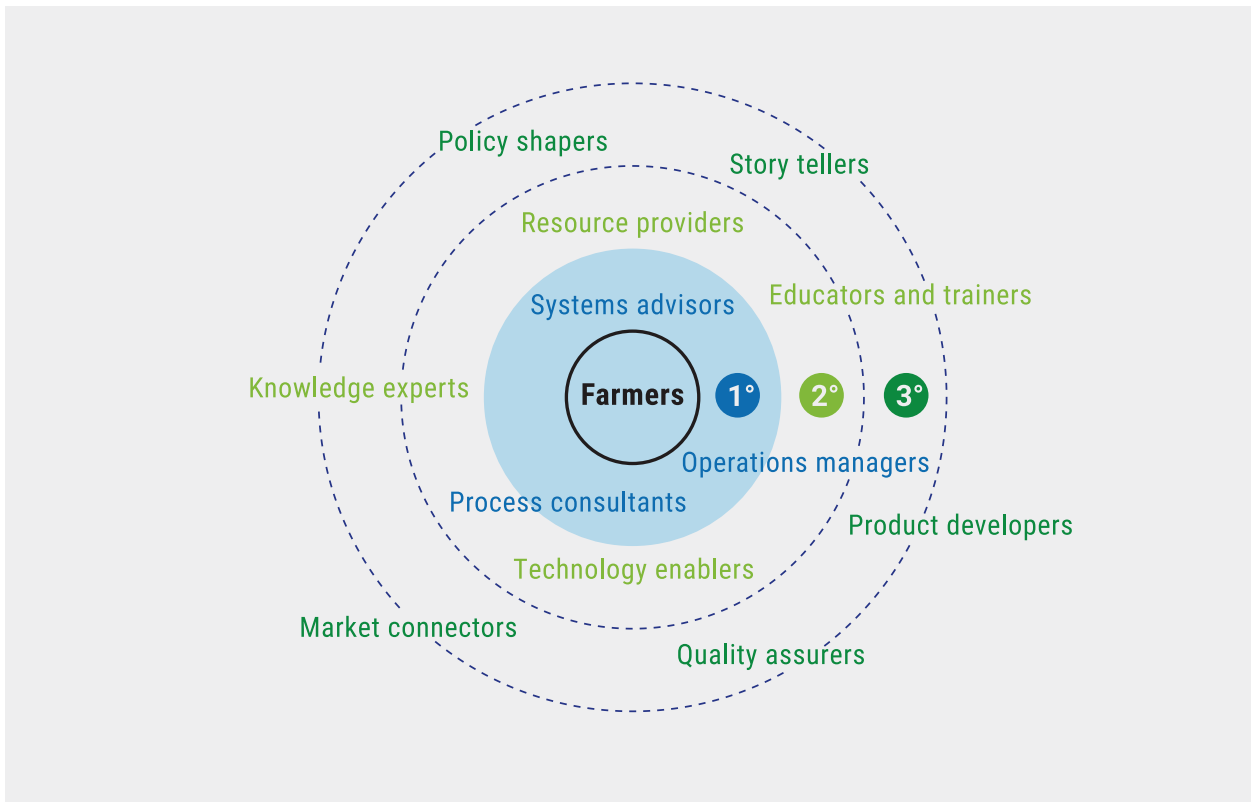


Figure 2: The rural professional system ecosystem (Matheson, 2021)

Opportunities for RPs in a VUCA world

So how do tomorrow's rural professionals help farmers become better farmers? What are the opportunities for rural professional roles in our so-called VUCA world? If historically we held the view that the farm ended at the cattle stop at the front gate, there is an argument to be had that today's farm stretches all the way across the ocean and/or cyberspace to the ultimate consumer of our food and fibre products. QR codes on consumer goods can literally open a window into a farmer's business. Through social media some farmers are inviting global audiences to see what they do every day. Producers and exporters are providing opportunities for farmers to make individual choices about selling price or markets.

Based on this hypothesis, the roles and opportunities are essentially endless. Of course, such a definition is potentially meaningless and provides little in the way of a framework to discuss, debate, dismiss or develop.

To be of the greatest help to our clients, rural professionals perhaps need to start to think less about defining themselves in terms of the 'work' they do for our clients and more about the 'role' they undertake for them. Our proximity to the farmer helps determine the role we play, but this doesn't establish our relative importance or limit the value we might create. Nor are we necessarily fixed in a role or perform the same role for everyone.

Figure 2 presents an alternative framework for how we might 'define' ourselves as rural professionals. This

rural professional ecosystem has the farmer or grower at the centre of its construction, with the various roles rural professionals perform for farmers stratified based on how closely their involvement with them is. For simplicity, three orders of roles are considered:

- The layer closest to the farmer is defined as 1° roles and they tend to operate within the farm system. Such rural professionals are typically privy to the goals and aspirations of the farmer at a deeper level than more transactional relationships. They tend to be high trust relationships and the rural professionals are deeply invested in farmer success, but 1° back from true ownership. These professional roles would tend to include what we might consider a 'traditional' farm consultant, but in today's more diverse agribusiness environment would include operations or executive managers, coaches, succession experts and mentors
- The next step out are 2° roles, which are rural professionals providing resources (knowledge and capitals) to the farm system, but with a less complete view of the farm business or a more transactional relationship. These roles would typically encompass rural lenders, specialist knowledge and service providers (agronomists, veterinarians, scientists), training and tertiary education organisations and those professionals who turn grower data into information (those at LIC, Farmax, Overseer etc)



The role of the rural professional is changing. As knowledge and resources become more directly accessible to farmers, assisting with processes and providing connections and value proposition to farmers' consumers is our new currency.

- Finally, we have the 3rd rural professional roles. These roles connect the farm system to the value chain and our communities through stories, policy development, manufacturing, quality assurance, value proposition and innovation. These roles include marketing, the rural press, our tech entrepreneurs, policy analysts and food processors.

Of course, professionals will invariably perform roles with farmers outside of their functional position – the banker who has a sufficiently deep relationship to assist with enabling farm succession, or scientists who work closely with farmers to implement novel practice change. The reality is that our relationship with a farmer can have as much bearing on the role we might play as does our technical competency. Perhaps, more importantly, our proximity to the farmer doesn't generate a greater claim to being a rural professional or imply a higher relative status to other professionals in the ecosystem. All these roles are equally valid and important and our industry and Institute need you all.

Conclusion

The role of the rural professional is changing. As knowledge and resources become more directly accessible to farmers,

assisting with processes and providing connections and value proposition to farmers' consumers is our new currency. When we consider the extent to which uncertainty is being amplified through change we didn't expect, our preparedness to ask questions about the things we don't fully understand will be as important as being able to provide answers about the things we already know.

As a profession we need to embrace the opportunities provided by collaboration. We also need to recognise that in a farm business that reaches all the way from the gate-to-the-plate, the rural professional has an equally expansive remit, which gives us all the opportunity to grow and potentially re-imagine our roles with farmers.

'Helping farmers become better farmers' is certainly a wider remit than it used to be. As a result, we need to evolve ahead of our clients so we can help them shape tomorrow.

Further reading

Adam Duker. *How Can Rural Professionals Be More Effective in This Time of Transformational Change?* Report for the Kellogg Rural Leadership Programme. Course 40, 2019.

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SHIFTING TRENDS IN LAND USE CHANGE – ECONOMIC, SOCIAL AND POLITICAL

This article looks at the changes that have occurred in rules covering forests in the Emissions Trading Scheme (ETS). It also summarises events that have occurred to increase land prices and comments on what is happening on the ground in a farming/land use context.

Increased interest in planting forests

The ETS has been in effect for over 12 years and in this time the price of carbon has gone from \$18 down to \$2 and now up to \$85 per unit. For the first eight years it really concerned mainly pre-1990 exotic forest landowners who had to pay deforestation charges if forests were removed and converted to a non-forest use.

This was particularly so in the Central North Island and Canterbury, as over 250,000 ha of pre-1990 exotic forest was removed and converted primarily to dairy farming or activities associated with that industry. A few hill country

dryland farmers and forest companies started to plant and register forest into the scheme, but only in small numbers.

Post-1989, registered participants were very cautious about selling credits issued as there was a requirement to repay these if the forest was harvested or destroyed by some natural event. This created a contingent liability with a value that depended on the prevailing market price at the time. In the past two years there has been a large increase in interest in planting forests as the price of carbon has dramatically increased.



The ETS has been in effect for over 12 years and in this time the price of carbon has gone from \$18 down to \$2 and now up to \$85 per unit.

What's changed in the ETS?

There have been some important changes to the rules and way in which forests (or, more importantly, land) eligible to earn carbon credits will be administered. These rules are not in effect yet but come into force on 1 January 2023. The following is a summary of the main changes.

Averaging carbon accounting

Averaging allows you to claim the carbon accumulated for a period of time on the *first rotation*.

Figure 1 shows the period in which you can claim carbon and what happens on subsequent rotations. You can only claim carbon on the green portion of the line.

Each forest type in the ETS has its own average age:

- Radiata pine: age 16
- Douglas-fir: age 26
- Exotic softwoods: age 22
- Exotic hardwoods: age 12
- Indigenous: age 23.

For example, a radiata pine forest is usually harvested at 28 years. The average amount of carbon stored by a radiata pine forest over multiple rotations when it is harvested at 28 is equivalent to the amount of carbon it stores at age 16. If you registered a first rotation radiata pine forest in the Waikato region into the ETS when it is planted it would earn carbon for 16 years. Using the default carbon tables the forest would earn a total of 354 units.

The key point to note here is that credits can only be claimed from the start of the *first rotation*. This has important consequences for older trees. If you have an eligible radiata stand, under averaging carbon can only be claimed for the first 16 years. If you have a stand that was planted in 1993, never registered, has been harvested and is about to be replanted, under averaging it is not eligible to receive any credits.

In effect, averaging can supply credits for a first rotation forest planted on new non-forest land. Note carbon can be claimed every year up until the average age is reached. Once the average age is reached, there are no more reporting or compliance obligations apart from ensuring the land stays in forest cover if destroyed or harvested.

At harvest no credits have to be repaid and the timber crop revenue remains with the owner, but they are obligated to replant the land into any forest type within four years of harvest. In the future there is no carbon revenue (only timber) unless it is converted to a permanent forest category.

Permanent forest

Permanent forest operates under the Forest Stock system, which allows you to claim carbon annually up until age 50 years. In this time the forest cannot be clear-felled, but log removals can be undertaken so long as 30% canopy cover is maintained and production thinning and continuous canopy cover forest management systems are used. These systems are not common in New Zealand, but are more prevalent in Europe and in some North American areas.

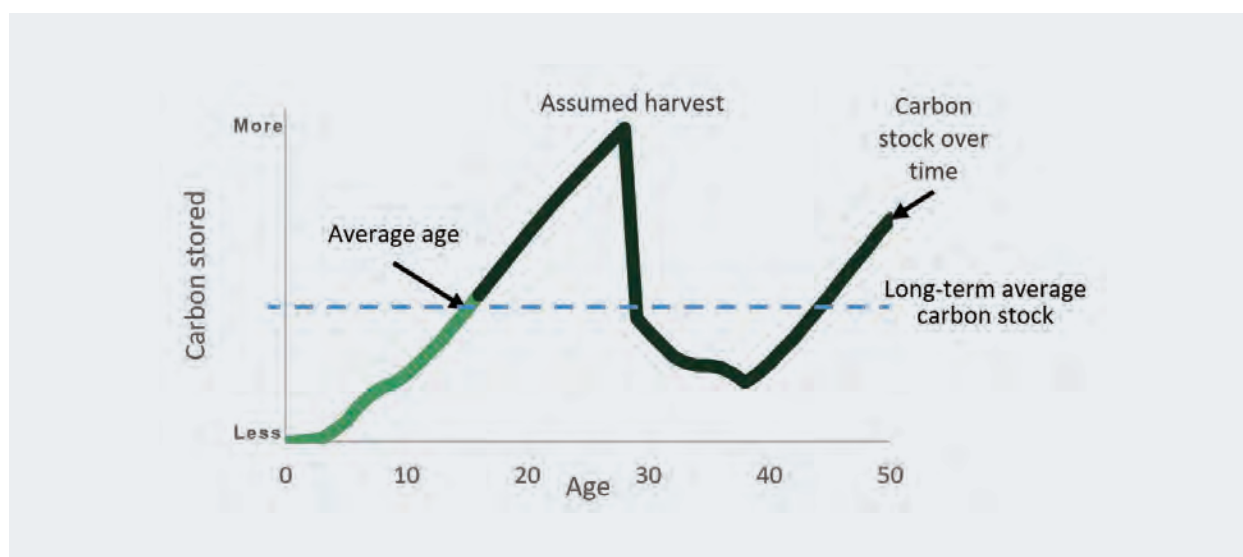


Figure 1: Averaging credit claim timing.Source: www.mpi.govt.nz/forestry/forestry-in-the-emissions-trading-scheme/averaging-accounting/

Permanent forest operates under the Forest Stock system, which allows you to claim carbon annually up until age 50 years.

At age 50 years there are three options:

1. Continue as permanent forest for 25-year periods.
2. Repay all the carbon claimed to date and, subject to Resource Management Act (RMA) 1991 rules, change land use.
3. Revert to averaging.

Under this you must repay the carbon back to the averaging age of the species. For example, if radiata you would keep the first 16 years of carbon claimed and repay the last 34 years. You can then clear-fell and it then becomes a normal averaging forest.

Forests can convert from averaging to permanent at any time, but note though that the 50-year period starts from when you become a permanent forest and not from the planting date. It is interesting to note that at the present time no-one can register a forest as permanent in the ETS, as the Permanent Forest Sink Initiative (PFSI) has closed and will be absorbed into the new Permanent Forest category in 2023.

Adverse event cover

Under the original ETS any forest lost via a natural event (fire, wind etc) resulted in the participant being obligated to repay all the credits that had been issued to them, either upon declaration of the event or within a few years afterwards. This is difficult and expensive to insure against. Large forest owners with a scattered and diverse estate could self-mange this risk, as many do for fire now. For small owners this was very difficult. As a result, most owners were reluctant to sell credits and expose themselves to this risk.

As of 1 January 2023, the Crown will provide adverse event cover. In summary, if a forest is destroyed through natural events the carbon liability will not have to be repaid. It will, in effect, be parked. There is an obligation to replant the forest within four years and once the forest achieves the carbon stock it was at the time of loss it can receive credits again. Note that the liability is not extinguished and follows the replanted forest.

For averaging forests, if the destruction event is after the averaging age there is no issue because once the averaging age is achieved the forest can be harvested anyway – it must just be replanted. For permanent forests, the forest must be re-established and once it achieves the carbon stock it can start to earn new credits again. The exact details of how this can be applied for are being developed as regulations now and will be revealed later in 2022.

Why has the carbon price risen so much?

This is a combination of new government policy, which has been in discussion and formulation over several administrations of all colours, and the passing of the Climate Change Response (Zero Carbon) Amendment Act 2019. This established the Climate Change Commission (CCC) and its subsequent report of recommendations about how to tackle climate change issues.

Alongside this has been the 2015 Paris Agreement with governments and large companies taking on board the concepts and goals of reducing emissions. We see this reflected almost daily in our lives and the news today. All industries now face increasing scrutiny and questions about what we are doing to both reduce emissions and general environmental stewardship, which has resulted in international carbon prices rising, including those in New Zealand.

The world has talked about reducing emissions in the past and now it appears action is being taken.

In New Zealand's case, the government of the day has picked up the recommendations of the CCC and started to implement these. **Figure 2** provides a summary of the CCC's recommendations around forestry.

In total, the CCC recommended a further 380,000 ha of exotic forest by 2035 alongside 300,000 ha of native forest by this date as well. Post-2035 there is not deemed to be a requirement for more large areas of exotic forest for climate change purposes, but further natives will be required into the future after this date. This, of course, assumes all other reduction actions are taken and achieved to some degree.

New Zealand's ETS has now become a true Cap and Trade scheme with a cap on emissions set and reducing as time passes. With a reducing supply of offsets through government auctions forecast, and price ceilings lifting, we have seen secondary market prices lift as well. The ETS is designed to incentivise emission reductions through price signals and as the price rises the signal is stronger.

Land use effects

For this discussion I present what I see as happening in rural New Zealand with all the changes above occurring. In my view, it's not all about trees.

Having been in the forest industry for 40 years, with 33 years of that working with farmers, iwi and small forest investors (and while working with large international investment funds), it has been an interesting evolution and journey. I must also admit to being a Boomer – the last year (1963). My children inform me it is very important that I

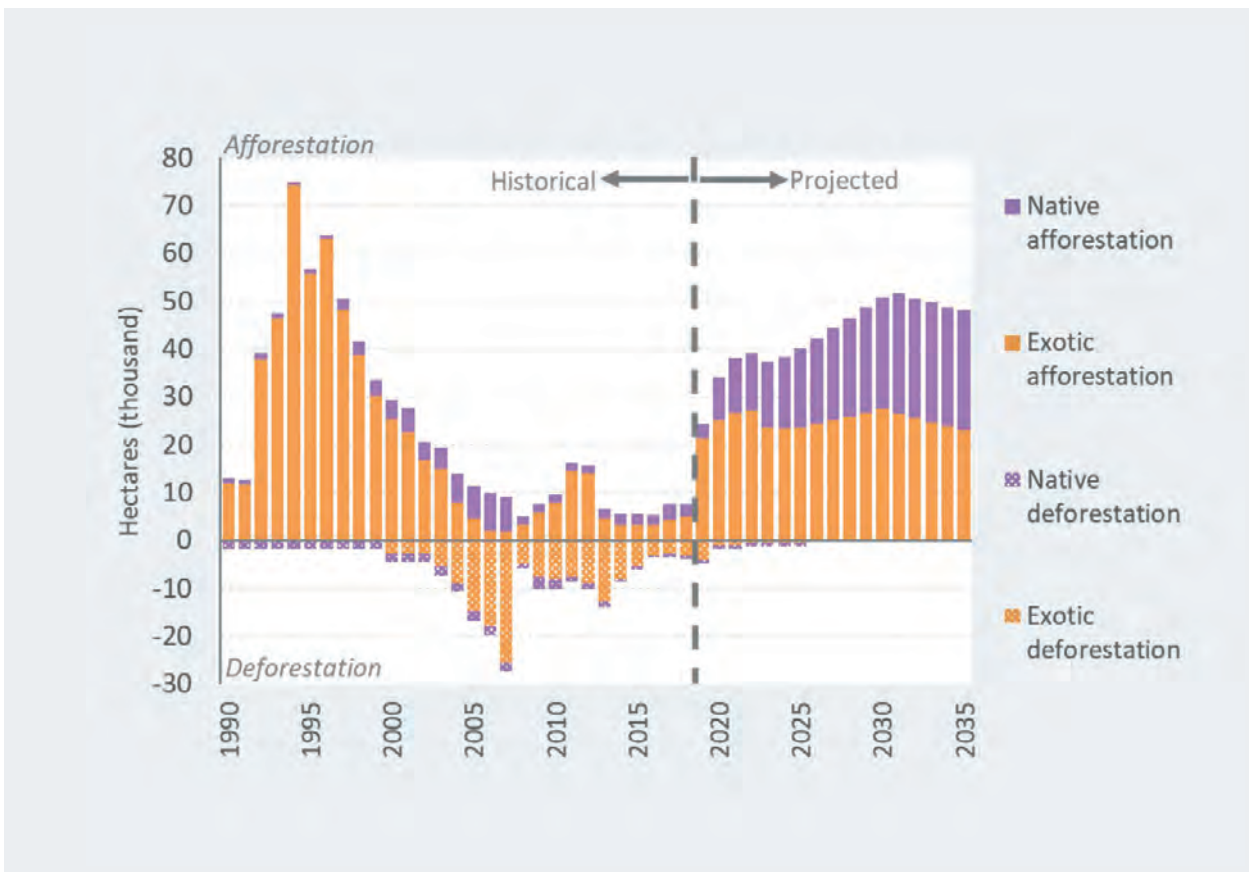


Figure 2: Climate Change Commission projection on new forest required

An important point, often misreported, is that overseas investors cannot register for permanent forests. They are confined to averaging for new forests, so if planting radiata within 16 years they are solely timber forests.

understand I come from another time – I inform them we are grateful social media didn't exist in our time.

So what's happening? With several factors in play – the rise in carbon price, the perceived risk of political change reducing, international political and business acceptance of the requirement for reductions in emissions or offsets – it is unsurprising that we are seeing a large upswing in the demand for land to plant trees.

International buyers

These buyers receive a lot of the headlines as they are visible and are buying some very large properties to plant. What motivates them to be here? Carbon – naturally the returns from the first 16 years are very good. *But* an important point, often misreported, is that overseas investors cannot register for permanent forests. They are confined to averaging for new forests, so if planting radiata within 16 years they are solely timber forests.

Alongside this are predictions (World Bank, Gresham House) that within 30 years the demand for timber products will increase from between 200-400% compared to now. Time will tell, but it seems from my discussions with large international investors that they do give credence to these predictions.

Nearly all the new overseas buyers are new to New Zealand and the traditional large overseas forestry timber companies here are, by and large, not participating in the new planting. Some of these entities are very interesting companies – some are many hundreds of years old and have been forest owners for centuries. They are in for the long term and having survived numerous wars in Europe and political upheaval so have a different perspective on the world. This group is a growing presence in our rural land markets and have large amounts of capital that no-one in New Zealand can match.

New Zealand permanent carbon farmers

There are a small number of companies in this space and these two are the main entities:



NZ Carbon Farming Ltd

NZ Carbon Farming state they are managing over 46,000 ha as a permanent forest and have bought larger areas of land in lower price land areas of New Zealand. They recently tried to sell a portion of their estate to a UK-based fund, but this was declined by the Overseas Investment Office (OIO), as they will not let overseas entities participate in permanent forestry



Dryland Carbon

Dryland Carbon is a partnership of four Kiwi companies – Air New Zealand, Contact Energy, Genesis Energy and Z Energy. They seek carbon credits from New Zealand forestry operations to meet their compliance surrender obligations under the ETS. How much is intended to be permanent versus averaging for Dryland is unknown.

This form of exotic forestry appears to be the area that is creating the most angst, alongside large overseas buyers. Interestingly, both companies appear not to be competitive, with buyers focused on using averaging accounting when trying to buy land. Analysis we have undertaken shows that on land with reasonable timber returns pure carbon farming cannot compete as land prices increase. It will win on land that has low profitability for timber only.

Permanent exotic radiata forest on land that is believed to be profitable for animals or timber is not viewed favourably by either the agricultural or the traditional forest industry or many environmental groups. There may be disagreement between the sectors over animals or timber, but there appears to be collective agreement about losing land that could be profitably used for either.

Farmers

This is the space where change is rapidly occurring and is not reported as no land sales take place.

At the present time, we are seeing unprecedented levels of interest from traditional farming units to look at trees as another option for land use. From my observations this is driven by three factors:

1. Succession – the elephant in the room

As farmers are ageing, they are looking to pass farms onto family as in the past. Many these days find that their children are in good jobs, and earn as much (if not a lot more) than they can on the farm. Their partners do not want to live in remoter provincial areas. They get four weeks' leave plus statutory holidays off. They want the children to go to school in urban areas and then be with them, and they want a new house.

If they do have a family member wanting to take on the farm they then have to navigate other family members wanting 'their share' – you must deal not just with the family but also the partners and their lawyers. Then there's the small issue of the parents who have worked so hard for many years and deserve a break, although they will invariably sacrifice this to see the next generation onto the land.

2. Farm labour

As with any industry today labour is a real and growing problem. This is one area that is coming for all rural industries. If you read some of the demographic work by those such as Dr Natalie Jackson some areas in rural New Zealand are going to experience a 20-40% decline in the working age population over the next 10-20 years. Population may rise but it's full of Boomers needing help. Immigration will not solve this as every developed country has this problem. In my view, this is the real issue all industries need to be seriously thinking about and planning for.

3. Profitability – another elephant in the room

As I listen privately to top bankers, accountants, farm advisors, farmers and (most importantly) farmers' wives, this is a serious problem. We need to find ways to improve profits. Talk of productive land is meaningless unless it is profitable – they both start with P but have very different outcomes. Succession is impossible unless there is profit. For some the high land prices now are their escape ticket out and mean families can have Christmas together every year. The reality is three to four years ago there were numerous farms on the market that couldn't sell.

These three issues are leading many farmers to plant trees to take advantage of carbon and timber. For some it is natives and for others it is pine. Some are planting 5% of their farm and a few up to 100% – it's what works for them. I constantly remind them to be careful and to retain optionality and flexibility.

Higher carbon prices have produced a large increase in tree planting and there is much debate around the mix between overseas, permanent and integrated farm plantings.

For farmers who dipped their toes in this pond up to 10 years ago and have started the journey the result has been transformational. They have solved their succession issues due to high profits. They have also retired the harder, unprofitable land, and there is no marginal land anyway as you either make a dollar or lose a dollar. It's also solved most of their water issues at the same time. Their farms are immaculate and they produce great animals. As one wife from a third generation farming family said to me, 'We always had dreams of what we could do, but they were just dreams – those dreams have become reality now.'

Summary

Higher carbon prices have produced a large increase in tree planting and there is much debate around the mix between overseas, permanent and integrated farm plantings. What we are seeing is many farmers starting to explore and plant trees on their farms. This is driven not only by returns and the ability to use land that was not profitable in traditional land uses (but now has a far higher profitable land use option), but also succession options to allow land to stay within families and help enable fair and equitable solutions within them.

Labour availability is a real issue looming large in all rural areas – not just farming. At the same time high land prices

have provided an opportunity for some landowners to leave the industry as it is the best solution for their families.

Finally – what's coming? As a Boomer I've learnt a few things:

1. Young people these days are a lot brighter, engaged and smarter than I was at their age.
2. We shouldn't feel insulted that it's changing compared to how we did it – we didn't do it wrong.
3. None of my three boys are remotely interested in following me into my business – it's not a crime to not pass the land on.

Watch out for tokenisation, blockchain and digitalisation of carbon, biodiversity and other things – it's happening now and will potentially revolutionise how we make our incomes in the future.

*David Janett is a Director of Forest Management Group, a Registered Forestry Consultant and has been involved with the ETS since its inception. He is a seconded member to the Northern SI Beef and Lamb Council and a member of the Technical Advisory Group working with MPI on the new ETS regulations. Email: dave@forestmanagement.co.nz **J***





ADAPTING TO CHANGING NEW ZEALAND WEATHER PATTERNS

Weather patterns are changing across different regions of the country. This article looks at the data and what rural professionals should be considering to help farmers adapt farm systems in anticipation of these shifts.

Climate change and the primary sector

The science is unequivocal: the climate is changing and human activity is the main driver. The Intergovernmental Panel on Climate Change (IPCC) released its report on the Physical Science Basis earlier in 2021, stating that 'human influence has warmed the climate at a rate that is unprecedented in at least the last 2000 years.' In Aotearoa New Zealand, as well as across the planet, changes to our climate are already being observed in the timing of growing seasons, the expansion of the range where pests and diseases can flourish, and with increased intensity of extreme events.

Research is increasingly able to identify how climate change is altering the likelihood of extreme events. In the 2007-2017 period floods attributed to climate change cost \$140 million in insured damage, and the droughts of 2007-08 and 2012-13 \$800 million.

The primary sector is at the forefront of the impacts of a changing climate, being dependent on climatic conditions for much of its production. Aotearoa New Zealand's current production has developed based on decades of favourable climatic conditions and the regional specialisation reflects this (e.g. Hawke's Bay kiwifruit, Marlborough wine and Waikato dairy). The impacts of climate change will affect

The IPCC released its report on the Physical Science Basis earlier in 2021, stating that 'human influence has warmed the climate at a rate that is unprecedented in at least the last 2000 years.'

the suitability of some regions to continue their current production altogether, while it may present opportunities for other regions.

This article will focus particular attention on the physical impacts of climate change, although they are only one part of the picture. The sensitivity of the system and the adaptive capacity of land managers are also critical in determining the ultimate impact.

Climate data

In New Zealand we currently have access to data about future climates (known as climate projections) developed using the outputs of six global climate models. The New Zealand Regional Climate Model (NZRCM) uses these outputs, downscales and bias corrects them to a 5 km grid. The current projections are based on the global CMIP5 collection of projections.

These provide projections out to 2110 of climate variables, including precipitation, temperature, hot days and humidity. These variables are projected under four Representative Concentration Pathways (RCPs), which span a range of global greenhouse gas (GHG) concentrations and climate warming by 2100. A range of futures are considered under RCPs, as we cannot predict how the world will act in reducing emissions. These projections are available from the Ministry for the Environment, or the raw data can be obtained from NIWA. Simple visualisations are also available from the NIWA website.

In the most recent IPCC report on the Physical Science Basis an updated set of climate models have been developed (CMIP6), and new sets of inputs are used to also capture socio-economic pathways associated with different emissions levels. These are known as Shared Socio-Economic Pathways (SSPs). This data will not be available in a downscaled form in New Zealand until 2024. Further information about this type of climate data is available on the Deep South National Science Challenge website (<https://deepsouthchallenge.co.nz/resource/climate-data-information-for-researchers/>) or from NIWA.

How will New Zealand's climate change?

In general, current projections indicate that Aotearoa New Zealand can expect ongoing warming throughout the 21st century, as well as changes to extreme temperatures. Extreme warm temperatures and heatwaves are likely to be more common in the future, and extreme cold temperatures and frosts are likely to decrease. Rainfall patterns may change across the country, with the west and south of the

country becoming wetter and the north and east of the North Island becoming drier.

Some areas may not experience much change in total annual rainfall, but the seasonality when rainfall occurs may change, with summers becoming drier and winters becoming wetter. The intensity of extreme rainfall is likely to increase in a warmer climate. Winds are also likely to increase across central New Zealand, particularly in winter.

Implications for the primary sector

The projections of climate variables such as temperature, precipitation and hot days are likely to be of limited use to primary sector decision-makers. Understanding the implications of climate projections on production, such as crop yield, milk solid production or the quality of crops is likely to be more important. Although research exists in these areas, the sectoral coverage is uneven.

The Climate Impacts and Implications Programme (CCII) provided a useful cross-sectoral overview of climate impacts and adaptation options. Since then further work has been carried out across Crown Research Institutes (CRIs), universities and industry bodies, particularly in understanding pasture and crop growth rates, drought impacts, land use suitability, and also identifying the economic implications of these changes.

The climate projections data are also used to drive modelling of other variables that affect primary sector production (e.g. projections of drought intensity and duration, or the effects of a changing climate on irrigation water and supply).

Adaptation despite uncertainty

Primary producers in Aotearoa New Zealand have adapted and transformed their systems over the past century in response to climatic as well as policy, market, regulatory and social drivers. They are internationally recognised as being highly responsive to market signals. Is there any reason to expect adapting to climate change will be any different?

First, the pace and magnitude of the projected changes are unlikely to resemble any gradual changes experienced in the past, and the potential for disruption (e.g. in the form of droughts that persist for several years and over multiple regions concurrently) is likely to be different from historical experience.

Second, and perhaps most importantly, particularly for climate data, is the fact that land managers may need to adapt without certainty of the climatic changes. Although the projections described previously provide a critical

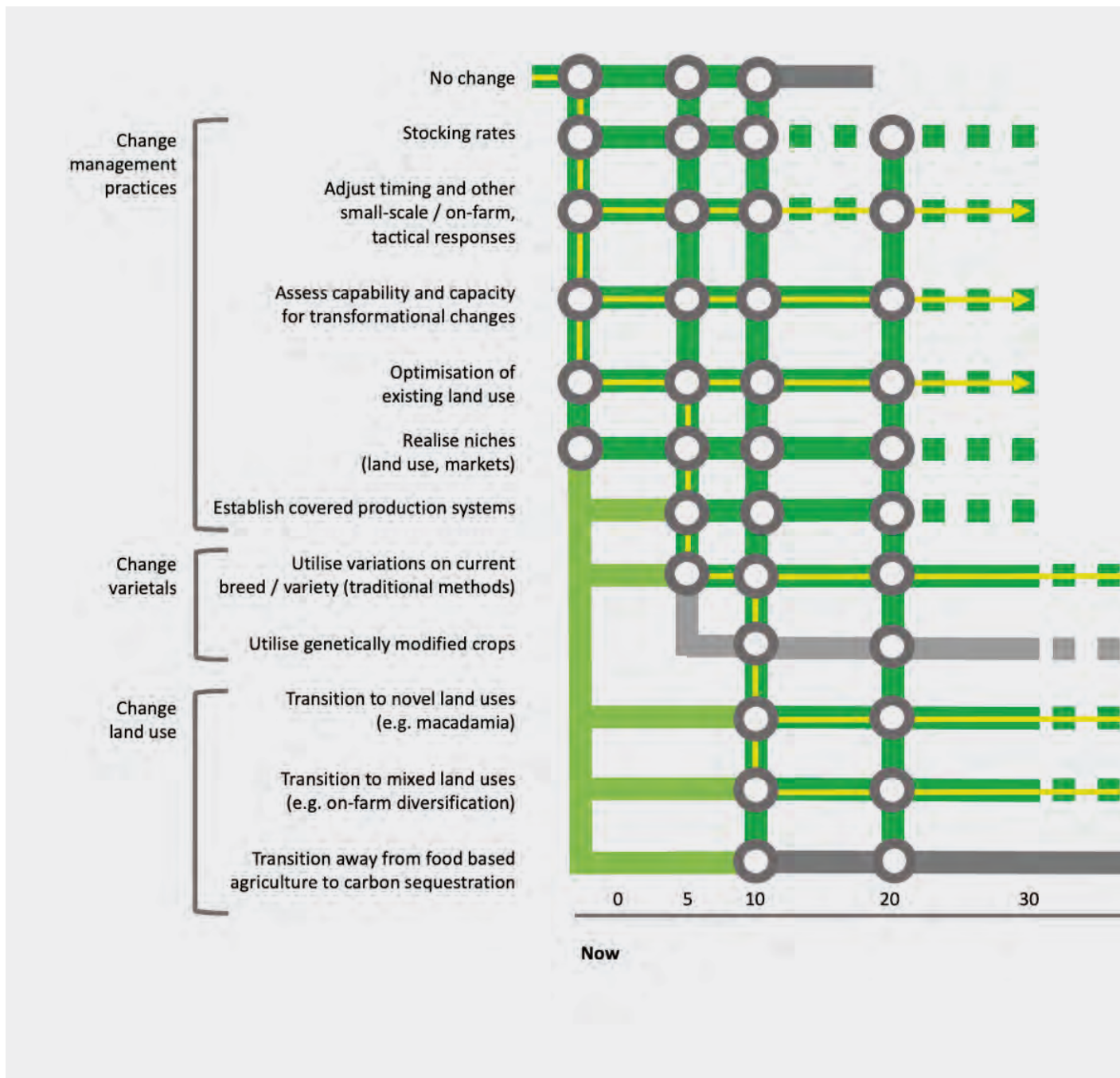


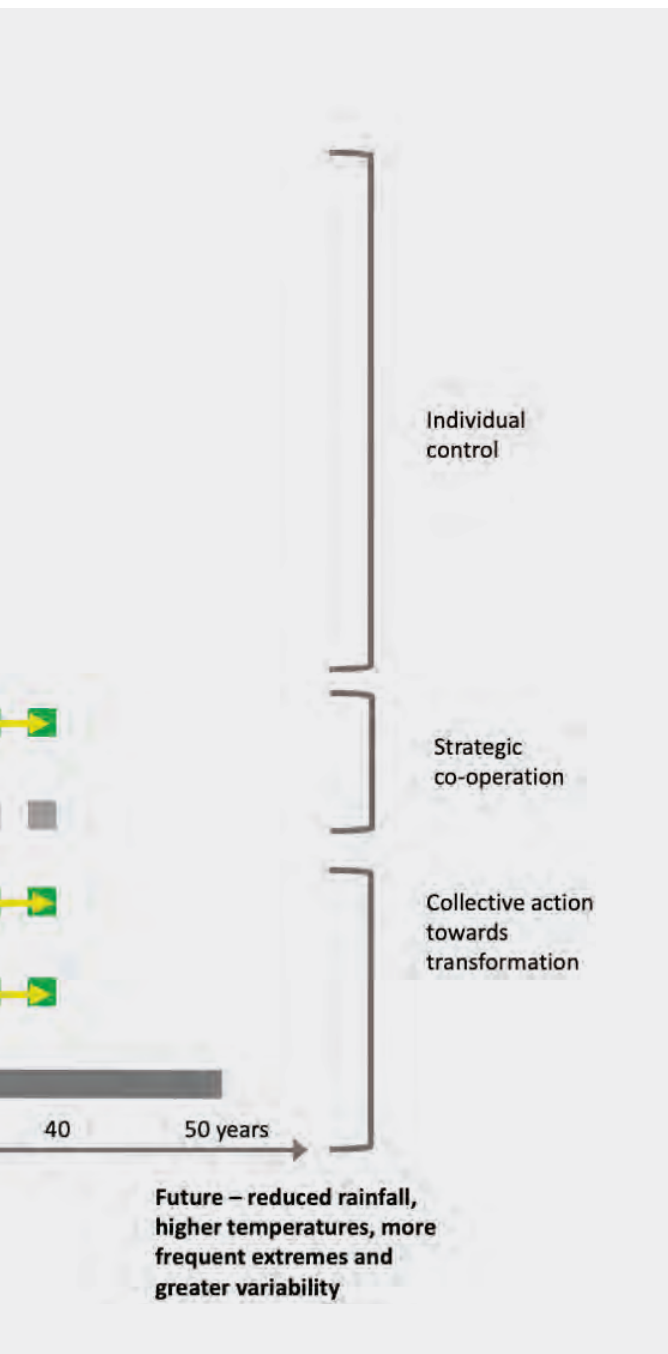
Figure 1: Green lines indicate the period of time an adaptation option is suitable (dark green) or the time required for preparation (light green). Dashed lines indicate the adaptation can contribute in part towards a solution. Grey lines indicate options that were discussed and are currently not able to be applied (light grey) or are not favoured (dark grey). The yellow line shows the preferred suite of options identified by stakeholders in workshops. Circles indicate a point in time at which decisions need to be made or adaptation options changed (from Cradock-Henry et al., 2020)

understanding of the likely changes, considerable uncertainty remains in the timing, magnitude and precise location of impacts. Uncertainties exist about the potential future societal outcomes, the success of global mitigation actions, and for the climate models themselves.

While it may be appealing to access increasingly high-resolution climate data, it is important not to misconstrue this as providing greater accuracy. The ability to downscale to finer time and spatial scales does not imply any greater confidence in the projections, but may lead to a false sense

of precision by the end-user. In fact, each additional layer of modelling adds further uncertainties, leading to an expansion of uncertainty at each analytical step, generating what is known as 'cascading uncertainty'. Rather than beginning with the climate projections, it can be helpful to focus first on the context of the land manager, their farm and their circumstances. How have they been affected by 'weather' in the past and what are their particular areas of vulnerability?

Adaptation research recommends identifying 'robust' approaches to adaptation where possible, focusing on



At some stage decisions with longer-term consequences will need to be made, and this might be investing in a livestock housing system to address heat stress or to avoid extreme rainfall and pugged soils.

While adapting to the current climate and focusing on co-benefits is a good starting point, it is also important to pay attention to the future using the range of climate projections available. This will ensure the producers are able to identify options and make plans for future adaptation, even if there is no need for action to be taken now. Being mindful of the future may also help avoid unintended consequences or ‘maladaptation’.

Longer-term consequences

At some stage decisions with longer-term consequences will need to be made, and this might be investing in a livestock housing system to address heat stress or to avoid extreme rainfall and pugged soils. What is the best time to invest in this and what if the climate does not turn out the way that was expected? The climate change adaptation literature has drawn on approaches from a range of disciplines to develop principles and methods for taking action despite uncertainty.

These approaches can include developing methods for planning and sequencing actions in the future. These are generally built on the foundations of adaptive management and include a monitoring, research, evaluation and learning process to improve future management strategies. Possibly the most well-developed and formalised approach is that of the Dynamic Adaptive Policy Pathways (DAPP).

DAPP develops alternative, and sometimes complementary, sequences of decisions for a range of futures. Types of decisions include: initial, short-term actions; longer-term investments or actions; and signals or triggers to identify when a decision needs to be revisited and a path potentially changed. This approach has been applied with land managers in the Hawke’s Bay. **Figure 1** provides an example of a regional-scale primary sector pathway from that work, which could also be developed at the farm-scale.

In the case where there is a one-off, at least partially irreversible, investment or decision to be made, real options analysis (ROA) may help support the decision-making. ROA is an extension of cost-benefit analysis that places an explicit value on flexibility and learning over time. This makes investment as efficient as possible and adaptable to a range of futures, avoiding costly over- or under-investment. ROA could be applied to deciding:

actions that generate a range of benefits in the current climate. This might be seen in actions that work both to adapt to climate impacts, as well as reduce GHG emissions and improve water quality. One example is by planting trees on-farm, providing shade and shelter for livestock, while also offsetting GHGs, with further possible potential for improving water quality and increasing biodiversity.

Other characteristics of robust adaptation include maintaining flexibility, where possible, and avoiding making changes that lock the producer into a certain pathway that may prove to be unsuitable in a future climate. In general, identifying adaptations that perform well in a range of climate futures rather than optimising for one specific future are likely to be more robust.



We have access in Aotearoa New Zealand to a range of climate projections and an emerging understanding of their implications for primary production. This is a useful starting point for planning for adaptation.

- Whether to invest in a covered barn to house animals or in water storage
- What size storage would be the most economically efficient considering all plausible future climates
- Whether there is value in allowing the possibility for expansion in the initial construction.

Considering the value of resilience to a range of future climates through diversification is another approach. This might be diversification of land uses, but could also consider diversification of species (e.g. livestock breeds or pasture species), or spatial diversification (e.g. distribution of wine grape production throughout Aotearoa New Zealand).

Portfolio Analysis (PA) is a further economic approach originating from financial economics, where optimality is traded off for resilience. Although few applications currently exist in the primary sector, this is an area of increasing interest.

For some production types in some regions, there may come a time when more radical transformation such as land use change is required. The approaches discussed could also assist with this type of decision. The DAPP could identify a sequence of adaptations that would allow the producer to continue with their current land use for as long as possible,

while making plans for more transformative change if it became necessary. ROA could be used in conjunction to identify the optimal time to make a major land use change decision given the range of potential futures.

Working together

We have access in Aotearoa New Zealand to a range of climate projections and an emerging understanding of their implications for primary production. This is a useful starting point for planning for adaptation, but as with all modelling outputs it should not be used as a prediction for the future. Robust adaptation can initially focus on flexible practices that generate benefits in the current climate and have synergies with other land management aims.

More complex decision-making processes, as discussed here, could be facilitated by rural professionals and sector bodies. Together with local and national government they also have a role to play in ensuring the cumulative effects of individual adaptations do not generate unintended consequences over time or at a regional or national level.

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A VISION TO IMPROVE FRESHWATER QUALITY

Living in harmony with the land we farm, the water we use and the environment that surrounds and sustains us is important for our own good health and wellbeing. For decades tangata whenua throughout the country have strongly advocated to central and local government about the need to reform water-related law and policy for a better system of care and respect for water in Aotearoa. This article looks at developments in this area, particularly the Essential Freshwater Policy and Freshwater Farm Plans.

Water is at the heart of our nation's wellbeing

The Environmental Aotearoa Report of 2019 showed that the way we live and make a living is having a serious impact on our environment. For the Government, this has meant putting the state of the environment at the centre of the reforms that were needed.

The Labour Government has set an ambitious goal to see a noticeable improvement in freshwater quality in five years by:

- Stopping further degradation
- Showing material improvements within five years
- Reversing past damage within a generation so that all New Zealand's waterways are in a healthy state.

Te Mana o te Wai

Central to the Essential Freshwater policy, practices and decision-making is Te Mana o te Wai, which guides the settings of a system for managing and protecting our

Central to the Essential Freshwater policy, practices and decision-making is Te Mana o te Wai, which guides the settings of a system for managing and protecting our waterways for future generations.

waterways for future generations. Te Mana o te Wai refers to the fundamental value of water and the importance of prioritising the health and wellbeing of water before providing for human needs and wants. It expresses New Zealanders' special connection with freshwater.

When Te Mana o te Wai is upheld, the future wellbeing of people and our unique ecosystems is protected. This does not mean all rivers and lakes have to return to a natural, pristine state, but it does mean being respectful about how much water we take and careful with the types of contaminants that we let go into the water.

New Zealanders value their natural environment and being outdoors is part of our national identity. We spend a lot of time in and around water, so as well as having clean water to drink we want clean water for our children and grandchildren to play in. Unfortunately, we cannot rely on our nearest river or lake being healthy.

Dr Mahina-a-rangi Baker, a Kāhui Wai Māori member who specialises in environmental planning and science, has noted to me that it is about lifting the standard of how we care for freshwater. She says that, in practice, ensuring the life-supporting capacity of water means taking steps such as:

- Protecting wetlands
- Allowing fish passage up and down catchments
- Ensuring that practice on-farm is improving to reduce contamination
- Being more conscious in our decision-making about freshwater
- Thinking differently about urban development, such as using water-sensitive design to reduce stormwater contamination and ongoing investment in upgrading wastewater networks to reduce overflows.

Te Mana o te Wai includes two sets of values that are required to be given effect to. The first set of values are what New Zealanders are relatively familiar with and that is good governance, stewardship and care and respect for water. The second set are Māori values and they are: mana whakahaere (the way that tangata whenua wish to govern the use of land and water); kaitiakitanga (unique practices around the care and protection of taonga or treasures, which include water) and manaakitanga (our own cultural philosophy around sharing, equity and reciprocity). Te Mana o te Wai is truly a bicultural framework.

Giving effect to Te Mana o te Wai

Giving effect to Te Mana o te Wai requires leadership by all – central government, local government, tangata

whenua, marae, papakainga, local communities, businesses, farmers, growers, families, individuals – all working together to set a long-term vision and plans and actions to restore our waterways.

The key policy, legislative and regulatory tools to achieve this are:

1. National Policy Statement – Freshwater Management (NPS-FM) 2020 (Longer term – driver for generational change)
2. New Freshwater planning processes under the Resource Management Act and Freshwater Commissioners
3. National Environmental Standards – Freshwater
4. Stock Exclusion Regulations
5. Freshwater Farm Plans under Part 9A of the Resource Management Act.

This looks all very complex, and it is. Industry representatives have an important part to play in helping farmers and growers to navigate through these changes, and to support the continuation and development of new farming practices. Farming is a way of life in New Zealand and being prepared to adapt and find new ways to farm and grow food will not only protect our businesses but our environment as well. Increasingly consumers want products that are better for them and also for the environment.

Regional councils

Every regional council must include an objective in its regional policy statement that describes how the management of freshwater in the region will give effect to Te Mana o te Wai. For regional plan development, regional councils must include the two sets of values and actively involve tangata whenua and the community in freshwater management decisions and processes, and identify long-term visions for improved environmental outcomes in their regions.

The other important part of NPS-FM 2020 for Te Mana o te Wai is the National Objectives Framework, commonly referred to as the NOF, which requires that every regional council:

- Identifies values for each freshwater management unit in its region
- Sets target attribute states, flows and levels for waterbodies
- Develops interventions (e.g. limits specified in rules or action plans) to achieve the target attribute states, flows and levels
- Monitors waterbodies and freshwater ecosystems
- Takes steps if deterioration is detected.



Tuna (eel), a taonga species for Māori. The protection and restoration of mahinga kai habitats to enable access to abundant and healthy mahinga kai is a feature of the NPS-FM.2020. Photo courtesy of Lyn Harrison

Te Mana o te Wai is a bicultural framework that provides for Māori participation and partnership based on the principle of Mana Whakahaere.

A compulsory value in the NOF is mahinga kai, which is one of the four compulsory values in the NPS-FM 2020. The others are: ecosystem health (e.g. water quality, habitat and aquatic life); human contact (swimming, waka, boating, fishing and water skiing); and threatened species (support for the critical habitats, survival and the recovery of threatened species).

Mahinga kai is about freshwater species that have traditionally been used as food or other resources by Māori. It is about:

- The local places where those species are found and the act of catching or gathering them
- The practice of providing food for our whānau, marae and communities
- Those traditional sources of kai that Māori have been deprived of as a result of the degradation of our waterways.

The local sites or places where mahinga kai is found give a real-time indication of the overall health of the waterway. For the mahinga kai value, it is simple – kai must be safe to harvest and eat.

Mahinga kai is a value which is important to Māori, but it is not unique to Māori. All families and communities seek to be able to safely access our rivers and streams, whether it is for recreational, swimming or food-gathering purposes.

Tangata whenua

Te Mana o te Wai is a bicultural framework that provides for Māori participation and partnership based on the principle of Mana Whakahaere. This is about those who have 'authority' at place and how they wish their lands and water to be managed.

In this context, Mana Whakahaere refers to hapū, ahi kā (Māori landowners), marae and iwi. It will be the responsibility of regional councils to give effect to the principle of Mana Whakahaere, and reflect the vision and values (including mahinga kai) into policies, regulations and rules. Mana Whakahaere groups are likely to form at the catchment level.

The opportunity exists for collaboration with catchment groups, bringing together two sets of values to protect the life-supporting capacity of water.

Freshwater Farm Plans – role of farmers and growers

How can farmers and growers play their part in giving effect to Te Mana o te Wai? While regional councils are responsible for giving effect to this and setting the values in regional plans which assess risks and highlight the priorities to be addressed, the Freshwater Farm Plans are a further step in the Essential Freshwater package.

The Freshwater Farm Plans provide a practical way for farmers to comply with the new reforms. The plans will be used to identify and document the risks of farming practices on the environment and waterways and set out a plan of actions about how to mitigate these.

Every Freshwater Farm Plan must demonstrate how they will achieve three outcomes:

- Farm practice that minimises and mitigates the impacts of farming practices on the environment
- Ecosystem health
- The wider catchment context.

The evidence is there that action by each individual farm, when aggregated, will result in environmental gains.

'Catchment context' reflects that not all issues and values that communities have for a catchment are the same. Regional council plans to give effect to the NPS-FM 2020, including Te Mana o te Wai, will provide this context. As part of this, limits will be set to manage issues in particular catchments. For example, it will vary as to whether there needs to be a focus on the better management of sediment, *E. coli*, nitrogen and/or biological contamination.

The requirement to reflect in a Freshwater Farm Plan catchment context avoids a one-size-fits-all, which farmers and growers know does not work. It means that the plans will be fit-for-purpose and should build on what farmers already do.

Where there are high environmental risks, it is likely that there will be a practice standard that all farmers need to use (e.g. intensive winter grazing and stock exclusion). Freshwater Farm Plans offer farmers, growers, advisors and the farm certifiers of the plan the opportunity to provide farmer-led solutions, provided they address and mitigate the risks to the waterways and the environment.

There will be a requirement for Freshwater Farm Plans to be periodically independently audited. The primary sector has already taken a leadership role in farm planning. I know from my own experience as Chairman of Miraka, and the implementation of Te Ara Miraka (an integrated sustainable farming practice system), that there is a willingness from most of our farmers to engage, innovate and seek to achieve the highest standards of farming and environmental practices. Making sure that farm system changes are pragmatic, fit-for-purpose and cost-effective for farmers and growers is key to bedding in practice change.

We hear from the Government and the Ministry for the Environment that existing farm planning programmes, which many farmers and growers are already a part of, will be given a pathway to be able to adapt and evolve to meet the new legislative and regulatory requirements.

Embracing the concept of Freshwater Farm Plans

The evidence is there that action by each individual farm, when aggregated, will result in environmental gains. This has already been demonstrated by the Horizons Council where over the last seven years, just by implementing the known mitigations for reducing sediment, it has resulted in an improvement in their waterways by one whole grade of sediment.

Over time, the Ministry for the Environment and the Ministry for Primary Industries intend that Freshwater Farm Plans will be a module of an Integrated Farm Planning approach. This will bring together all aspects of the farming operation – people management, biosecurity, animal welfare, GHGs and freshwater.

Timelines

Regional councils have until the end of 2024 to have in place new regional policy statements and regional plans that implement NPS-FM 2020 and Te Mana o te Wai. That means the first generation of Freshwater Farm Plans will be based on existing regional council policy statements, plans and rules.

Farmers and growers are a critical part of local communities and rural New Zealand. It will be important for them to be active participants in regional council engagement and consultation and hearing processes on the regional policy statements and plans.

The Ministry for the Environment has put out plenty of information on all of this. Their material on Freshwater Farm Plans and the webinar available on their website, featuring its Chief Advisor, Bryan Smith, is well worth an hour in a busy schedule to view.

The Ministry for the Environment's consultation on Freshwater Farm Plans concluded on 7 October 2021. The Ministry is considering all submissions and will be continuing to work with tangata whenua, sector organisations and leaders on the options for the Freshwater Farm Plan regulations. The Ministry has advised that these regulations are expected to take effect in the second half of 2022, with a phased roll-out.

A joint effort

Te Mana o te Wai reinforces our connection between our environment and our wellbeing and we must work within the limits of our water, land and environment. Success requires everyone playing their part. He waka eke noa – we're all in this together.

Acknowledgements

The author is grateful for the resources produced by Kāhui Wai Māori on Te Mana o te Wai featuring Dr Mahina-a-rangi Baker and Annette Sykes. Also, to the Ministry for the Environment for their resources and webinars.

Further information

To view a video of Te Mana o te Wai see: [Te Mana o te Wai Introduction and Overview](#)

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LUCERNE / CLOVER ACTION NETWORK GROUP

Improving agricultural extension and farmer confidence to make future farm system change

Plantain clover mix introduced to one of the South Wairarapa farms after 2019 Marlborough farm visit

Over time agricultural extension has moved from government to private provision. This article reviews a collaborative style of knowledge sharing that has facilitated new learning and helped farmer confidence to introduce innovative management solutions into their farm systems.

Need for agricultural extension

There is a continual need to consider ways of improving agricultural extension as concern has been expressed about the slow farmer uptake of new agricultural technologies.

Agricultural extension available to New Zealand pastoral sheep and beef farmers has traditionally comprised a mix of technology transfer, education and consultancy. Farmers use knowledge gained from agricultural extension to gauge their own ability to adopt an innovative technology or change existing farm systems. However, approaches to agricultural extension have changed over time, moving away from the linear model, and a growing trend is to emphasise making connections with specific farming interests and to provide relevant solutions for farmer-specific environments.

The collaborative style of knowledge sharing, as well as the opportunity to observe and share experiences with valued peers, has been evident in the Lucerne/Clover Action Network group which formed in 2019. This has facilitated new learning that has enhanced farmer confidence to introduce solutions and manage them into the future.

The purpose of agricultural extension is to support farmers to reflect on their practice, to learn about new technologies and to build capacity to adopt them on-farm. It is commonly understood to be a service that aims to extend research-based knowledge to the rural sector to improve the lives of farmers who require new knowledge and skills when introducing change into existing farm systems. Agricultural extension has therefore become both an organisational and educational contributor to the rural knowledge economy.

The purpose of agricultural extension is to support farmers to reflect on their practice, to learn about new technologies and to build capacity to adopt them on-farm.

The traditional extension view of knowledge transfer, from consultant or extension agent to farmer, is still the main approach used in helping farmers consider and change the way they farm. While this linear model can lead to the successful adoption of new technologies, its effectiveness has been strongly criticised. The observations made by the Lucerne/Clover Action Network group suggest that a farmer's belief in their ability to initiate change is reliant on past successes that employed practices based on scientific evidence.

Origin and operation of the group

The Lucerne/Clover Action Network group evolved from a group of seven farmers who expressed an interest in joining a Red Meat Profit Partnership (RMPP) Action Network Group with a focus on utilising lucerne or clovers to improve overall farm productivity on traditionally 'summer dry' country. Five of the farms were situated in the southern Wairarapa region, one was a coastal Manawatū property and the remaining one was in the Horowhenua region.

I facilitated the group after completing my PhD study measuring change in farmer self-efficacy, while they participated in an 18 month agricultural extension activity (based at Riverside Farm in the Wairarapa), and the impact it might have on future farm system changes. Four of the farmers involved in the group came from the Riverside project and viewed its focus as a continuance of the previous extension activity. The farmers who were the focus of this research came from the Hawke's Bay, Manawatū and Wairarapa region and were using a range of perennial summer forages.

The importance of understanding the science behind growing and grazing these crops efficiently, being able to adapt to changing environmental factors, and experiencing success from the adoption of new technologies into existing farm systems was essential. The key aim of the group was to increase farm productivity leading to an improved financial position.

Group activities were based on topics that the farmers identified as central to their current farming operation. Farmers wanted to develop more drought-tolerant systems by using existing legumes more efficiently and introducing new drought-tolerant varieties. Discussion and practical activities were planned for each workshop to build on their experiential knowledge and confidence to initiate change to existing farm systems. The plan going forward was to identify topics that would help them increase their annual farm productivity by better utilising lucerne and/or clover.

An initial meeting was held in Masterton to establish a specific group focus and develop an outline of what the participants wanted to achieve from it by capitalising on the energy and knowledge within it. It was also an opportunity to link into a range of subject matter experts from across the agricultural sector. These experts included Peter Kemp (Professor of Pasture Science at Massey University), Dick Lucas (Dryland Pasture Specialist at Lincoln University), John King (Director of Succession) and visiting Marlborough farmers Fraser Avery, David and Jo Griggs, and Chris Dawkins.

Peter Kemp discussed the establishment of sub-clovers with the group and went over ways of managing lucerne crops more efficiently. Farmer understanding of managing legume crops changed as they gained more knowledge about the science of plant growth and the importance of managing the plants with optimal numbers of stock grazing.

The next major activity for the group was when Dick Lucas organised for the group to visit three leading Marlborough farms to look at how sub-clover could be established under careful management to provide a source for animal feed a little further into the summer. Some interesting pasture mixes were also observed on Fraser Avery's property. An added feature of this activity was for the farmers to question the host farmers first-hand about what they had done and the impact these changes had on overall farm productivity. An added bonus was having Dick Lucas on hand to provide the scientific knowledge to supplement the farmer's practical knowledge.

Observations made by the group on their visit to Marlborough enabled them to develop more drought-tolerant strategies for their farms. The combination of the practical aspect of this advice and the scientific aspects provided by Dick Lucas gave the farmers confidence to, as one participant noted, 'have a crack at bringing in more red clover.' Farmers identified the importance of understanding the biophysical requirements of plants, and they now believe that understanding their climatic and physical soil requirements has improved their ability to succeed in managing legume crops. One farmer stated that he was 'starting to understand why things last and why they do not', and for the first time that he needed to totally take the pressure off his legumes, resulting in improved plant growth, longevity and health. This increase in grazing potential has enhanced his belief in his ability to manage his legumes more effectively in the future.

The final major activity for this group involved Dick Lucas visiting each of the Manawatū and southern Wairarapa farms

Farmer understanding of managing legume crops changed as they gained more knowledge about the science of plant growth and the importance of managing the plants with optimal numbers of stock grazing.

to look at how the farmers had implemented change into their farm systems because of what was observed from the Marlborough visit. Farmers initially described changes that they had made to their farm system as a result of this visit. Dick Lucas facilitated further discussion and provided more guidance based on his extensive knowledge of managing legumes in traditionally summer dry areas of New Zealand.

The group, including partners, gathered for an evening meal at a local Martinborough restaurant to listen to John King talk about 'regenerative farming'. An interesting discussion followed his presentation, as the farmers involved in this Action Network group believed that by trying to re-establish the clovers that were held within the natural seed bank on their farms they were operating a form of regenerative agriculture.

Value of the group to farmer participants

Farmers participating in this group commented that the enthusiasm of the other members, and observing the success of the various strategies in developing clover-friendly pastures on their own farms, helped grow their belief in their ability to pursue ideas they had observed and heard about.

Farmer knowledge was improved by sharing their own positive and negative experiences with the agricultural scientist subject matter experts and other farmers participating in the group. One commented that:

There are farmers who are trying new things and others who have been there and done that. However, when you go to a region like Marlborough and you look at that paddock of lucerne or mixed legumes you think, ah, that is what you do or not do.

After attending the Action Network group activities, the farmers realised that they were only touching on the potential of these crops. Observing the Marlborough farms, and hearing how the farmers had established and managed legumes (along with the knowledge given by the subject matter experts), provided a higher level of understanding of the benefits of introducing legume crops into existing farm systems. One farmer stated:

We are starting to see the benefits coming through from all this stuff [clovers] that is growing. The perennial and legume-based forages can handle the dry [summer dry conditions] better by getting the stock off the property before Christmas when it has gone dry without looking at it through rose tinted glasses.



Action Network group observing how lucerne can grow in the traditionally dry Marlborough region

Farmer knowledge was improved by sharing their own positive and negative experiences with the agricultural scientist subject matter experts and other farmers participating in the group.

Another farmer credited his enhanced ability to successfully adopt and manage his new farm system to the information that he gained through observations made while visiting the Marlborough and group members' farms. These observations had led to successful changed practices on his farm.

Subsequent changes made to farming systems

Adopting new practices relies on the willingness and capacity of farmers to experiment, innovate and learn at the farm level. After participating in the group's farm visits, farmers understood the importance of grazing residuals and the impact that overgrazing lucerne/clover crops has on crop longevity and future plant growth rates. They were confident in their ability to introduce different stock classes to grazing their crops because of the information shared by the scientists, observations and discussions with other trusted farmers throughout the duration of the group.

Participants continued to share successes and address persistent challenges collaboratively throughout the duration of the group's meetings. The farmers all alluded to the collegial style of knowledge sharing between the agricultural scientists and farmers as an important factor that supported their sense of being able to manage lucerne/clover crops. The group meetings routinely provided farmers with opportunities for robust dialogue with the scientists and with each other. Grazing options proved to be a recurrent theme in these conversations.

Changes farmers made to their farm systems as a result of participating in the Action Network group included:

- Increasing grazing rotation length by mobbing yearling bulls with ewes and lambs
- Keeping all but a few R2 bulls off developing sub-clover paddocks to allow the sub-clover to grow out
- Adopting the plantain/clover strategies observed while visiting group members' farms on some better quality paddocks closer to key facilities
- Investigating introducing a mix of phalaris/tall fescue/ cocksford/clovers in a group of paddocks currently in rape as they appear to be more clover-friendly, the key being to establish enough paddocks (five to six) to allow for a realistic grazing rotation
- Exiting the current lucerne strategy to allow for the adoption of the perennial summer forage/legume mixes by introducing a short rotation ryegrass to manage the weed issue continuing through to the next crop or new grass
- Developing a farm management strategy, which identifies specific areas of the farm to introduce legume mixes into or continue with traditional pastures.

One farmer described how he was able to wean his lambs early and leave them on the mixed pasture, where they would continue to grow while placing the ewes on poorer quality feed, allowing more high-quality feed for lamb finishing.

Most farmers introduced early lamb weaning as a means of moving more stock through their farm system. Understanding the physiology of lucerne/clover plants allowed for better grazing strategies. Experiencing the results of these new management strategies learned while participating in the Action Network group increased their ability to manage lucerne/clover crops more efficiently.



Farmers and scientists should be encouraged by central government agencies to identify effective strategies to make changes through pooling their resources and acting collectively as future research and extension are designed.

Is the RMPP Action Network model a useful approach?

Farmers faced with adopting a new policy or complex technologies make a judgement about their capability to achieve a successful outcome based on their present knowledge and skills. Information on the suitability of new technologies that they gather from their own experiences, from their peers through social networks, and by observing early adopters is therefore highly valued. In this case, a factor that supported farmer knowledge was the balance between theoretical and practical discussions, or as a group member stated, 'getting that mixture of ideas from the scientists and the farmers.'

All participants in this Action Network group used their co-constructed knowledge to create original management strategies, strengthening their belief in their ability to increase farm production using a mixture of legumes and traditional pasture species. For example, this group of farmers travelled to the Marlborough region to observe the use of lucerne, red clover and sub-clovers within dryland pastoral farming systems and they wanted to replicate their observations on their southern Wairarapa farms.

One of the group stated, 'You look at someone who is doing it [using lucerne and clovers successfully] and think to yourself, if they can do it, we should be able to as well.' This comment shows the power of farmers observing a peer's farming operations as an enabling factor that strengthens their efficacy to incorporate change into existing farm systems.

Designing collaborative learning-focused activities where farmers have diverse opportunities to engage in dialogue with others to co-construct new understandings has an implication for agricultural extension. Participating in this RMPP Action Network group enabled each member to bring their own expertise to the learning process (the farmers their farm environment and system practical knowledge and the scientists their knowledge of agronomy, plant physiology, and animal production and welfare). Opportunities need to be provided for farmers to develop respectful and trusting relationships with others whose expertise they want to engage with in extension activities. Future agricultural extension can be designed with the intention of increasing the knowledge of both scientists and farmers.

The RMPP Action Network model provides an environment that facilitates collegial sharing of problems and finding solutions. Farmer self-efficacy was enhanced through

the observations of trusted others and access to accurate, easily understood unbiased research publications that define the nature of the knowledge required for reaching a successful on-farm result. Central government policy guidelines and/or agricultural extension programmes designed to increase farmers' belief in their ability to initiate change may achieve a greater rate of adoption of new technologies.

Farmers and scientists should be encouraged by central government agencies to identify effective strategies to make changes through pooling their resources and acting collectively as future research and extension are designed. The agricultural scientists supporting this group were university teachers with considerable experience about how to facilitate discussion to build on the farmers' experiential knowledge. Responses to their questions provided them with increased confidence to 'set the wheel in motion'. Farmers became more empowered to change a farm system when legitimate information sources endorsed their implicit knowledge. Implicit knowledge consists of know-how that is difficult to transfer to another person in written or verbal form (i.e. the openness of participants to question each other), and the scientists helped to surface this sort of knowledge and make it more accessible to others.

Conclusion

The involvement of subject matter experts and the experience of sharing activities and peer modelling strategies enhanced farmers' belief in their ability to introduce change to existing farm systems. Exercises (such as the digging up and examination of plants) helped them become aware that managing the root system was as important as paying attention to the plant's leaves. Knowledge gained from this activity provided the group with guidance to solve future problems. This knowledge was not simply passively received, but was constructed in the numerous activities that occurred routinely throughout the duration of the group. Building on the knowledge shared by other farmers and agricultural scientists therefore led to new management practices designed to improve farm productivity.

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KIM ROBINSON

EXTRA MILK LEADS TO MORE WORK –

BUT NOT NECESSARILY MORE PROFIT

PKE and DDG are fed on the feed pad to minimise wastage

Many farmers have increased milk production in recent years by importing more feed. The hidden costs of this on labour and machinery have now been measured in a farm systems trial. This article looks at how farmers are working harder, but not necessarily making more money.

Supplement profitability trials

The Northland Dairy Development Trust (NDDT) has just completed six years of supplement trials at the Northland Agricultural Research Farm (NARF) near Dargaville. NARF is an 84 ha farm at Dargaville, which can run three independent 28 ha farmlets providing valuable information to evaluate these system differences. All costs and time are recorded so that full profit comparisons can be made.

The most recent project was a three-year trial investigating the economics of feeding palm kernel extract (PKE) and other

supplements on dairy farms. The trial came about as a result of farmers asking if it was profitable to purchase other feeds such as distiller's dried grains (DDG) to boost production when Fonterra's fat evaluation index (FEI) is limiting PKE use.

The project followed on from the previous three-year trial looking at whether farmers could grow crops to reduce the amount of purchased supplement. Northland farmers had clearly identified that they would like to reduce their reliance on imported feed, particularly PKE, and wanted to know the financial implications of this.

The trial came about as a result of farmers asking if it was profitable to purchase other feeds such as distiller's dried grains to boost production when Fonterra's fat evaluation index is limiting PKE use.

This trial ran from 2015 to 2018 and addressed the following issues:

- Could the farm maintain production and profit with reduced imported feed through a range of seasons?
- Could we replace imported feed with extra forage grown on-farm?

One of the farms grew a range of crops including maize silage, turnips and fodder beet in an attempt to remove the need for imported feed. This Cropping farm was compared with a Pasture Only farm (with no imported feed) and a PKE farm, with PKE imported to fill feed deficits. The results were:

- The PKE farm was the most profitable farm over the three seasons, which included a range of climatic conditions
- The Pasture Only farm was slightly less profitable, but did allow us to measure the marginal costs and return to importing PKE or growing forage crops
- The Cropping farm was the least profitable of the three systems, and unfortunately variable crop yields and the opportunity cost of removing the cropped land from the pasture rotation made the cropping strategy uneconomic.

Table 1 shows the performance of each farm averaged over the three seasons. We were now confident that PKE was a useful tool to maintain profit through a range of climatic conditions. However, high levels of PKE feeding were affecting milk processing characteristics and Fonterra introduced the FEI index with associated financial penalties if too much PKE was fed.

Farmers then started looking to alternative supplements to add when FEI was limiting PKE use. These other

supplements were generally more expensive than PKE and there were multiple claims that response rates were better than those to PKE feeding. Farmers began to ask if the extra supplement was profitable, or whether they should choose other strategies such as drying cows off or destocking when FEI was limiting.

In response, NDDT set up a further three-year trial on three farmlets that looked at the economics of buying these extra supplements when FEI was limiting feeding levels. The three farmlets were:

1. **Pasture Only farm:** No imported supplement, home-grown grass silage (2.7 cows/ha).
2. **PKE Only farm:** PKE used to fill pasture deficits, but constrained by acceptable milk FEI (3.1 cows/ha).
3. **PKE Plus farm:** PKE fed up to acceptable milk FEI and then other imported supplements added (3.1 cows/ha).

PKE was fed on the PKE Only and PKE Plus farms only when grazing residuals indicated that pasture supply is limiting. Other supplements (DDG, soya bean hulls (SBH) and baled silage) were purchased by the PKE Plus farm on the basis of cost, and only fed when milk FEI levels indicated no further PKE could be fed without incurring penalties.

Climatic variation was considerable, with a difficult spring and a prolonged drought during the trial period, which gave us useful information about the resilience of each system over time.

Pasture growth

Pasture growth for the three seasons is shown in **Figure 1**. The 2019/20 season was marked by a prolonged drought and 2020/21 also had a relatively dry summer/autumn along with a wet spring. Total pasture production during the latter two seasons was lower than the historic (10-year) average.

Table 1: Farm performance averaged over three seasons 2015-2018

		Pasture Only farm	Cropping farm	PKE farm
kgMS/cow		358	368	392
kgMS/ha		915	997	1,092
Operating profit \$/ha				
Milk price:	\$6/kgMS	\$1,998	\$1,588	\$2,252
	\$8/kgMS	\$3,818	\$3,581	\$4,437

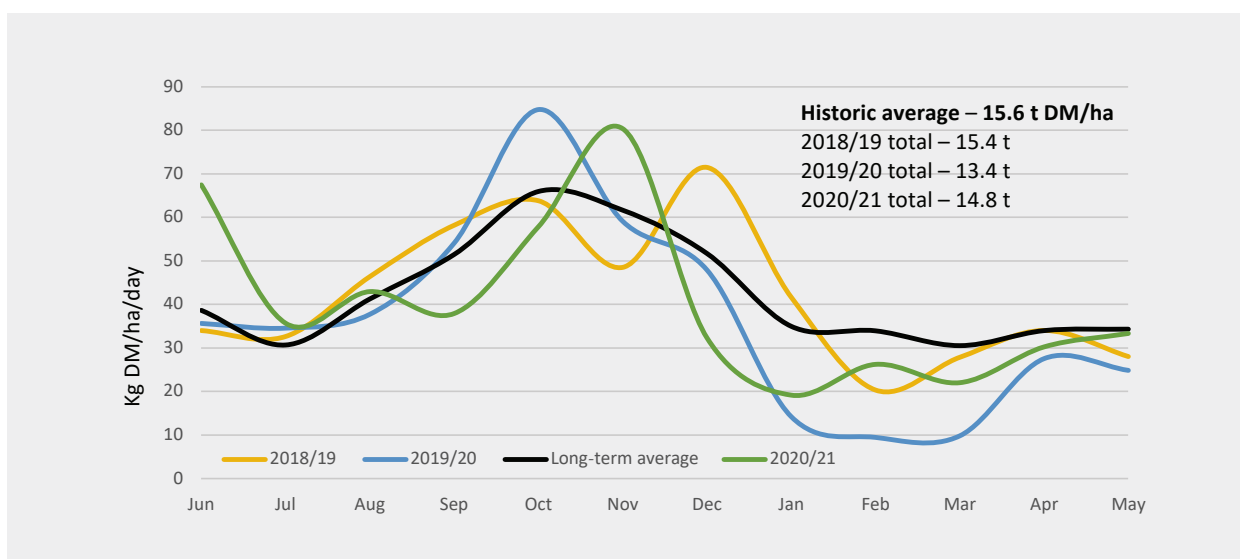


Figure 1: Calculated pasture growth rates at NARF – average of three farms

Supplement use

Silage was made on all farms and fed back into that farm. PKE was fed on both PKE farms when residuals were below targets and FEI allowed. Extra supplement was then purchased on the PKE Plus farm when FEI limits were reached and residuals were still below target. The choice of supplement was made on the basis of cost per unit of feed when allowing for nutritional requirements. Soya hulls were used when protein was not limiting in spring. DDG was used in both spring and summer, and good quality grass silage was purchased in autumn when the cost (per unit of energy and protein) was considerably lower than that of DDG.

Table 2 summarises the supplement used over the three years of the trial. Supplement use was highest during the drought season of 2019/20. In each season most of the supplement was fed during the summer/autumn period.

Milk production

Milk production was lowest during 2019/20 on all three farms due to the summer/autumn drought. However, production on the PKE Plus farm was less affected by the drought than the other farms, as the other two farms used once-a-day (OAD) milking to manage body condition score (BCS) and then early culling and/or drying-off of cows to manage feed demand (see Table 3).

Table 2: Imported supplements fed during the three seasons

	Imported supplement kgDM/cow		
	2018/19	2019/20	2020/21
Pasture Only farm	0	0	0
PKE Only farm	748	978	784
PKE Plus farm	1,046	1,410	1,303

Table 3: Total milk solids production per ha and per cow

	kgMS/ha			kgMS/cow		
	2018/19	2019/20	2020/21	2018/19	2019/20	2020/21
Pasture Only farm	996	816	936	372	313	340
PKE Only farm	1,225	1,129	1,272	403	359	405
PKE Plus farm	1,300	1,279	1,405	423	407	447

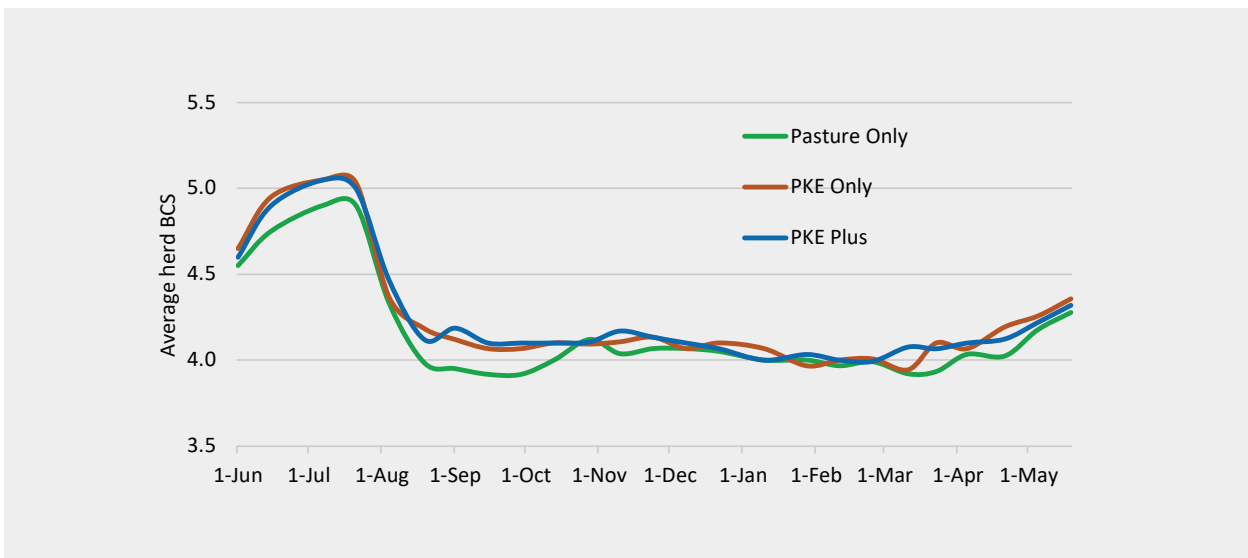


Figure 2: Herd body condition score – average of three years

A worry score was assessed fortnightly, which relates to the concern the manager has about cows and feed supply.

Mating results

There were no significant differences between farms for six-week in-calf rate (average 73%) or empty rates (average 8%). Feed levels prior to mating were challenging on the Pasture Only farm each year, resulting in lower cow condition than the other farms during early spring. The impact of this was managed through using OAD milking every year for low condition cows and heifers and at times all cows. This appears to have been an effective tool in minimising the impact of lower feeding levels pre-mating.

Body condition score

BCS was assessed fortnightly. The Pasture Only farm had lower BCS during spring and late autumn than the other farms in each of the three seasons (see Figure 2). Earlier drying-off allowed the Pasture Only farm cows to regain condition during May to be near the condition of cows on the other farms. Strategic OAD milking was used to manage condition on cows below BCS 3.5.

Worry score

A worry score was assessed fortnightly, which relates to the concern the manager has about cows and feed supply. The Pasture Only farm tended to have a higher worry score during late winter, spring and early summer, largely due to the inability to bring in additional feed during these periods (see Figure 3). The worry score for the PKE Only farm tended to be elevated during late summer/early autumn when milk FEI was challenging. The Pasture Plus farm had the lowest worry score through all seasons.

Key results from trial

Milk production on the PKE Plus farm was least affected by the weather

As would be expected, milk production was highest on the PKE Plus farm and lowest on the Pasture Only farm in all three seasons (see Table 3). The 2019/20 drought reduced milk production on the Pasture Only and PKE Only farms, but only had a minor effect on the PKE Plus farm, due to the ability to purchase extra supplement to counter the lower pasture growth.

Milksolids response to supplement feeding was higher on the PKE Only farm than the PKE Plus farm

Milk response to PKE fed on the PKE Only farm was higher than the combined response of feeding PKE, DDG and silage on the PKE Plus farm (see Table 4). This is probably due to lower substitution in the PKE Only farm herd as they were often under more feed pressure. The responses are higher than the 12-year Dairybase average (80gMS/kgDM) and those reported in other studies, probably due to strict adherence to decision rules on feeding supplement only when pasture residuals are too short. Supplement feeding was not used to prop up production and is determined by the careful monitoring of grazing residuals.

Profit was highest on the PKE Only farm except during the drought year

Financial analysis of the individual farms considers all variable costs. The farms were run independently of each

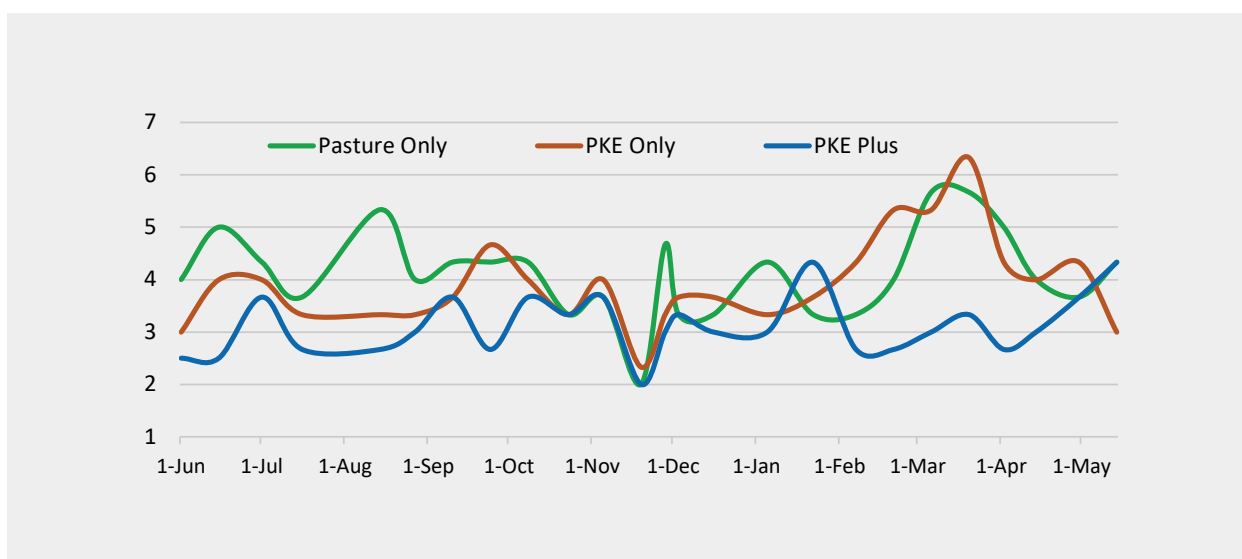


Figure 3: Managers' worry score for the three farms (1 = low, 10 = high) – average of three years

other, so all costs were captured, including differences in labour and machinery hours. Farm operating profit (EBIT) was highest on the PKE Only farm in two of the three seasons, while the PKE Plus farm was the most profitable in the 2019/20 season when a drought occurred and cows on the other farms were dried off early (see Table 5).

Marginal cost of extra milk is high on the PKE Plus farm

This study provided the opportunity to calculate the marginal cost of the extra milk produced by feeding the extra supplement, which is the minimum milk price needed to

make the extra feed profitable. The marginal cost of feeding PKE is generally lower than the DDG and silage fed on the PKE Plus farm (see Table 6). This is primarily due to the lower milk response to the additional supplement and the higher cost of the DDG and silage compared to the PKE.

Further analysis showed consistently that for each dollar spent on purchasing supplement \$0.66–\$0.86 was added to other farm expenses. These extra costs are mostly labour and machinery costs associated with feeding out, which effectively increases the cost of PKE from 33c to 60c/kgDM. Consultants do not always take these hidden extra costs into

Table 4: Three-year average purchased feed and milksolids response compared with Pasture Only farm

	Supplement kgDM/c	Milk response gMS/kgDM
Pasture Only farm	–	
PKE Only farm	836	113g
PKE Plus farm	1,253	104g

Table 5: Operating profit for the three seasons (\$/ha)

	Milk price \$6.35/kgMS	Milk price \$7.14/kgMS	Milk price \$7.55/kgMS
	2018/19	2019/20	2020/21
Pasture Only farm	\$3,002	\$1,877	\$3,031
PKE Only farm	\$3,301	\$2,119	\$3,743
PKE Plus farm	\$2,991	\$2,336	\$3,488

Further analysis showed consistently that for each dollar spent on purchasing supplement \$0.66–\$0.86 was added to other farm expenses. These extra costs are mostly labour and machinery costs associated with feeding out, which effectively increases the cost of PKE from 33c to 60c/kgDM.

Table 6: Cost of additional milk produced (marginal milk, \$/kgMS)

	Marginal milk cost – \$/kgMS		
	2018/19	2019/20	2020/21
PKE Only farm over Pasture Only farm (PKE fed)	\$5.39	\$6.54	\$5.65
PKE Plus farm over PKE Only farm (DDG, SBH, silage fed)	\$10.57	\$5.70	\$9.47
Marginal profit PKE Only (\$/kg MS)	\$0.96	\$0.61	\$1.89
Marginal profit PKE Plus (\$/kg MS)	-\$4.22	\$1.45	-\$1.93

account when evaluating feed inputs. Farmers intuitively know these costs are occurring and make comments such as, 'My milk production has gone up and I am working harder, but I don't seem to be making any more money.'

Methane reduction did not always lead to less profit

Overseer modelling of greenhouse gases (GHGs) on each farm allowed us to estimate differences in methane emissions between farm systems.

On average over the three seasons, the Pasture Only farm produced 23% less methane than the PKE Plus farm, but only earned 10% less profit. The PKE Only farm emitted 9% less methane than the PKE Plus farm and increased profit by 4%. The extra feed eaten on the higher input farm led to higher emissions, but not necessarily higher profit, which is due to the high cost of the marginal milk on that farm.

Conclusion

With looming environmental challenges, farmers are looking at more than production per hectare when evaluating their systems. Dropping out high cost production can reduce GHG emissions significantly without necessarily affecting profit as much as individuals expect. The changing environmental regulations are definitely putting the spotlight on high input systems. Farmers are beginning to question whether these systems are sustainable in the long term for people and the environment. Succession planning becomes more difficult due to the higher level of management skill required in high input systems. It is therefore important for farm consultants to look at all aspects of the farm system when helping farmers assess change.

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THE IMPORTANCE OF **BIODIVERSE** AGRICULTURAL ECOSYSTEMS

The role and implications of the National Policy Statement for Indigenous Biodiversity

The National Policy Statement for Indigenous Biodiversity will have implications for landowners. This article defines biodiversity and the concept of ecosystems. It then goes on to outline the policy that has developed over time globally and in New Zealand before concluding with some comments on the potential implications.

What is biodiversity?

Biodiversity is one element of the wider concept of biological diversity, which also encompasses genetic diversity, species diversity and ecosystem diversity. Biodiversity refers to the number and diversity of species of plants, animals and micro-organisms, ecosystems and ecological processes. An ecosystem is a natural unit of living things – animals (including humans), plants, micro-organisms and their physical environment. It encapsulates the intrinsic value of biodiversity, and the more holistic recognition of the interconnection between aspects of natural resources, including water, soil and the inherent biodiversity within.

Biological diversity is important for two main reasons. First, the moral argument, in that humans have an obligation and responsibility to maintain biological diversity, and correspondingly ecosystems and species have rights. Second, the economic argument, the value that biological diversity provides directly through its use, and indirectly through the potential for future use and/or through the knowledge of its existence.



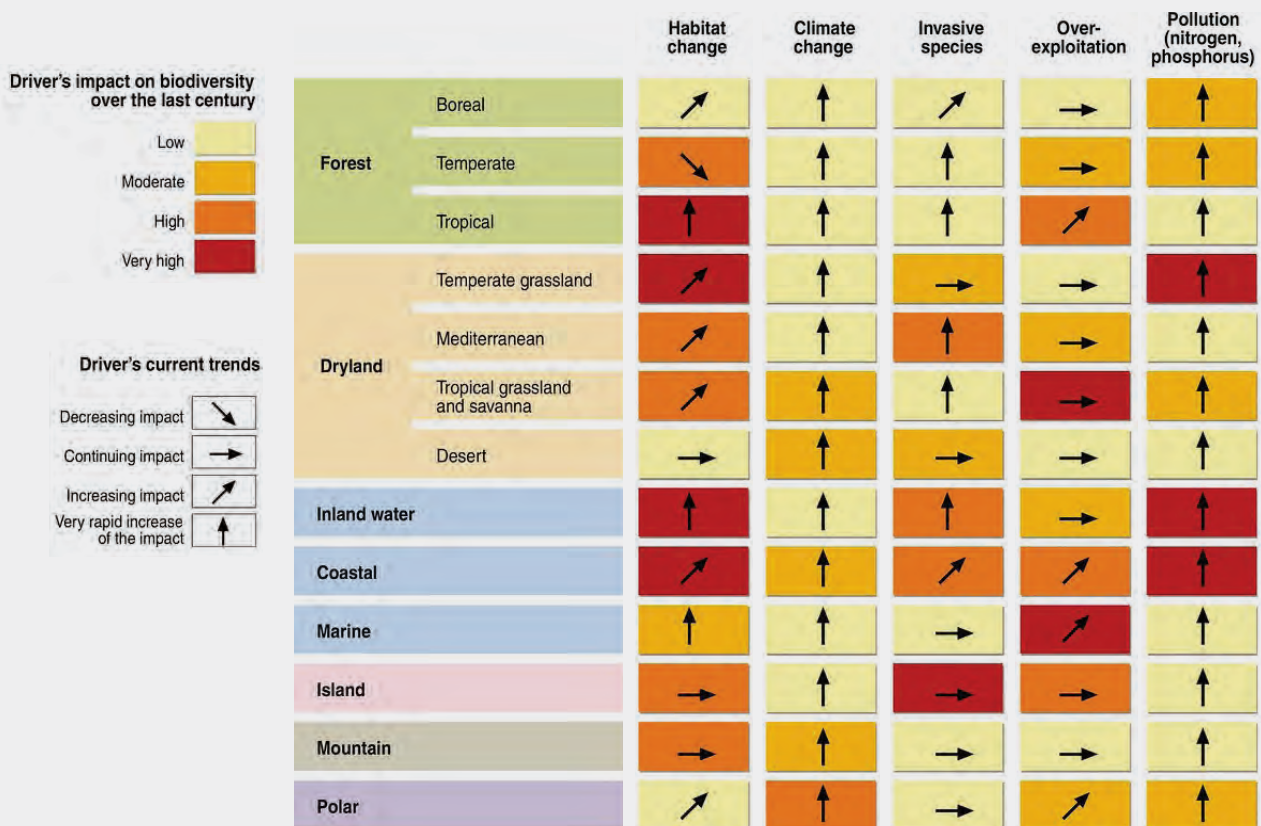


Figure 1: Drivers of ecosystem degradation. Source: grida.no/resources/6066

Due to the public good nature of biological diversity, it has declined over time. There has been habitat loss and fragmentation, over-exploitation of resources, pollution of the soil, water and atmosphere, problems as a result of introduced species, and issues associated with industry, across all levels – primary, manufacturing and service.

Millennium Ecosystem Assessment

In 2000, the United Nations Secretary-General, Kofi Annan, called for the first comprehensive assessment of the state of the global environment. The Millennium Ecosystem Assessment set a widely recognised standard on the language around ecosystem services, and identified the benefits people obtain from ecosystems.

The Millennium Ecosystem Assessment Framework is based on four services:

- Provisioning services – the products obtained from ecosystems, including food, water, fibre, fuel, medicine, and genetic resources
- Regulating services – the benefits obtained from the regulation of natural processes through, for example, pollination, erosion regulation, pest control, nitrogen fixation, climate regulation and water purification
- Cultural services – the non-material benefits people obtain from ecosystems, including spiritual enrichment, cognitive development, reflection, recreation and aesthetic enjoyment

- Supporting services – the services that are necessary for the production of all other ecosystem services, such as soil formation, photosynthesis, primary production, nutrient cycling and water cycling.

The findings from the Millennium Ecosystem Assessment made grim reading. Approximately 60% (15 out of 24) of the ecosystem services evaluated in it are being degraded or used unsustainably. The degradation of ecosystem services often causes significant harm to human wellbeing and represents a loss of a natural asset or wealth of a country. Further, the drivers of this degradation remain constant or are growing in intensity in most ecosystems (see Figure 1).

The assessment is one factor providing impetus to address this degradation, recognising that the public good nature of ecosystem services requires national land use planning and collaboration for our atmospheric and water resources on a global scale. Nationally, reinstating and enhancing the natural processes associated with soil, water and nutrient cycling, pollination and pest management means that farmers have a key role to play. This may require an enhanced understanding so that they recognise, if not already, the benefits provided by ecosystem services and how to manage these.

Ecosystems services and land management

Soil health is hugely important for nutrient availability, with key processes in the soil influenced by soil biodiversity. Modern agricultural practice can be detrimental to this biodiversity. For example:

- Soil tilling can negatively impact invertebrates, such as earthworms and mycorrhizae
- Pesticides are detrimental to soil organisms
- Fertiliser use can reduce the abundance of arthropods
- Irrigation can change the functioning of soils, particularly the microbes.

Environmental management (such as reduced tillage, pesticides and fertiliser inputs, and control of irrigation) can help to reduce the damage.

Pollinating species (bees, butterflies, hoverflies and birds) are important components of many agricultural ecosystems. Worldwide estimates suggest that 35% of the human diet consists of pollinated food sources and that pollination is worth €153 billion. Similarly, the value of pest regulation, the presence of natural enemies of crop pests for biological control, also has a value. One estimate for the economic value of natural pests suggests that this is worth US\$123.3 billion. Intensive agriculture has been detrimental to many of the pollinator and natural enemy species.

Environmental management, which promotes these pollination and natural enemy species, is therefore important. This includes providing supplementary food (alternative prey/hosts), complementary foods (honeydew, pollen, nectar), modified microclimates (windbreaks, shade) and refuges (over-wintering sites, habitat during fallows). This can be within or adjacent to the crop and should be at different temporal and spatial scales for maximum benefit. There is, however, the direct cost of provision and indirect costs associated with the potential for unintended negative consequences.

In New Zealand, values associated with ecosystem services have also been estimated (see **Table 1**).

There are also incidental benefits associated with the increased potential for meeting compliance and assurance requirements arising from environmental management, the potential for improved public relations and marketing as a result, and even networking opportunities.

Environmental and natural resource policy

Globally, and historically, environmental policy has been scattershot. Different concerns were (and continue to be) dealt with separately and sometimes in conflict. Despite this, there are attempts at a more strategic approach to policy-making.

In New Zealand, the Resource Management Act (RMA) 1991 replaced or amended 50 existing laws and was introduced to coordinate, streamline and provide a more comprehensive approach to land management and the associated atmospheric and water resources. Part 2 Principles refers to the following:

... safeguard the life-supporting capacity of ecosystems; protect significant indigenous biodiversity and significant habitat of indigenous fauna; provide for the relationship of Māori and their culture and traditions with their taonga; have particular regard to kaitiakitanga and the ethic of stewardship; and take into account the principles of Te Tiriti o Waitangi.

The Act was meant to be accompanied by statements, standards, regulations and (most importantly) plans. However, the implementation of this was a lengthy process, resulting in reform in 2021 and three new Acts, including the Natural and Built Environments Act to better protect and restore the natural environment and enable more development within environmental limits, and the primary replacement for the RMA. The implementation of these Acts is ongoing at this time. Indigenous biodiversity is one small (but very important) part of the value associated with ecosystem services.

National Policy Statement for Indigenous Biodiversity

Under the RMA a National Policy Statement for Indigenous Biodiversity (NPSIB) was first discussed in 1999. Three different versions were developed between 2001 and 2005, although none were notified. Instead, non-statutory

Table 1: Value of ecosystem services in horticulture, cropping and agriculture

\$million	Hort and cropping	Agriculture	Total
Provisioning and cultural	2,265	9,075	29,705
Regulating	3	3,345	15,000
Supporting	23	7,751	22,530
Total	2,291	20,171	67,235
Passive (non-use)	-	-	12,045
Gross	2,291	20,171	79,280
Net (gross – supporting)	2,268	12,420	56,749

Source: Adapted from Patterson & Cole, in Dymond J.R. (Ed.). 2013. *Ecosystem Services in NZ*. Lincoln, NZ: Manaaki Whenua Press

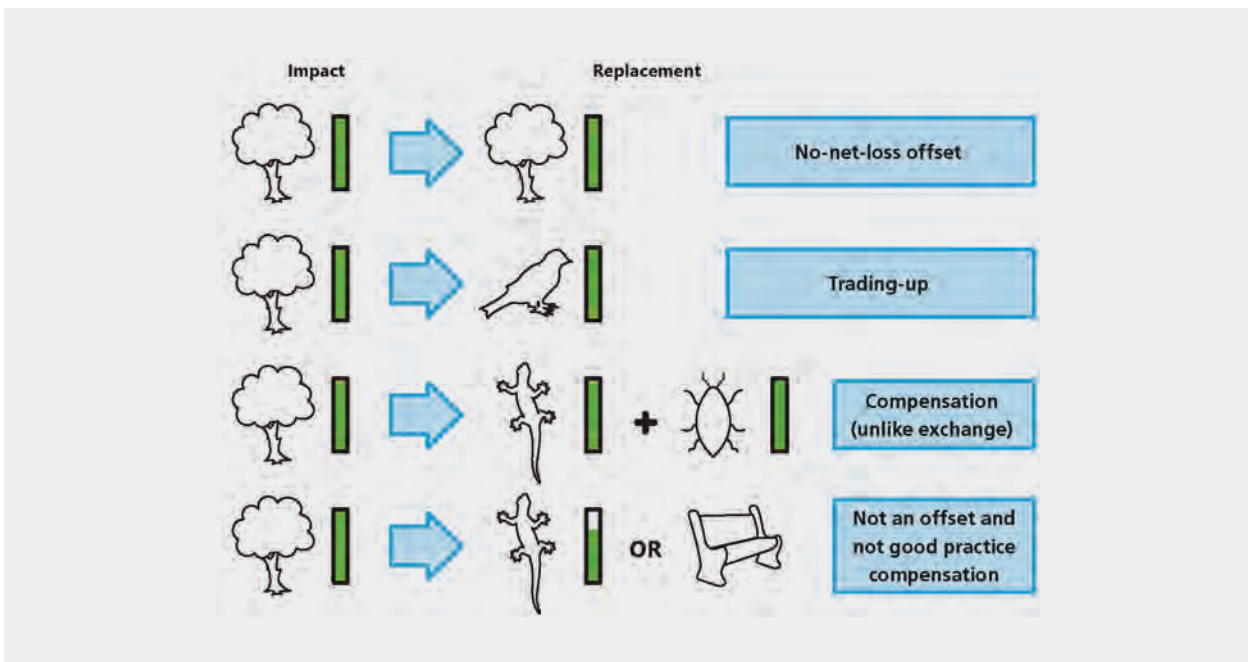


Figure 2: Effects management hierarchy: biodiversity offsetting and compensation. Source: LGNZ. 2018. Biodiversity Offsetting Under the Resource Management Act: A Guidance Document. Wellington, NZ

guidance, *National Priorities for Protecting Rare and Threatened Native Biodiversity on Private Land*, was issued in April 2007.

By 2010, there were a number of concerns, including severely reduced lowland habitat, the declining quality of the remaining land and water habitats, and the impact of pests and weeds. The first proposed NPSIB was finalised in 2010 and made available for public consultation between January and May 2011. It was not progressed due to lack of stakeholder agreement and was withdrawn.

In 2016, it was announced that a new draft NPSIB would be developed led by a collaborative group of environmental and landowner organisations. The group was established in 2017 and delivered a report to the Government in October 2018, which included a new draft NPSIB. The Ministry for the Environment and Department of Conservation developed this and a proposed NPSIB went out for consultation between November 2019 and March 2020. The Government is currently working on the feedback and a revised draft.

The focus of the most recent proposed NPSIB was to promote the maintenance and protection of indigenous biodiversity, while also providing for the social, cultural and economic wellbeing of communities. The proposed NPSIB had six objectives and 15 policies for indigenous biodiversity, with the emphasis on maintaining, restoring and improving the management of indigenous biodiversity, and to enhance the ecological integrity of ecosystems.

As part of this, the document specified that local authorities must develop meaningful and tailored objectives, policies and methods. This included:

- Developing regional biodiversity strategies
- Monitoring and assessing indigenous biodiversity

- Implementing informed and sympathetic management across the terrestrial environment
- Identifying and protecting Significant Natural Areas (SNAs), which are areas of significant indigenous vegetation and significant habitats of indigenous fauna. Section 6 of the RMA requires their protection. These are referred to as New Zealand's most important remnants of native habitat, including native forests, wetlands and places where rare or threatened plants or animals (~4,000) are still found.

There are a number of issues in the implementation of an NPSIB related to the requirement for local authorities to: (a) engage in the monitoring of indigenous biodiversity and implementation of appropriate management across the wider landscape; and (b) identify and protect SNAs, in particular the indigenous lowland forest and wetlands. This is problematic when most of the land in question is held in private ownership.

Given that the requirement to protect SNAs was stated in the RMA, some regional councils have already progressed with their identification, others have not, and in some cases are waiting for an NPSIB to actually be in place. Many councils have taken a desktop-based approach to the identification of SNAs, and then contacted landowners to visit and verify (they can be refused access).

Implications on-farm of the NPSIB

A major concern is that once identified as an SNA, the landowner faces the prospect of added complications of management at their own cost, a loss in land value, or even losing the land itself. Adding to this concern, is that 'significant' is a term not defined by the RMA, and each council can apply different standards. Attempts to standardise the definition of significant are being made.

Land loss is an option, but would be voluntary. A National Heritage Fund exists to purchase land if the buyer, the Government, is willing and if the seller is also willing. A loss in land value and more complicated management will also be a possibility for some. Alongside any implementation of the NPSIB would be a range of measures to support landowners, such as money for fencing and pest control.

The National Heritage Fund also provides grant funding, through a competitive application process, for the protection of high-value ecosystems. For many, the reality is that existing practices will continue, and many landowners are already doing the work needed to protect indigenous biodiversity. The question will be how this is monitored and how appropriate management will be agreed upon. There will, going forward, be no option for intensification, and new activities that would negatively impact would not be allowed.

In the wider landscape, beyond SNAs, there is an effects management hierarchy for managing and enhancing the state of biodiversity. Potential adverse effects on indigenous biodiversity will need to be avoided, where possible, and (if not) remedied, where possible, or mitigated. Biodiversity offsetting and compensation are also possible (see **Figure 2**).

Biodiversity offsetting means there should be no net loss, so that if a habitat or indigenous species is negatively impacted on a direct replacement should be put in place, which can be at a site elsewhere. There is also the option for trading up (e.g. a new habitat is created or an existing area is added to), leading to enhanced biodiversity. Biodiversity compensation is designed to compensate for losses; it is not designed to demonstrate a no-net-loss outcome. The compensation is not a direct replacement for what was lost, but has the potential to add to or improve biodiversity elsewhere or at least go part-way to some form of compensation.

Learning from the past – no need to reinvent the wheel

There are already initiatives in place that should form the basis for the implementation of an NPSIB. New Zealand has a Biodiversity Strategy, published in 2000, recognising the importance of biodiversity – economically, socially and culturally. Many regional councils within their strategies and plans recognise the need to protect and restore habitats and ecosystems. They have taken this forward through pest management and biosecurity strategies and plans, with objectives, rules and responsibilities outlined for landowners and the councils themselves. Precedents have been set for managing land.

Tenure review is an example of relevance for land exchange – it was a voluntary process that gave pastoral lessees an opportunity to buy some of their leasehold land. The rest of the land returned to Crown ownership, usually for conservation purposes. This land included some of New Zealand's iconic high country scenery and is culturally, environmentally and economically significant.

The process was designed to help protect distinctive and rare ecosystems, add to the conservation estate, improve access to the most scenic parts of the country and give farmers more control over managing the land. Tenure review ceased in 2019. There were many issues associated with the review process and outcomes, and although this involved lessees, there are lessons here of relevance to both councils and private landowners for the establishment and management of SNAs.

Outside of the government framework, the Queen Elizabeth II National Trust (QEII) is a registered charity that was established in 1977 'to encourage and promote, for the benefit of New Zealand, the provision, protection, preservation and enhancement of open space.' QEII enables landowners to protect special features on their land through its open space covenants. QEII does this by partnering with private landowners to protect natural and cultural heritage sites on their land with covenants.

The landowner continues to own and manage the protected land, and the covenant and protection stays on the land, even when the property is sold to a new owner. The covenant applies to present and subsequent landowners. QEII covenants consist of a network of over 4,729 protected areas, ranging from small backyard patches of a few hectares to huge swathes of high country (6,500 ha).

These covenants protect more than 180,000 ha of private land and play a hugely critical role as a refuge for some of New Zealand's rarest and most endangered biodiversity and ecosystems. It includes native forest remnants, wetlands, grasslands, threatened species habitats and sites of cultural and archaeological significance.

The establishment of a covenant involves an evaluation of what is there, the potential threats to the site, practical considerations around management and funding available. There will be costs to the farmer, but alongside the environmental benefits, there may also be benefits for the overall agricultural system, and enhancing the latter should not be ignored. A potential key factor is that the landowner volunteers their engagement.

Concluding comments

For the NPSIB to succeed, there needs to be recognition of what is already being done. Landowners should be applauded for having, protecting and enhancing the existence of indigenous (and other important) habitats and species on their land.

Our landowners are the custodians of our landscape. The implementation of an NPSIB should support and enhance what currently exists. For this to occur, a more collaborative partnership between the Government, council and landowner is needed, and there is a role for the rural professional here, the individual and the organisations behind them.

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LYCINDA LETT

This profile looks at the life and work of Lycinda Lett, currently a Senior Consultant and Director at AgFirst Waikato based in Hamilton.

Early interest in soil science

Lycinda grew up on dairy farms, starting at Elstow in the Waikato, then spending most of her early school years in the South Waikato area of Puketurua where her parents sharemilked. The family's first farm ownership took her to the area of Eureka, finally settling at Tatuanui during her late schooling.

Growing up around progression, profitability and a passion for dairying definitely influenced Lycinda. Her parents were keen contributors to the industry, involved in discussion groups and heavily involved in the then Sharemilker of the Year competition. While studying at high school, surrounded by peers heading off to study design, psychology and accounting, she identified and understood the important role agriculture had in New Zealand.

Aware of the shortage of soil scientists in the country, and having a strong interest in science, she headed off to Lincoln University to complete a Bachelor of Agricultural Science focusing on soil sciences. Other areas of agriculture redirected her focus, and leaning towards a degree based more on dairying and plant sciences, she completed it in 2009.

Working life

Through her Lincoln degree, she undertook summer work, which included jobs on both dairy and sheep and beef properties. This was time well spent to learn about the diversity of dairy and pastoral farming in New Zealand.

She also spent a summer working as a research technician for DairyNZ in the Canterbury office. The

Lycinda strives to get the best out of her clients and their businesses through strategy and financial planning, as well as working on the farm system and day-to-day farm management.

technician role provided a good grounding in the basics of pasture management, but also allowed her to see a career in science was not where she wanted to end up. At that time her father was a Consulting Officer for DairyNZ, which gave her a good insight into the role of a consultant and the appeal of being able to help farmers on many levels.

As her time at Lincoln was drawing to an end, she was fortunate to land a graduate role with AgFirst Waikato. Mentored by James Allen, Nico Mouton and John Hall, as well as other team members, she enjoyed her junior consultancy role working on key projects such as Dairy Push South Waikato and developing a solid skillset in Farmax Farm Systems Modelling. As her confidence grew, she took on her own clients.

In the early days of the role, she was passionate and had a keen interest in the environmental space, but over time her attention was drawn to the people space. Now, as well as holding the role of Generalist Dairy Advisor, she specialises in recruitment and people management. Her current role enables her workload to be varied and to work with a wide range of farmers and clients. Lycinda strives to get the best out of her clients and their businesses through strategy and financial planning, as well as working on the farm system and day-to-day farm management. Over the last six years she has taken three periods of maternity leave, supported by her outstanding team. She also had the privilege of being offered a share purchase into the company in 2020 and is now a Senior Consultant and Director of AgFirst Waikato.

Professional development and industry roles

Prior to having children, Lycinda was on the Waikato NZIPIM branch committee for just under two years. She enjoyed this role as it gave her better connections with other local rural professionals and enabled personal growth in knowledge and skillset. She continues to regularly attend branch events, taking the opportunity to continue her own development and catch up with friendly faces. She would encourage all young consultants to attend NZIPIM events to meet other like-minded people in the industry.

During her consultancy journey she has undertaken numerous courses and certifications to keep her skillset and knowledge up to date. One outstanding part of this development process was being awarded a Kellogg Scholarship in 2014. Not only was this a great chance to grow personally, but it also enabled her to invest some real time and thought into the people area of the dairy industry.

As part of the scholarship, she undertook research into the 'Barriers and Opportunities to Improving Dairy

Farm Rosters in the Waikato'. It was a detailed look into a traditionalist dairy region and reflected on how the industry had moved to recruit and retain better people on-farm. Following its completion, she was awarded the Farmax Farm Consultant of the Year Award and the NZIPIM Emerging Consultant of the Year 2015.

This latter award enabled further research into the people space looking at 'The Application of Meeting Minimum Wage Requirements On-Farm'. Lycinda believes that this professional development and personal growth responsibility has helped lead her to the position she is in today and would strongly encourage others to step out of their comfort zone and apply or seek nomination for these opportunities.

Vital role of rural professionals

Lycinda also sees that the ability to farm is ever-changing, and in some areas (such as water use, nutrient use and nutrient losses) becoming reasonably controlled. With these changes comes the requirement for better data storage, reporting and accountability. She believes that one of the key factors to moving forward in all industries will be the need to have a good supporting team for each farm business. This is the on-farm team (including employees, managers and contractors), but also rural professionals.

Putting the key professionals who support the business around a table once a year enables progress and direction to be developed and clearly communicated. The support team helps to ensure all requirements are met and that each business is considering every option to farm, aligning practicalities with values and vision.

An example she cites is the use of Farmax, enabling her to model scenarios and options with clients that can then be discussed with lenders, accountants and on-farm staff. This high-level analysis looks at the profitability, return and physical performance of opportunities for agricultural businesses. She feels it is vital that the rural professionals supporting the business are independent to offer the most value to their clients. This allows for outside perspectives, without emotional attachment, so that the tough decisions can be made.

Throughout her time as an Agribusiness Advisor she has seen the impact of drought, low milk price and regulation on the dairy industry. What she reflects on is that during all of this, farmers continue to be problem solvers, seeking knowledge and advice to allow them to continue on.

More frequently she hears discussion of business resilience and strategy, with clients looking at their venture from a higher level. This opens doors to opportunities, and



Putting the key professionals who support the business around a table once a year enables progress and direction to be developed and clearly communicated.

although taking time, it is time well spent to achieve goals, productivity and profitability. She strongly believes that taking the time with our clients and our own businesses to develop and review strategy is vital, and that there is opportunity to be found in spending less time on detail and day-to-day running.

People in industry

People in dairying is Lycinda's key area of passion. What she is currently seeing is a shortage of people available to work in farming businesses. The dairy industry has relied on migrant staff, who are currently unable to get through the border with ease. There has been some transition of people from other sectors of employment, but dairying is often seen as a less desirable job opportunity.

The industry has not lost its reputation for long hours and limited time off, with many opting for different career paths. She believes that the reality of dairying is that there will always be extended periods without leave and long hours where responsibility is involved, but that there are efficiencies to be gained and technology to use to support a better lifestyle alongside farming. The motivated and driven people she has applying for jobs now hold family as

a high priority and strive to have a good balance between doing a great job and being highly present in family life.

With these farmers comes knowledge and systems to do better and be better, hopefully foreseeing a future where dairy farming is an aspired career path for many more. In her view, the issue really lies in the short term as to how the industry copes with a shortfall of available staff given the many jobs to be done on-farm. There is much efficiency to be gained on-farm, but time is poor to identify better ways of doing tasks. Lycinda believes that it is the rural professional's role to assist clients to understand that they may need to change the roles they define or what they offer (not just dollars and cents) to get the right people on farms.

Lycinda says that rural professionals need to be the expectation managers of all parties. She also says that, as outsiders, part of their role can be to identify areas to gain efficiency and help get more tasks completed on-farm in less time. They can do this because they have the privilege of applying high-level thinking without being involved in the day-to-day detail.

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