The case for expanding the range of subject specialists used in farm planning

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Abstract

We explored the merit of expanding the range of subject specialists used in farm planning. We document the outcomes for sheep and beef farmers to improve water quality and promote climate change awareness as part of the wider planning process in two community catchment groups (Hurunui District Landcare Group and King Country River Care group). We found that subject specialists added value. A land resource specialist contributed to greater precision and a more detailed description of the farms natural and built capital. This contributed to a more robust analysis and better targeting of the actions in the work programme. The terrestrial ecologist activated the link between the management of indigenous biodiversity and stream health, with resilience to future climate events. The carbon specialist created the link between tree planting and water quality outcomes because of where tree plantings were located on most farms. The carbon specialist also highlighted the option to register existing soil conservation plantings under the emissions trading scheme, adding a revenue stream. With the subject specialist(s) as part of the wider farm team, environmental concerns are more likely to be integrated into the business plan with mitigation actions better tailored and targeted in the work programme.

Keywords: farm-planning, land resources, terrestrial ecologists, carbon specialist, resource management.

Introduction

Farmers currently procure the services of a diversity of specialists like an accountant, veterinarian, agronomist, and fertiliser advisor, as part of their current business. Farm plans (e.g., Freshwater farm plan, soil conservation plan, riparian plan, integrated farm plan) are increasingly being used by local and central government as a vehicle for affecting change in farm management practices (Stokes et al. 2021) and for delivery on an increasing range of outcomes [e.g., water quality, biodiversity, greenhouse gases (GHG)], alongside farm production, financial and personal goals. As a result, does the sheep and beef industry need to consider expanding the current range of subject specialists engaged in the sector? Further, would engagement of a soil and land resource specialist, terrestrial or aquatic ecologist, carbon specialist or strategic planner, add value, identify, and create more adaptation and mitigation options to improve water quality and future climate awareness for farmers? These two questions were the subject of a project funded by the Ministry for Primary Industries Sustainable Land Management and Climate Change (SLMACC) fund. This paper reports the findings from working closely with groups of sheep and beef farmers in both North and South Island over thirty months.

Materials and Methods

The project worked with two groups of sheep and beef farmers, the Hurunui District Land care Group (https://hurunuilandcaregroup.co.nz/) and the King Country River Care Group (https://www.kingcountryrivercare.co.nz/) over thirty months. Within each, a subgroup of farmers was formed. One farm was chosen per subgroup each year and given the opportunity to select and work with any two subject specialists over 12 months, totalling four farms over two years. The facilitator of each group selected the farm based on farmer objectives, and the farm characteristics, challenges, and opportunities with the overall interests of group in mind. The choice of specialists selected by three of the four farms to assist with farm planning included expertise in soils, land, mapping, and geographic information systems (GIS). Specialists with skills in indigenous vegetation were selected by two farms. Specialists with skills in carbon sequestration and the emissions trading scheme (ETS) were also selected by two farms, while a specialist in strategic planning was selected by one of the farms.

Further information regarding the composition of the two groups, the process for managing and coordinating the two subgroups and the work of the subject specialists can be found in a comprehensive report by Mackay et al. (2022). In brief, once the subject specialist had been identified, the first step was a visit to the farm

to meet the farming family and start the process of understanding the goals and objectives of the business.

That initial visit was followed up by field work by each subject specialist. For the soil and land specialist this included mapping the geology, slope, soils, waterways, vegetation types and infrastructure, and recording that information in a geospatial data base. The terrestrial ecologist completed a detailed survey of the indigenous vegetation, including condition. The carbon specialist mapped native and exotic vegetation, including parameters for assessing eligibility for registration of plantings in the ETS, in addition to potential future planting options. The strategic planning specialist examined the existing enterprises and explored possible new land-based enterprises. Each specialist then shared that information and initial analysis in a preliminary report with the farming family. Once the family had reviewed the report, a follow-up meeting was held for further discussion and refinement of the report.

In brief the soil and land specialists report provided the farming family with i) soil and LUC maps identifying the strengths (e.g., areas with unrealised potential) and weaknesses (e.g., risk of erosion) in GIS; ii) identified low slope land; iii) prepared a vegetation map to enable calculation of aerial extent of pastures and other vegetation types; iv) provided data on the length of waterways and area of wetlands; and v) all built infrastructure. They also provided a list of potential opportunities and risks associated with the farm operating in that location. The terrestrial ecologist report provided the farming family with i) a detailed map of the indigenous vegetation in a GIS; ii) information on any significant natural areas (SNA), as part of the review of the local District Plans; and iii) potential actions the farmers might consider to further protect and or enhance native flora and fauna. The carbon specialist report explored with the farming family the i) implications of their current and proposed tree plantings on carbon sequestration; ii) the eligibility of current and future plantings for registration with the ETS; iii) the impact of any decision on cash flow and assets; and iv) the impact of any new plantings on other environmental outcomes including stream health, water quality and resilience to future climate events. The strategic planning specialist report examined the existing livestock policy, potential changes to that policy, and also examined the use of the elite soils on the farm for enterprises beyond livestock. Key findings of the reports were then shared with the wider subgroup in each Island in a subsequent meeting. The meeting included a presentation, field visit and a session reflecting on the learnings and implications to the farm planning process and outcomes.

The learnings and reflections on the (i) impact of the subject specialist on farm planning; ii) impact of the subject specialist on environmental outcomes; iii) extracting value from the subject specialist; and iv) barriers to engagement with a subject specialist, were drawn from observation of the interactions between the four farming families working with eight specialists and input from the discussions with the two subgroups. Examples are drawn from the interaction with the subject specialist with skills in soils, land, indigenous vegetation, forestry, carbon sequestration, ETS, mapping and strategic planning.

Results and Discussion

Impact of the subject specialists on farm planning

Subject specialists were able to provide access to more detailed data on the farm resources, increased knowledge and awareness, and greater integration of production, environmental and business goals.

Access to better data

Three of the subject specialists provided access to accurate, fine scale and detailed geospatial information on the biophysical resources (e.g., soil types, slope, erosion types and severity, all vegetation types, including native, land use capability, waterways) of the farm. The improved precision of the biophysical data resulted in the farmer having accurate data for the area in pasture, area in native bush and exotic plantings, length of streams, area in wetlands, slopes, aspects, length of fences, drains and tracks. This had major flow-on effects on the farm business and planning process, e.g., the area in pasture and indigenous vegetation and length of waterways varied by 5-15% compared with actual. Errors in the estimation of the area in pasture impacts on the calculation of stocking rate, pasture feed budget and fertiliser requirements. It also impacts on the reporting of all the outputs from the farm ranging from production and financial performance (stocking rate/ha, product kg/ha, income $/ha^{-}) to environmental analysis and reporting (e.g., nutrient losses).

One of the outputs from the soil and land specialists mapping the rock type, soil, slope, vegetation, climate, and the potential for erosion across the farm was the development of a detailed LUC unit map (Lynn et al. 2009). The LUC unit map is an invaluable underlying resource map used for identifying highly productive land (LUC Class I-3) through to informing soil conservation practices on land at risk to erosion. The LUC unit and soil map contributed to the development of the land management unit (LMU) or land unit (LU) map for the farm, with the latter a required layer in a freshwater farm plan set out by Ministry for the Environment ((https://environment.govt.nz/publications/freshwater-farm-plan-certification-guidance/).

Access to farm scale geospatial data (soil types, slope, LUC units), breaks the dependency of the

farm on national inventories that are often used as a default, but were not designed for use in farm planning. Detailed information on the area in native bush by the ecologist, the areas and density of space planted conservation trees, through to woodlots, provided by the carbon specialist, were invaluable in calculating carbon sequestration and the eligibility of plantings for registration with the ETS. The location, species composition, size, and condition of the indigenous vegetation noted by the ecologist, provided the basis for developing an indigenous vegetation restoration plan for the farms, and also to check information held by the local District Council on SNA's related to the farm. In addition, because the resource information has been assembled and signed off by the specialists it is more likely to satisfy processes that include either the certification of an environment plan or on-farm quality assurance programme requirements (e.g., New Zealand Farm Assurance Programme Plus).

Knowledge and awareness

A key learning that came through was that the new additional information and knowledge of the on-farm resources (e.g., farm scale land resource, water way, indigenous vegetation data,) and their significance to the business (e.g., area in pasture, native bush, riparian and wetlands) and environment (e.g., identifying SNA's), added value to the farm planning process. Knowledge provided by subject specialists, increased the farming family's understanding of impact to the farm business from current regulations (e.g., NPS Freshwater, ETS, SNA, stock exclusion, intensive winter grazing), likely future legislation (NPS biodiversity, freshwater farm plans) and market requirements (NZFAP+).

The subject specialists facilitated increased awareness of benefits to the farm business from a wider range of organisations and resources. These resources included potential sources of funding for tailored environmental work, and increased awareness allowed for better positioning of the farmer to respond to an opportunity (e.g., funding for native planting).

An observation made on several occasions was the increased knowledge within the farming family resulting from the engagement of the family with the subject specialist. This reduced pressure on individual family members in deciding on next steps. Collectively these benefits translated into increased confidence to decide, and proceed, even if that decision supported the status quo.

Integration

Environmental challenges (e.g., erosion and sediment, water quality, biodiversity, GHG and carbon sequestration) were more likely to be integrated in the planning process when the subject specialist was engaged with the farmer. As an example, the terrestrial ecologist activated awareness of the link between indigenous biodiversity, stream health and climate outcomes. The carbon specialist created similar linkages, because of where tree plantings are located on most farms. These links emerged as one of the major benefits for the three farming families that worked with these two subject specialists. Critically, farm planning is not a series or a sequence of isolated activities to address production and environmental issues (e.g., Soil conservation plan, Freshwater plan, Intensive Winter Grazing plan, Riparian plan, Soil health plan, Biodiversity plan) but rather a process to bring all those activities together into a single plan. With a more integrated approach to the planning process the list of targeted priorities and actions in the work plan are more likely to be effective in their primary purpose (Manderson et al. 2007). Additionally, they offer other co-benefits that feed into the farms annual operating plan and are consequently actioned. For example, assistance with developing 5 – 10-year work programmes with detailed actions integrated into the business plan emerged as one of the benefits from working with subject specialists.

Impact of the subject specialist on environmental outcomes

The land resource specialist, selected by three of the four farms, provided an accurate and in-depth assessment of the farm resources that enabled a more complete analysis of the current environmental condition and performance of the farm., It also allowed for the development and prioritization of more targeted mitigation actions. For example, the underlying resource information (e.g., slope, water courses, critical source areas and soil type), was used to produce a stock exclusion and intensive winter grazing plan on one farm in response to the Central government's Essential Freshwater legislation (https://environment.govt.nz/freshwater /work-programme/) The stock exclusion and intensive winter grazing plan would have been less accurate and more difficult to complete if access to underlying resource information was limited to the national land resource inventories.

The terrestrial ecologist (selected by two of the farms) integrated the indigenous biodiversity into the farm planning process and works programme. Restoring native bush not only delivers biodiversity outcomes and greater carbon sequestration, but also water quality outcomes by virtue of where most indigenous fragments are found in the landscape. The positive relationship between biodiversity outcomes and wider environmental gains (water quality, climate resilience, through to vista) could be utilised more by both the sector and government to advance wider environmental outcomes (Dominati et al. 2021).

The carbon specialist (selected by two of the farms and independently contracted by a third) identified registering their existing or programmed soil conservation plantings with the ETS as a business opportunity for sheep and beef farmers. This has the potential to benefit water quality and climate change outcomes, and also contribute to funding tree planting activities into the future. Few farmers have taken up the opportunity to register their existing or programmed soil conservation plantings with the ETS (https://beeflambnz.com/news/urgency-around-registering-eligible-forests-ets). This forgoes an income stream into the future that could be utilised as collateral for funds to support additional soil conservation efforts and other plantings, such as riparian margins and for shade and shelter.

On one farm, a significant area of elite soils was identified during the soil mapping exercise. This created the opportunity to explore enterprises beyond livestock including vegetables, arable, and horticulture. Some of these options create the potential for more labour (families) and higher returns. By default, it also creates a mitigation option that would change the GHG emissions profile of the farm. Further investigation is required to identify the necessary skill sets a subject specialist would need to effectively address the barriers to diversifying livestock systems.

Extracting value from the subject specialists

Base farm plan

What has become evident in this project, as well as in various forums, is that farm planning requires both farmers and the sector to acquire new skills and establish fresh relationships. In this regard, it is essential to acknowledge that it will require both time and continuous support to build the necessary capabilities and capacity in farm planning in the sector.

Feedback from the subject specialists was farmers that had a base farm plan, would obtain more value from working with subject specialists. A base farm plan includes a set of objectives for the business, a breakdown of the farm into its major LMU, a list of production and environmental strengths and weaknesses for each LMU, and a set of actions that have been pulled together into a programme of work to address the risks and opportunities (Synge et al. 2013). The current draft for the MfE freshwater farm plan (https://environment.govt.nz/acts-and-regulations/freshwater-implementation-guidance/freshwater-farm-plans/) acknowledges the importance of incorporating a spatial environment and dividing the farm into LU's. However, it falls short in its analysis by solely focusing on identifying weaknesses and risks without considering the strengths and opportunities. This limitation restricts the range of potential mitigation and adaptation actions that could be implemented to enhance water quality (Mackay et al. 2018).

Order of engagement

At the outset of the project, we anticipated the participating farming families would select subject specialists in an order starting with a soil and land, water quality and or aquatic ecologist, before a terrestrial ecologist or someone with specialist skills in carbon, but that did not transpire. In this study the selection of the subject specialist by the farming family was in response to an opportunity (e.g., new investment) personal interest (e.g., indigenous bush enhancement) or a concern for the business (e.g., pending regulation). The order in which such knowledge was acquired did not appear to affect integration into the whole farm plan.

Behaviours of the specialist

Having a rapport with the farming family, demonstrating expertise in the subject area, and developing an understanding of the farm, including the objectives of the business and its resources, were all behaviours the subject specialists needed to demonstrate. Establishing what geospatial data and information the farm already had available emerged as an important part of the process of engagement by the specialist. With the digital technologies available today, the subject specialist can build on existing reports to ensure an integrated rather, than siloed, approach to planning.

It is critical the subject specialist is involved in the development of the work programme with the farmers to ensure the mitigation actions are tailored and targeted for maximum gains and minimum costs. The actions in the work programme also needs to be integrated into the farm operational plan, recognising workflows and available resources, to ensure implementation (Manderson et al. 2007).

Barriers to engaging with a subject specialist

Identification

Locating subject specialists posed a challenge, as they were not commonly found among the existing pool of rural professionals. Of the subject specialists available identifying the most suitable and compatible ones presented another hurdle. The importance of a trusted adviser or the suggestion of using personal networks (such as discussion or catchment groups) to assist in identifying the specialist were seen as two options to address this issue. The latter emphasised the potential value of being part of a discussion group or producer network.

Value

The value of the subject specialists was appreciated

by both subgroups, and within each group some were prepared to pay for some services. Of the subject specialists engaged, the carbon specialist had the potential to gain more traction, as this work demonstrated immediate monetary returns. The ecologist would be engaged by farmers who perceive many advantages in maintaining native biodiversity on-farm, but there is a clear desire for greater support in overcoming identified barriers (Maseyk et al. 2020). Understanding more about the environmental footprint of the farm (impact on receiving environments) is likely to be a driver for the interest in a land resource specialist. Access to better land resource information creates the opportunity to increase production and profitability, through the better use of resources (Mackay et al. 1998) while providing assurance to the market and peace of mind to the farmer.

Availability

Availability was a critical issue. There is a very limited pool of subject specialists with the required suite of skills. All the subject specialists engaged in this project have few peers. One potential solution discussed was farmer groups could engage an ecologist to work with at the group level. In doing so this would advance each members biodiversity plan because the issues and actions are likely to be similar for all group members. This offers an option for smaller farm operations, with limits on their discretionary budget to access specialists, while at the same time spreading the specialist a little wider. Whether this negates the need for one-on-one follow-up requires further investigation.

Conclusions

Expanding the range of subject specialists engaged by the sector had a positive impact on the farm planning process of the participating farming families. It is difficult to place a value on the greater certainty and confidence that the more detailed geospatial and biophysical data provides for nutrient budgeting, farm planning, developing the work programme, regulatory compliance (e.g., developing an intensive wintering grazing plan for slopes >10°), farm assurance for the market, and for farmer peace of mind. With a subject specialist as part of the farm team, the environmental challenges were more likely to be integrated in the planning process. With a more integrated approach to the planning process the list of targeted priorities and actions in the work plan are more likely to be effective in their primary purpose. Feedback from the subject specialists was that farmers who had a base farm plan, would obtain more value from working with subject specialist. What has become evident in this project, as well as in various forums, is that farm planning requires farmers and the sector to acquire new skills and establish fresh relationships. In this regard, it is essential to acknowledge that it will require both time and continuous support to facilitate this process effectively.

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