TITLE: Optimising land use based on land type classification: Southern Alps

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Key words *(for searchable database)*
land use capability, land classification, land management units, tenure review, high country farming, sustainability, conservation, climate change, greenhouse gases, offset emissions, carbon credits

Introductory sentence *(for website)*
Richard and Sarah Burdon of Glen Dene Station have increased the sustainability of their farming system through developing an understanding of their land resource and subsequently optimising management of this resource in a challenging environment.

Interviewee details

- Name: Richard and Sarah Burdon
- Location: on State Highway 6 between Lake Hawea and Lake Wanaka and up to The Neck
- Business / farm details: Sheep, beef and deer farmer on a high country property
- Size: 5974 ha freehold at Glen Dene and 463 ha leasehold at Hawea Flat and Maungawera (about 15 minutes drive away)

Key points *(from supporting evidence doc, written in list form, will be displayed in a pull out box)*

1. The Burdon's aim to achieve long term sustainability through balancing environmental, economic and social issues in their farming business.
2. Identifying land management units based on land classification has increased sustainability
3. Tenure review was fundamental in the process of considering the land according to its capability for long term production
4. Glen Dene Ltd has diversified into enterprises more suited to the land capability that are equally or more profitable than traditional high country farm revenues
5. Conservation and environmental values have been enhanced through consideration of land use capability
6. There have been significant social benefits to the community and region through public access, protection of conservation values and culturally significant areas

Body of the case study

Richard and Sarah Burdon of Glen Dene Station have increased the sustainability of their farming system through developing an understanding of their land resource and subsequently optimising management of this resource in a challenging environment. The couple farm a 5974 ha high country sheep, beef and deer farm located on State Highway 6 between Lake Hawea and Lake Wanaka, Otago, New Zealand. They also lease 463 ha at Hawea Flat and Maungawera (about 15 minutes drive away).

The property currently carries around 15,000 stock units comprising mainly Merino sheep along with deer and cattle (54:18:28 sheep:cattle:deer). Of these, around 10,500 stock units

are run on Glen Dene itself and the balance of the stock units (mainly finishing stock and some dairy grazing) are carried on the lease blocks.

Glen Dene Ltd as it is known today is the northern portion of the original Mt Burke Station owned by Richard's grandfather, George Burdon. It became an independent property in 1979, after a decision was made to split the property into two farms. At this time, it was unfenced on both sides of the State Highway, as it was the undeveloped side of the original station. Richard and Sarah moved into the homestead in June 2003 to become the third generation to farm the property.

In 2007, the Burdon's completed tenure review. In 2008, Glen Dene Station was the supreme winner of the Otago Ballance Farm Environment Awards.

Mission statement Glen Dene Ltd:
"To maintain control and management of the land with continual improvement of the soil, water, vegetation and saleable commodities, showing profitable returns and successful business management"

Consideration of land based on land use capability

Tenure review and the resulting outcome in 2007 was a fundamental driver in the process of considering the land according to its capability for long-term production, based on its physical limitations and site-specific management needs, to promote sustainable land management. It resulted primarily in 2194 ha of Class VII and VIII land being retired due to limitations of extreme potential erosion, very steep slopes combined with severe climatic and soil fertility limitations. It was deemed that this land was more suited to erosion control, water catchment management and conservation of flora and fauna. A further 2000 ha of Class VII and VIII land was freeholded subject to conservation covenant.

This meant a change in farming away from the traditional practice of running merino wethers in this country for 9-10 months of the year, to the current management where ewes are run in the native tussock grassland for only three months in the summer.

Richard believes that *"the tenure review result was very positive. There is good public access outcomes, wetland areas have been fenced off, areas of significant importance to Maori have been identified, and it has provided enormous recreation benefits to the community".*
"It was a very public process, everything was scrutinised by the many stakeholders that were interested in particular values on the property".

Another driver of sustainability has been the increasing volatility in the income traditionally derived from merino wool. Traditional high country properties that have been dependent on wool as their primary source of income have had to diversify.

Land Management Units

Glen Dene has been classified into land management units (LMUs) based on land use capability (LUC). These management units are fairly self-evident, reflecting a combination of environmental units (e.g. rolling downs, hill slopes and steep hill) and management (e.g. cultivated, over-sown and top-dressed and native). Only 460 ha (7%) of Glen Dene is flat to rolling land along the lake shore. The balance is split between oversown and topdressed moderately steep, mid altitude hill country (2505 ha, 42%) and steep, high altitude, native tussock grassland (2730 ha, 46%) that is protected by conservation convenant.

LMUs on Glen Dene are classified as follows (this could be displayed in table format?):

1. **Glen Dene Paddocks (140 ha)** – (LUC – IVe10) rolling land along lake front, well subdivided. Characterised by free draining soils, reticulated water, good shelter, winter crops, lucerne, hay and silage production, woolshed and amenities located here.
2. **Glen Dene Deer (55 ha)** – (LUC - IVe10) rolling land along lake front, well subdivided with deer fences (the original deer unit) and fenced along lake front. Characterised by free draining soils, irrigation on 16 ha, one area (Big Swamp) uncultivatable, good shelter
3. **Oversown Hill Country (2505 ha)** – (LUC – Vie22) moderately steep to steep slopes, mid to high altitude (up to 1100m a.s.l in places) sunny and shady faces, vegetation includes bracken fern, short tussock and native grasslands. Responds well to oversowing and topdressing. All natural water, major waterways fenced off where possible. Naturally sheltered. 810 ha deer fenced.
4. **Dinner Flat Paddocks (110 ha)** – (LUC – Vis12) very shallow, stony terraces, fans and moraines. Soils are free draining with moderate fertility. Cultivatable, well subdivided, a some reticulated water and stock access to natural water, wetland areas, exposed to northwest winds, lacks shelter.
5. **Dinner Flat Deer (156 ha)** – (LUC – VIs12) very shallow, stony terraces, fans and moraines. Soils are free draining with moderate fertility. Well subdivided with deer fencing, cultivatable and partially oversown and topdressed, wetland areas, all reticulated water with stock access to some natural water, lacks shelter.
6. **Native tussock grassland (2730 ha)** – (LUC – VIIIe9 & VIIe21) undeveloped open tops, dominated by snow-grass (tall tussock) associations, and fragile ecosystems. Steep to very steep slopes above 1100m a.s.l. Highest point 1386m. Relatively 'untouched' with high conservation values and biodiversity values – protected by conservation covenant. Grazing with ewes in summer (Feb-Apr). Moderate erosion risk. All natural water.
7. **Native bush (214 ha)** – (LUC – some areas within VIIe12) Scattered bush fragments with some large areas within gorges and steep sided gullies. Natural boundaries not requiring fencing in some places. The aim is to protect these areas for erosion control, aesthetics, providing ecological corridors.
8. **Pine plantations (38 ha)** – Some plantations and shelterbelts within LMU 1 & 2, 4 & 5. Planted to provide shelter from prevailing northerlies and in non-productive areas.

Impact of identifying LMUs on sustainability

Identifying LMUs based on LUC, enables the Burdon's to integrate objectives relating to stocking, pasture improvement, animal and plant pest control, recreational management, and native biodiversity. Analysis of the strengths and weaknesses of each LMU has meant that other potential management options to improve sustainability have been considered.

<u>Financial</u>

Glen Dene Ltd has diversified into enterprises more suited to the land capability that are equally or more profitable than traditional high country revenues.

- Deer breeding on 810 ha of LMU 3 (oversown hill country) through 67km of deer fencing since 2000. The moderately steep to steep slopes and associated natural vegetation present in this unit lend it towards use as a deer breeding block. There is potential to add another 160km of deer fencing. However, sheep and cattle are still run in this area as part of an integrated system that gives flexibility between LMUs in changeable conditions.
- Intensification of LMU 3 (oversown hill country) by spraying and burning of bracken fern followed by oversowing and topdressing has enabled overall production to be sustained despite retiring land and lowering stocking rates in LMU 6. Bracken fern is dominant and the most limiting factor to production after slope in this unit.
- A change to crossbreds aims to better utilise the increase in dry matter resulting from the development of the oversown hill country (LMU 3) and also overcome current production losses associated with merinos from footrot and lower lambing percentages. It will also mean easier management and greater efficiency

- Resource consent has been given to irrigate 40 ha on a gravity K-line system in LMU 4 that is susceptible to drying out in the summer months. This will increase the dry matter production in this area and mean land less suitable for grazing can be planted in trees without affecting overall production in this unit.
- Tourism and recreation - the Burdon's already run an annual event the "Hawea-Wanaka Ridge ride" (a 35km trail bike loop ride) on the property that traverses LMU 6. Their recent purchase of the Lake Hawea Holiday Park is an investment that will support development of tourism and recreation opportunities through providing accommodation and a hub for activities in the area. The Burdon's also operate a growing trophy stag hunting operation which further diversifies their business. Glen Dene's natural lake boundaries and imposed limitations on helicopter and vehicle access ensure paying clients a unique 'big game' experience.

Environmental

Conservation and environmental values have been greatly enhanced on Glen Dene through consideration of land use capability.

- Through tenure review, conservation covenants in LMU 3 protect this relatively 'untouched' area that has high conservation values and biodiversity. Monitoring by Canterbury University and DOC will determine future grazing opportunities in this LMU.
- Wetland areas identified in LMU 4 and 5 are being enhanced through planting of native species. These areas will also be fenced off to encourage an increase of wild fowl and mitigate problems associated with stock access to natural water.
- There are plans to plant about 1000 trees, including native plants such as flaxes and Pittosporums, each year in areas less suited to grazing. This is mainly in the un-cultivatable gullies of the lower land and along the lake margin. Regulations in the district plan of the Queenstown Lakes District Council regarding pine plantations make this more challenging. The Burdon's however, are keen *"to develop a landscape that reflects the area's natural beauty"* and aim to plant as many natives as they can to achieve this.
- Where there is exposure to northwest winds in LMU 4 and 5 the intention is to establish shelterbelts of native and exotic species to help conserve soil moisture and reduce wind erosion.
- Areas of native bush have been identified and subsequently fenced off where possible. Most areas of native bush are located in steep gullies and protect the land from erosion. There is public access (in the form of walking tracks defined as a result of tenure review) through parts of the native bush. The Burdon's see this as an important part of the environmental and social sustainability of their property that provides economic benefits through potential diversification into recreation and tourism.
- As part of the development programme, and to maintain optimum nutrient levels, a well planned, strategic soil testing plan is carried out. Soil monitoring records stretch back to 1984.

Social

The consideration of Glen Dene's land use capability through the tenure review process has had a very positive result for the community and region. Public consultation enabled interested stakeholders to have input into the process. This intense scrutiny resulted in the development and identification of conservation areas, public access easements and culturally significant areas.

Managing climate change

Under the current management, Overseer estimates that the greenhouse gas (GHG) emissions from this farming system are **413 kg CO_2 eq/per stock unit**.

Based on this Overseer estimates that **364 ha of pine plantations** would have to be planted in one nett rotation to offset this or **… ha** of native. Records of plantings on Glen Dene are kept with a view to the possibility of using these plantings for offsetting some greenhouse gas emissions.

Richard believes that at 10% of total land area, South Island high country lands "will have a significant influence in balancing emissions, for New Zealand". Therefore, more information is needed on the amount of carbon stored in tussock grasslands or potential management actions to increase carbon storage. There is a need for more research into the effect of native tussock grasslands and vegetation in emission trading.

The Burdon's intend to expand on recreation and tourism opportunities that the outstanding landscape within which they farm provides and reduce their dependence on farming income. Farming near the popular and internationally acclaimed Wanaka and Queenstown creates huge potential to integrate farming with quality recreational and tourism pursuits. As well as providing an enjoyable challenge, such new ventures and the alternative income streams they create only add to the long term sustainability of the family's farming business. The ongoing development on their property takes into consideration any infrastructure required to expand into such activities (e.g. walking tracks and access) and also continual enhancement of the conservation and environmental values that add to the experience.

"We have plans to develop more eco-tourism with mountain biking and walking in the future as well as building on our trail ride business."

Richard and Sarah's dedication and drive to be sustainable, their openness to opportunities and ability to adapt in a challenging landscape will enable them to succeed in the environment a changing climate will bring.

Handy hints / Words of Advice

- Understand your land resource and increase sustainability through balancing economic, environmental and social issues
- Development of a Land and Environmental Plan provides a good framework for considering land resource and future opportunities
- Set goals and objectives in key result areas and communicate them with staff
- Keep abreast of changes in government policy and the potential impacts on your business to allow you to successfully plan for a sustainable future
- Be open to ideas that may challenge traditional thinking
- A day in the office setting up good systems doesn't ever beat a day on the hill mustering. However, it is vital to making your business systems work for you and is important for maintaining records and developing reports to allow you to plan for the future

For further information

Detailed farm / technology / practice methodology information including data / graphs / tables

- Appendix 1 - Glen Dene Stock Units – Livestock on hand as at May 2009
- Appendix 2 – Glen Dene classified by Land Use Capability
- Appendix 3 – Glen Dene Tenure Review Proposed Designations
- Appendix 4 – Fertiliser Test Results Glen Dene
- Output from OVERSEER
    - RBurdonA.ovp - Current farming scenario

Reference and resource list

- New Zealand Land Resource Inventory Worksheets (maps of land use capability) – available from Otago Regional Council, Alexandra. Tel: 03 448 8063
- Guidelines for Preparing Whole Property Management Plans for High Country Farms – Sustainable Farming Fund Project 04/063 (2 March 2008) David A Norton
- Guide to Tussock Grassland Farming, AgResearch, Invermay 1992, edited by Mike Floate
- Meat and Wool New Zealand, Land and Environment Planning Tool Kit (version 1.00)
- High Country Carbon Project C09/027 – a MAF Sustainable Farming Fund Project currently underway. Jim Morris (03 438 9458, ben.avon@xtra.co.nz)

Links to relevant websites and/or resources on websites

- Otago Regional Council website www.orc.govt.nz – growOTAGO maps – for soil and climate information
- www.landcareresearch.co.nz – Land Use Capability handbook - A New Zealand handbook for the classification of land, 3rd edition
- Land Information New Zealand website, www.linz.govt.nz – for information on pastoral land/tenure review
- www.carbonfarming.co.nz
- http://www.lincoln.ac.nz/carboncalculator/

Communications checklist

- Photographs (for human interest and to illustrate key points) – this may be too many …
  - Thomas features merino 22.jpg – **"Richard, Sarah and family"** – photograph taken by Michael Thomas [include near background details and quote photographer's name please]
  - Thomas features merino 9.jpg – **"The rolling Dinner Flat blocks (LMU 4 &5) at the northern end of Lake Hawea"** – photograph by Michael Thomas [include near description of land management units and quote photographer please]
  - Glen Dene 021.jpg – **"Oversown hill country (LMU 3) with bracken fern"** [include near description of land management units]
  - Glen Dene 015.jpg – **"Native tussock grassland with conservation covenant (LMU 6)"** [include near description of land management units]
  - Glen Dene 023.jpg – **"Landscape values create recreation opportunities"** [include with section on managing climate change?]
  - Thomas features merino 4.jpg – **"Merino ewes and lambs"** – photograph taken by Michael Thomas [extra if needed and reference photographer please]