CASE STUDY

2) Case Study: John Parnell

The Use Of Old Man Saltbush In Assisting With A Changing Climate And Noting The Production Consequences

Glenroy Estate, Via Carrieton, South Australia

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Introduction

In presenting this case study, it is understood that the reader will have an assumed knowledge of the matters discussed. Therefore the document does not have details of methods used or results achieved on some research. Only the findings are noted. If the reader does require more information, this is freely available. Please contact the author.

Property name

Glenroy Estate

Location

Glenroy Estate is located in the southern Flinders Ranges area, 60 kms south of Hawker and a similar distance north of Orroroo, SA.

Area of property

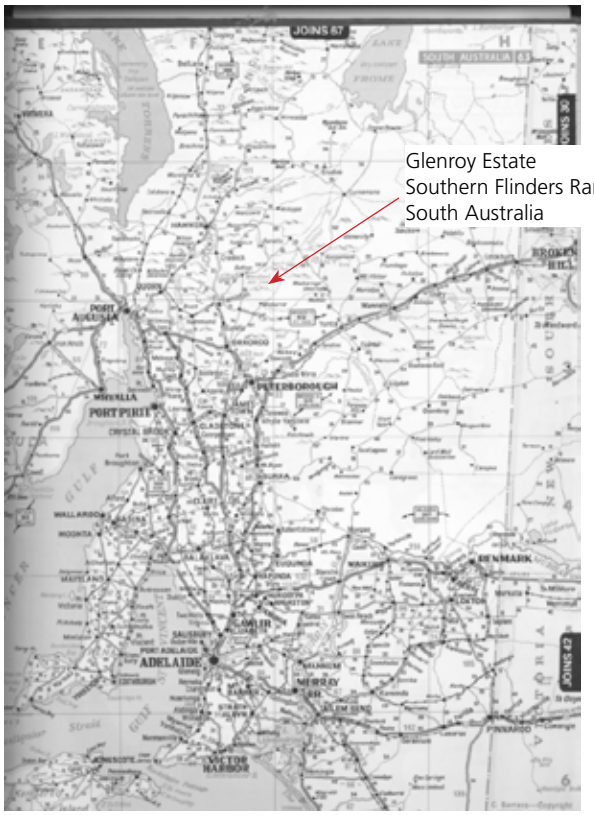
22,000 acres / 8903 hectares

Enterprise description

The business of Glenroy Estate is running a self replacing merino sheep flock.

This provides an income from the following:

- Sale of merino wool
- Sale of young wether lambs
- Sale of older merino ewes that have finished their economic breeding term
- Sale of merino ewe lambs not required for breeding purposes



Map 1: Location of Glenroy Estate

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Vision for the property

To always operate the business in an environmentally responsible manner, giving due regard to both the environment and the need for a financial return.

The environment: to understand and support the landscape ecology, in particular the following:

- To know how to asses patch quality and condition.
- Using the relationship between the area and isolation to predict species diversity.
- Area habitat relationships particularly involving microhabitats.
- To know the form and function principles.
- To apply the concept and utility of ecological thresholds in biodiversity conservation.
- To work well within the thresholds of the landscape parameters.

Financial return maximisation:

- Improving the quality of wool by careful and knowledgeable selection of rams, using all the tools and information available.
- Improving the type of sheep bred on site by measuring, individually, all the traits of each sheep. This to be carried out each shearing by measuring electronically the fleece for the following information:
    - micron
    - micron deviation
    - standard deviation
    - c. deviation
    - spin fine
    - curvature
    - % > com factor
- Then comparing the weights, general stretch and size of each sheep, remove the bottom 5 to 10% performers each year.
- Planting of old man saltbush to increase the carrying capacity of the land
- Use of a new management system "Holistic Management" which includes rotational grazing.

Where there is conflict between the environment and the commercial operation of the business, the minimum thresholds must never be exceeded.

Describe the impact climate variability has had on your production system and business

Reduced rainfall over the last 10 years has shown that despite all the work man may put into improving the land, rainfall is paramount. The rainfall records show that the mean is 310.1mm, the lowest ever received since 1967 is 84.9mm and the highest is 676.7mm.

Table 1: Rainfall at Glenroy Estate

Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean	20.0	20.3	16.1	19.6	30.7	38.6	33.9	32.2	27.7	24.5	22.7	21.8	310.1
Lowest	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	84.9
5th percentile	0.0	0.0	0.0	0.0	0.5	1.3	2.9	3.1	1.3	1.1	0.0	0.0	141.5
10th percentile	0.0	0.0	0.0	0.0	1.4	4.8	6.3	6.6	3.7	2.8	0.6	0.6	169.0
Median	8.1	7.4	8.0	10.5	21.4	29.5	28.7	28.5	20.0	17.3	14.0	13.2	293.3
90th percentile	54.3	60.3	39.4	57.6	64.2	92.9	66.7	61.0	65.2	56.8	56.8	49.4	461.0
95th percentile	82.1	80.6	47.7	73.8	88.0	105.3	84.3	73.8	80.0	68.1	68.8	74.9	525.5
Highest	176.1	139.1	236.0	145.6	190.6	147.9	149.3	119.7	150.7	137.2	183.6	160.6	676.7

Source: Bureau of Meteorology,2009.Product Code: IDCJAC0001 reference: 00199730

Table 2 Further information on weather details at Glenroy Estate

Climate for Glenroy						
Daily Rainfall	Total		Wettest		Driest	
May 2009	12.2mm	2 day(s)	12.0mm	25th	0.0mm	1st
Jan-May 2009	33.0mm	13 day(s)	12.0mm	25th May		
Rainfall Totals	Average		Wettest		Driest	
May 1882-2006	30.9mm	5.2 day(s)	190.6mm	1889	0.0mm	1891
Jan-May 1882-2006	107.9mm	15.8 day(s)				
Daily Min. Temperature	Average		Lowest		Highest	
May 2009	7.8°C		3.0°C	30th	13.0°C	16th
May 1967-2006	7.2°C		-2.7°C	24th 2006	18.0°C	5th 1988
Daily Max. Temperature	Average		Lowest		Highest	
May 2009	19.2°C		14.0°C	29th	24.0°C	23rd
May 1967-2006	20.2°C		9.0°C	22nd 1990	29.4°C	5th 1978

Source: Bureau of Meteorology. 2009.

So the major impact of climate variability on Glenroy Estate is the lack of rainfall from 1999 to 2010. These years have not had sufficient rainfall to provide sufficient moisture for growth of native grasses; therefore it has been impossible to maintain the most basic flock numbers. Glenroy destocked over this period to around 20% of the normal flock size. 2009/10 has brought much improved conditions and the rainfall to date has exceeded the mean.

A flow on effect from the variability of rainfall has been in the nutritional value of native grasses grown. The grasses, when tested, revealed different protein measurements which were dependant upon the amount of rain, and the time of the year the rain fell. Therefore the value of the grasses to production on Glenroy Estate varied considerably.

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Describe what the business looked like 14 years ago

History of the Area

Agricultural landscapes are the result of human intervention. This intervention, in many cases has changed the landscape permanently, and in some cases the change has not been of benefit to all users, or much benefit to the humans who instigated the change. The Southern Flinders Ranges in South Australia are a testimony to this type of intervention.

Glenroy Estate has a sorry history of human intervention in the environment, and this story is clearly told in two books. The first by the Carrieton Centenary Committee, *Carrieton in the Gum Creek Country,* 1978, Gillingham Printers, Adelaide, tells the story of an establishment of a country town as a result of farmers wanting to shift further north to capitalise on new country that may be fit for farming. This was despite the Surveyor General of the day, George Goyder, at the request of the state government in 1865, travelled throughout South Australia and plotted a demarcation line. North of this line, farming was not possible on a sustainable basis because the rainfall was too unreliable. He considered this country was suitable for light grazing only. South of the line, Goyder designated the land suitable for farming. The demarcation was plotted by Goyder noting the difference in the grasses, particularly saltbush. The rainfall in the north was 10 inches or less, whilst south of the line it was more than 10 inches.

Goyder's Line is now famous as a demarcation line between farming and grazing, and Goyder's skill in plotting this line has been applauded, except in 1860s.

The reason Goyder was sent to plot this line is previously farmers had gone further north and planted crops that, to begin with, grew and yielded well. However drought came and farmers were forced off the land. Entire towns and regions were abandoned in the face of unrelenting drought. These displaced farmers considered the Government was in error in allowing them to travel so far north to farm, and demanded compensation. Goyder was sent by the Government to plot a line that was to be the northern boundary of farming so this situation of the government being sued could never again occur. On Goyder's recommendation, land titles were changed banning farming north of Goyder's line.

Good seasons returned, and farmers again petitioned the government to strike out the caveat on the land titles forbidding farming north of Goyder's Line. This was done, and farmers returned to areas where a decade before farmers walked off the land in personal desperate situations because of drought. Both the farmers and the government had short memories, and Goyder himself was scoffed at plotting a line restricting farming to the south. The government assisted by proclaiming blocks of land of 640 acres available to progressive farmers, this amount of land being deemed as sufficient to make a good living. Droughts came again. And again farmers walked off their blocks and retreated south.

The book Carrieton in the Gum Creek Country goes on to record the story of those who stayed and purchased their neighbours blocks to gain sufficient land to make a profit.

Therefore Glenroy Estate, 14 years ago, was the product of earlier farming practices which had cleared the land for farming, used the land for purposes for which history has shown it was unsuitable. These practices resulted in loss of nutrients through top soil drift, encouraged erosion and caused the loss of plant diversity.

This is no reflection on the farmers of the times, as the farming techniques used at that time were regarded as acceptable. It has only been in more recent times that the mistakes of previous year's practices have come to light.

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Described what was done to transform the business from what it was 14 years ago
Old Man Saltbush

Two plantations of Old Man Saltbush (OMS) were planted over a three year period, totalling an area of 2,000 acres / 809 hectares. 1.7 million seedlings were planted. The area was split into 102 smaller paddocks and a water reticulation system was installed. Generally, each watering point serviced four paddocks allowing for the transfer of stock from one paddock to another by opening and closing gates at the appropriate time. At the same time water diversion banks were designed and constructed to allow, where possible, areas of OMS to receive additional water.

The benefits of this project are as follows;

- The OMS has a high protein between 19 and 22%
- The bush is drought resistant
- The bush is not reliant upon regular rainfall to regenerate
- Increased stock carrying capacity on existing country
- Good shelter
- Improves the soil
- Encourages native pasture
- The bush lives for about 100 years

The benefits noted are excellent for preparing and dealing with climate variability. However, it must be recognised that there are linkages throughout the environment that are only found by making a change in the first place. Some of the changes are good, some require additional work.

For example, improvement in the soil.

Research was carried out near a fence which bordered OMS plantation on one side, and unimproved land on the other. A trench was dug in the OMS paddock across two lines of bushes to a depth of 1m. A second trench was dug in the other paddock eight metres from the first trench but to identical specifications. Using the McGuiness Soil Structure System and other, the soil in the OMS paddock trench was and found to have more activity than the soil in the other trench.

However when noting the results of the leaf test carried out on the OMS, despite the good results it has been found that supplementary feed is required to utilise the benefits of the OMS. This can be provided by native grasses, or in their absence a grain supplement may be required. Similarly, it has been found that when grazed on OMS, sheep utilise the feed better when drinking dam water than bore water.

In addition there have been other unplanned benefits. It has been found in trials in Western Australia that there is a drench like compound in OMS that assist the health of the stock. Ground temperatures under the OMS has been found to be cooler in summer and warmer in winter as compared with the ground temperatures where there is no bush.

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The grazing regime of the OMS can be varied from time to time depending upon conditions. The broad principle is that stock must move through the paddocks as fast as possible, usually no more than a week per paddock, then the paddock left to regenerate for the remaining 11 ½ months. This means the paddock has fast graze with the stock eating not only their preferred feed, but also non-preferred feed and the paddock has a large amount of fertiliser dropped on the ground. Uninhibited regeneration over the 11 ½ months has seen a greater diversity and amount of native grasses growing. A variation of the grazing regime may occur in good seasons where spear grass (*Austrostipa trichophyalla*) is about to drop seed, and this may become embedded in the wool of sheep. This seed, acting like a cork screw, will screw its way into the skin and meat causing great discomfort to the animal. It also renders the animal unfit for sale. Being able to put the stock on OMS during this period avoids this issue.

Rotational Grazing

Another change in the business as compared with 14 years ago is the adoption of a holistic management system based on the Allan Savory *Holistic Management,* (Savory, 1999, Island Press, Washington) which includes rotational grazing.

To affect this new type of grazing, the existing five paddocks on Glenroy Estate were subdivided into 50 paddocks with a new watering system installed. 32 new dams were constructed to supplement the existing six dams and additional two bores were sunk. Where possible each paddock was serviced by both a dam and trough supplied by a bore and both dam and trough service two or more paddocks.

The grazing regime requires the stock to be in one paddock for a limited period, then removed to allow 11½ months regeneration. The available feed resource per paddock can be measured before stock enter the paddock, decisions made as to how much feed is to be left after grazing, and the time in the paddock calculated.

Research has been undertaken to compare the success of the regeneration of native grasses under both the traditional 'set stock' and the 'rotational' grazing with the following result:

Table 3: Percentage contribution of grasses to the total dry weight of pasture on research sites

Botanical Name	Common Name	Rotation	Set Graze
Limonium lobatum	Statice	0	71.8
Medicago minima	Wool burr medic	49	0
Austrostipa trichophyalla	Speargrass	272	22
Carrichtera annua	Ward's weed	76.4	96.4
Ausrodanthonia caespitosis	Wallaby grass	86.4	0
Sclerolaena decurrens	Bindii	202	21
Sida corrugata	Sida	96.2	0
Carthamus lanatus	Saffron thistle	21.6	0
Medicago polymorpha	Burr medic	103.4	21
Ptilotus spathulatus	Pussy tails	26	0
Boerhavia domini	Tarvine	18	0
Sida cunninghamii	Sida (2)	23.2	0
Maireana villosa	Blue bush	181.6	0
Austrostipa eremophila	Speargrass (2)	232	60.8
Goodenia hederaceae	Goodenia	34.2	29.9
100%	**Total dry weight (kgm/ha)**	**1422**	**322.9**

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Table 4: Dry Weight Kg/Ha

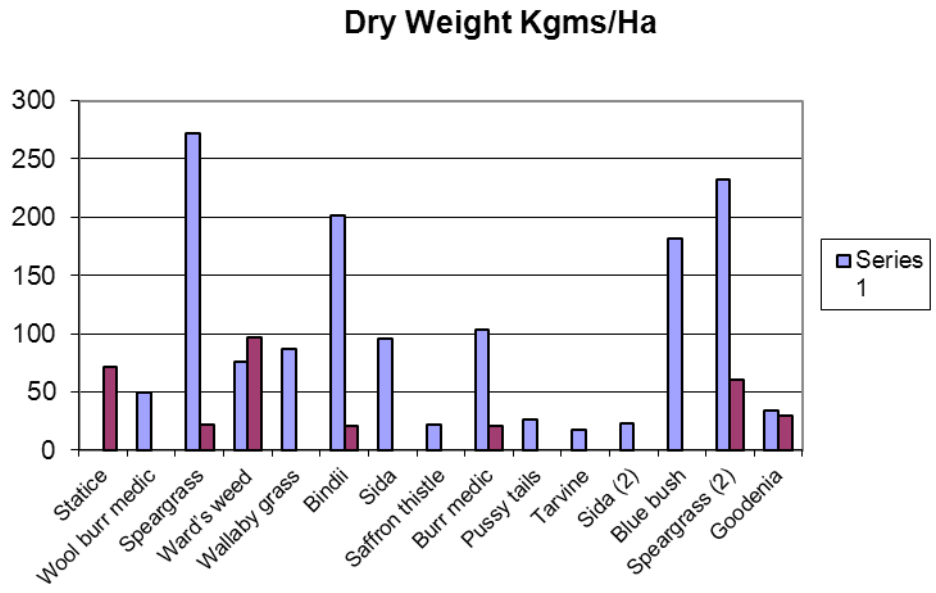

Table 5: Data analysis of total dry weight per hectare.

Column1		Column2	
Mean	94.8	Mean	21.52667
Standard Error	22.42536	Standard Error	8.004133
Median	76.4	Median	0
Mode	#N/A	Mode	0
Standard Deviation	86.85305	Standard Deviation	30.99987
Sample Variance	7543.451	Sample Variance	960.9921
Kurtosis	-0.40886	Kurtosis	1.218571
Skewness	0.920555	Skewness	1.461189
Range	272	Range	96.4
Minimum	0	Minimum	0
Maximum	272	Maximum	96.4
Sum	1422	Sum	322.9
Count	15	Count	15

Source: John Parnel, May 2009.

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Describe the impetus for change and how the need for a new approach was recognised

The make up of Glenroy Estate has been the amalgamation of smaller 640 acre farming properties that failed in the late 1800's (refer History of the area). The final size of the property in the 1900's was sufficient to make a comfortable profit from the grazing enterprise, this profit being assisted by high wool prices and little if any farm inputs. Because of the profitability of the enterprises generally in the area, land is tightly held by old grazing families and the opportunity to purchase additional holdings was extremely rare. As time moved on and the profitability of the properties in the area came under pressure, graziers were forced to reduce costs and increase income where possible. It was recognised that properties were being worked a little harder, and this, along with the inability to purchase more land, became the impetus for change.

About the same time the environment was being recognised as important asset that must be protected for the long term and that 'ownership' of land was not licence to carry out any management that the owner wished with no regard for others.

The landscape and its ecology are today protected by law.

Although most modern environmental law is, at most, less than three decades old, environmental law in fact is not solely a product of the twentieth century (Bates, 2002). In fact, it could be taken back to 1932 when Lord Atkins, on behalf of the Scottish Government used the 'snail in the bottle' case to give foundation to the law of negligence, which he based on the 'good neighbour principle' as found in the Bible (Donoghue V Stevenson. (1932) AC562). In this case, a lady was drinking a bottle of ginger beer and found a dead snail in the bottle. Her friend who was with her at the time challenged the drink manufacturer but was rebuffed. After some years, Lord Atkins dealt with the case, and basing his findings on the 'Good Samaritan' parable, found that the drink manufacturer was in error. Lord Atkins found that whatever we do in life, we must not do anything to affect anybody else in a detrimental way, even if that affected person is far removed from the original action. The law of tort now uses this case as a corner stone to the law of negligence.

More recently, the Gordon River Hydro-electric Power Development Act 1982 (Tas) which was going to allow the Gordon and Franklin rivers to be blocked by a dam, effecting an entire landscape and its ecology was blocked by the Federal Government because the area was in an area of National and world heritage significance. The resultant court action (Commonwealth V Tasmania (1983) 46 ALR 625: s 109) where this work was stopped put the environment on the agenda for all Australians.

Today, no action or work may be undertaken if there is going to be an effect on other stakeholders. In the case of the farming, this means that any action or work must be well thought through by the owner of the land. A stakeholder may be the bank, neighbours, users of the main road through the centre of the area, the environment and the users of the area as a habitat.

Therefore, the result is the owner of the land is required to run this land in a way that no stakeholder will be detrimentally affected by his actions.

This resulted in a new approach being required by landowners to the way they worked their land, and part of that new approach was the acceptance that Glenroy Estate had a number of different stakeholders. These stakeholders included the community and the flora and fauna that are on the property. Any enterprise carried out on Glenroy must not cause any detriment to any stakeholder.

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What have been the key achievements / stepping stones along the way?
Key achievements in this journey have not all been physical.

The first achievement was the recognition that change was needed at Glenroy Estate to achieve two goals. The first was that the size of the property was not sufficient to continually make a profit from the enterprise. So change was required to make a profit in most if not all situations.

These situations include climate change, prices received for produce, payment of reasonable costs involved in running the property, occupational health and safety requirements and traditional drought. Profitability would unlikely be achieved by the purchase of additional land, such land not being on the market and if it did become available, all farmers would be trying to purchase.

The next key achievement was the recognition that in any change being implemented, such change could not, by law, have any detrimental effect on any stakeholder, including the environment. This was particularly challenging.

Old Man Saltbush plantations being planted and the required infrastructure being built was a key achievement in 1996 to 1998. There was the hope that this would be one tool of many that would assist the profitability of the enterprise whilst not only considering, but improving the environment in a number of different ways.

The rotational grazing regime to include both the OMS plantations and the open range, giving the environment 11 ½ months per year of regeneration was the next major key achievement.

Finally, to have the courage and fortitude to stick to the plan over the years, against all odds and little outside encouragement has been an achievement.

What have been the major challenges?
The major challenge has been the lack of knowledge surrounding Old Man Saltbush.

During the entire period of research, implementation and working with the OMS, there was the constant understanding that this type of commercial exercise had not been done before. So major challenges arose when dealing with problems, as there was no real knowledge in many of these issues.

What were the key success factors, skills and knowledge the business required to make this change?
The key success factor was in getting the OMS growing and being used in a commercial manner according to plan. This meant that the environment was being cared for, no stakeholders were disadvantaged and some were advantaged. The OMS was actually being grazed commercially to achieve the planned additional carrying capacity, increasing the thresholds and presenting opportunities for profit.

The predominant skill in making the change was keeping the big picture in mind at all times. The knowledge was knowing that this was a new project and there would be plenty of wins and losses.

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What financial impact has the change had on the business?

The Old Man Saltbush project was very expensive to implement, as is with most new projects. The buying and planting of the OMS was the first expense and that was budgeted and carried out to budget. The infrastructure was under budgeted because it was found that the original paddocks were too big for the rotational grazing so additional fencing, and watering points had to be constructed.

Having done the first project, any future projects will be both cheaper and better costed.

There has been a positive financial impact from the improved carrying capacity and the improved flexibility provided by the OMS.

How has this change allowed the business to adapt to and become more resilient to climate change?

The old adage of 'volume against fixed costs' is just as applicable in farming as in commercial operations. If climate change means less rain, perhaps more droughts and rain at different times of the year, then to become more resilient, Glenroy Estate must keep the volume up and fixed costs down.

The addition of the OMS into the enterprise was originally budgeted to increase the carrying capacity of the property in excess of 2,400 ewes and lambs (Sippel, 1996). The traditional carrying capacity of Glenroy Estate was advised as one sheep to four acres (Heaslip, 1996). Even at a discount of 33% on the budget, there is an increase of the volume with no additional running costs. Therefore the requirement of increasing the volume has been achieved.

In addition, the increase in volume has been achieved while providing increased benefits to the soil and environment. One of the known benefits is the ability of OMS to regenerate without rain.

This has given the enterprise at Glenroy Estate the ability to be flexible in dealing with climate change:

- Improved flexibility
- Having the tools to ensure the environment is cared for
- Being able to always have a base flock to be productive
- Better care of the land

What are the future challenges for the business?

One of the big challenges is to get OMS an approved bush for use in generating carbon credits.

The fact that OMS does act as a carbon sink has been proven by independent research, and there are signs that this will be accepted in due course. If this is successful the benefits to Glenroy Estate business would be as follows:

- The carbon credits may be sold to generate additional income.
- Money could be used to plant more OMS thereby increasing income.
- Carbon credits will encourage farmers to plant OMS and benefit from the proven performance of land care of OMS.

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What plans for the business in the future?
Continuing best practice farming with a high emphasis on the environment as one of the many stakeholders. Also to improve profitability where possible, not confining efforts to the rural industry but to the land.

How to keep motivated?
Motivation is achieved by participation in industry groups (particularly Bestprac groups), attendance of rural forums and involvement in rural R & D.

In addition, keeping healthy and living a balanced lifestyle encourages motivation.

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