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Wool production & biodiversity
working together for
Rob & Annabel Dulhunty
Case Study

Fast facts

Location

'Nant Lodge': 6 km south-west of Glen Innes, New England Tablelands, NSW, Border Rivers Catchment. 'Hillside' and 'White Rock' are 5 km and 9 km west of 'Nant Lodge', respectively

Property size & paddocks

'Nant Lodge' 247 ha with 25 paddocks; 'Hillside' 630 ha with 21 paddocks; 'White Rock' 420 ha with 13 paddocks.

Average annual rainfall

'Nant Lodge' 915 mm (36 inches); 'Hillside' 965 mm (38 inches); 'White Rock' 865 mm (34 inches).

Main enterprises

Stud & commercial fine wool Merino flock (17.5-19.3 micron) and beef cattle fattening

Target (full capacity) stock numbers

15 000 DSE (current 13 500 DSE), being 9000 DSE sheep (current 8700 DSE) and 6000 DSE cattle (current 4800 DSE)

'Nant Lodge': 400 Merino rams, 500 stud ewes and 190 steers

'Hillside': 3000 commercial Merino ewes and 350 steers

'White Rock': 3000 weaner/hoggets and 50 steers

Stocking rate (target)

11.6 DSE/ha (overall) - 'Nant Lodge' 14.2 DSE/ha; 'Hillside' 12.7 DSE/ha; 'White Rock' 8.3 DSE/ha

Main soil types

'Nant Lodge' – heavy black/brown basalt cracking clay flats with low slopes of red/brown basalt loams and ironstone ridges; 'Hillside' – red/brown stoney basalt hill country and black/brown basalt clay flats; 'White Rock' – red/brown stoney basalt hill country with black/brown clays along Whiterock Gully

Elevation

1000-1300 m above sea level

Left: Rob and Annabel with their children Lily 6, Louis 4, Charlotte 2, and dog Lulu at 'Nant Lodge'. Photo courtesy of Karen Forge.

Rob and Annabel Dulhunty's family is at the core of their vision for a profitable, aesthetically pleasing, biodiverse farm, that provides a home and lifestyle to which their children can return as they grow up.

In a few short years, Rob and Annabel have transformed 'Nant Lodge' into an award-winning farm. Many people talk about trying to *balance* production with natural resource management (NRM), or about production *versus* conservation. For Rob and Annabel, however, NRM and productivity are inextricably linked because production *depends* on the resource base.

"You can't have one without the other," says Rob. "Our principal environmental aim is to maintain groundcover and achieve productive outcomes. Biodiversity is one indicator of the health of our resource base, and its intrinsic value is the combined production, resilience and stability that it gives our farm ecosystem," he says.

This booklet details the Dulhuntys' management, resource issues and enterprises, and describes the techniques they use to achieve their goals.

Biodiversity is the variety of all living organisms, including plants, animals, fungi and microbes. Biodiversity is necessary for productive, resilient ecosystems.

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Links with India

'Nant Lodge' is the original homestead site for Furracabad station which was taken up by Major Clunes Innes in the 1830s or 1840s, and after whom Glen Innes is named. 'Furracabad' is where Major Innes fought in India.

Rob refers to the Furracabad Valley as the Nile of Glen Innes, because the valley's fertile black flats were purchased by the Haymarket Land Co. in the 1880s, split into 30-300 acre closer settlement blocks, and farmed intensively for hay, corn, vegetables, horticulture, dairying and fodder crops.

Stocking rates

The Dulhuntys aim to run about 9000 DSE of Merino sheep, and 6000 DSE of cattle. These livestock targets equate to an overall stocking rate across the three properties of 11.6 DSE/ha (4.7 DSE/acre).

The target stocking rates vary between properties. 'Nant Lodge' on the fertile Furracabad Valley floor is projected to run 3500 DSE (14.2 DSE/ha) in full production. 'Hillside' with its basalt hill country and flats along the upper reaches of Reddestone Creek, carries 8000 DSE (12.7 DSE/ha). 'White Rock' runs 3500 DSE (8.3 DSE/ha).

During spring 2004, while the soil and pasture rejuvenation program continues on 'Nant Lodge' with some paddocks under crops, overall stock numbers are 13 500 DSE and the overall stocking rate is 10.4 DSE/ha.

Enterprises & management history

'Nant Lodge' is situated on the floor of the Furracabad Valley and is bisected by Furracabad Creek. Heavy black soil flats along the creek are bounded by lighter ironstone basalt and grey clay low slopes and ridges. Different parts of 'Nant Lodge' were once used for dairy, vegetables and an orchard prior to Rob's father purchasing it in 1968. When Rob returned in 1989, there was not a native tree on the property.

'Hillside' overlooks Furracabad Valley, with basalt flat-tops, rocky drop-offs, and undulating valleys and hills. 'Hillside' is drained to the north by Reddestone Creek. Rob's father cleared 'Hillside' but left scattered trees and clumps, 35 ha of yellow box woodland, 125 ha of white gum open forest, and understorey shrubs, such as blackthorn, wattle and occasional dry rainforest elements on the drop-offs.

One third of 'Hillside' was sown to pasture when Rob's father purchased it. He then sowed another third to pasture and fertilised the whole property aerially every year, initially with phalaris and clover seed, to increase the valuable species in the less accessible areas. There are still good stands of introduced pasture in the uncultivated areas.

'White Rock' is well-timbered, fertile, basalt hill country, and a lot more native than the other two blocks: 45% is uncleared and most of the remainder is native pasture, top-dressed over the years with annual aerial applications of fertiliser, phalaris and clover seed. In Rob's mind, the property was cleared well, with timber retained on the steeper country. There are about 300 acres of sown pasture, and the dominant tree species is white gum, with patches of shrubs on the steeper country.

Left: Merino rams penned up and on show at the 'Nant Lodge' woolshed. Photo courtesy of Karen Forge.

Fine wool Merino stud

Rob and Annabel manage an unregistered Merino stud of 500 ewes of Nerstane bloodline. 'Nant Lodge' wool is lustrous, stylish and soft, with a long staple.

Last shearing, the reserve rams averaged 17.4 µm and cut between 8-10 kg of wool. The hoggets average about 16.5 µm and cut 4 kg, while the ewes average 19 µm and cut 5 kg fleeces.

Maiden stud and commercial ewes are joined in the last week of March and lamb in the last week of August so lambs are on the ground at the start of the spring pasture growth spurt. Scanning in 2004 showed a 98% pregnancy rate with 34% twins.

Weaning and shearing of the ewes begins in the last week in November, with ram lambs tip-sheared at the same time. Lambs are shorn twice at 8-9 month intervals, first in May-June and again in February at 18 months of age, prior to sale of the wether hoggets, surplus ewe hoggets and cast-for-age ewes.

The remaining ewe hoggets are divided into stud and commercial, with the commercial portion going to 'Hillside' and the stud portion to 'Nant Lodge'. The ram teams are also run at 'Nant Lodge', and divided into the young ram lambs, sale rams and reserve rams to service the 'Nant Lodge' stud and commercial flocks. The rams and ram lambs are shorn annually in August, and all rams are tested for wool at each shearing.

The ewes are crutched in July prior to lambing. By shearing in November (the worst time for fly strike), fly problems are largely eliminated.

Rob and Annabel find that lambing percentages are better and production is higher through winter if the ewes lamb in the wool. Ewes need high nutrition in late pregnancy and in the cold Glen Innes winters, shearing can cause an extreme nutritional requirement right when pasture production is at its lowest.

Generally, the sheep are neither jetted nor dipped, but in wet summers, Rob may jet some of the lambs. At 'Hillside', Rob puts out fly traps containing horse drench (Neguvon) to attract and kill

blow flies, contributing to the low incidence of fly strike.

In recent years, the Dulhuntys have implemented an artificial insemination (AI) and embryo transfer (ET) program to capitalise on the performance of their stud sheep. Presently, they are placing greater emphasis on the ET program since the results of past programs have been outstanding. In 2004, more than 200 lambs resulted from ET and about 100 from AI with the balance resulting from single sire matings to test young stud sires.

Cattle

'Nant Lodge' is registered for the EU beef market so the Dulhuntys can capitalise on price premiums, if available. Steers are fattened for the European Union or local markets.

"If EU cattle are available at reasonable prices, we will buy the better end of the weaners (closer to a 250-300 kg animal) and look to turn them off at around 500-550 kg, nine to twelve months later," says Rob.

Feed requirements are matched to the summer peak in pasture growth. Up to 600 weaner calves (150-250 kg) are bought between March and June. They are sold 9-12 months later, around 200-250 kg heavier, as new young cattle are purchased.

Rob also runs about 20 cows on 'Nant Lodge' to manage rank pasture in special areas such as the driveway, aerodrome, and riparian zones.

Resource issues & problems

When Rob bought into the family business after his father's long illness, the infrastructure at both properties, and the pastures at 'Nant Lodge' were very run-down.

'Nant Lodge'

There were only a handful of willows and poplars on 'Nant Lodge' when Rob returned in 1989.

The pastures had not been renovated in a while, and the cropping soils had a long history of being farmed to death.

"The bottom country west of creek wouldn't fatten a wether. It was very sour and prone to waterlogging, predominantly gilgais or melon holes covered with pinrush. What pasture remained suffered scarab beetle attack, and the water wouldn't drain. All the fences were falling over, there were always box-ups, and everything was always in the wrong paddock," says Rob.

Furracabad Creek used to be the main source of water for livestock, so many of the main paddocks were fenced onto the creek, leading to overgrazing of the riparian zone. There were lots of floodgates, meaning lots of repair work after each flood.

The sticky basalt soils of the farm dams which watered the other paddocks were death traps for livestock in dry times as the water levels dropped. On one morning alone, Rob found ten dead stud lambs bogged in a dam, each one worth $400-$500 (Figure 1).

Figure 2 shows the farm layout in 1989.

'Hillside'

'Hillside' was very different. According to Rob, his father had done a good job of clearing it, leaving scattered trees on the gentler slopes, with dense clumps on the flat-tops and drop-offs, but leaving most of the timber on the steeper rocky basalt drop-offs.

Small areas were perhaps ploughed and sown a few times, but most of the arable country was sod-seeded and sown to pasture only once.

Because of the sloping nature of 'Hillside' and severe gully and stream-bank erosion, Rob's father had the NSW Soil Conservation Service undertake curative and contour bank work in the 1960s and 1970s.

Production & resource base decline

Rob knows from experience that if your resource base spirals down, so does production. He has compared the ecological functioning of 'Nant Lodge' and 'Hillside', and observed the turn-around in production and efficiency of 'Nant Lodge', in the last 15 years.

"In many ways, 'Nant Lodge' and 'Hillside' are opposites. 'Nant Lodge' was run into the ground by 150 years of farming. Meanwhile, 'Hillside' demonstrated the productive capacity of a healthy resource base, and was my inspiration to address resource base decline," says Rob.

Figure 1. Stud sheep dead from bogging in a sticky basalt watering point on 'Nant Lodge'. These kinds of losses forced Rob and Annabel to create a farm water supply/ wetland, and troughs. Photo courtesy of Rob Dulhunty.

Solution:
Property planning

A major capital works program was required to bring 'Nant Lodge' back into full production, so Rob and Annabel took the opportunity to study property planning with Landcare, Farming for the Future and Resource Consulting Services.

Property planning is essential, says Rob, "If you had $250,000 to build a house, would you go to a builder without plans and say, 'build me a house'? If you are going to spend a similar amount or more re-designing your farm, you need a plan—it makes you think through everything first, it allows you to apply for finance (bank managers love plans!), and it is a really invaluable tool."

Rob and Annabel re-designed the infrastructure and livestock enterprises from scratch. After 7 years, they have completed the major part of the re-development of 'Nant Lodge' (Figure 2) and have made a start on 'Hillside'.

On 'Nant Lodge', they re-fenced the entire property to accommodate rotational grazing, fence out the riparian zone, introduce a laneway and plant shelterbelts and tree lots.

They turned problems into assets. An eroding gully system full of rubbish was converted into a drought-proof farm-water supply doubling as an on-farm wetland for biodiversity. Clean water is reticulated to troughs in a move away from using farm dams and the creek.

They have developed a latticework of native tree and shrub shelterbelts across the whole property for shade, shelter and biodiversity, and they have provided block plantings to protect the farm water supply and a section of the riparian zone along Furracabad Creek.

Rob and Annabel have also implemented a soil rejuvenation program, using a cropping phase to restore soil organic matter and structure before sowing down perennial pastures across the whole property.

On 'Hillside', the farm water supply/ wetland has been constructed, and the pipelines installed. Rob is currently drawing up the re-fencing plan.

Rob and Annabel's property planning has been characterised by attention to detail and innovation when it comes to fencing, gate and trough design. This was necessary due to the shrink-swell soils wreaking havoc on fences and pipelines, and the fact that Rob had 5 years of re-hanging gates and chasing livestock from one paddock to another in the lead up to their buying into the business.

Once the Dulhuntys had drawn up their re-development plan for 'Nant Lodge', they realised they would need 100 new gates, 16 new troughs, 6.5 km of underground pipe, and 26 km of new fencing. It was a huge opportunity to come up with more efficient designs.

Soils & pastures

Although the pastures and cropping soils on 'Nant Lodge' were run-down, the soils are inherently fertile and lend themselves to pasture development.

"Sown pastures can persist through drought on our basalt soils, phalaris-based pastures coming through the 1994 drought better than most," says Rob.

Many native species persisted or volunteered on 'Nant Lodge', and Rob appreciates the diversity of native and sown species, saying, "Pasture diversity is good—the more diversity, the better, to fill the pasture growth gaps that occur in any season and balance out production across the year."

Native sorghum is one such example, which volunteers well in the sown pastures.

"Native sorghum is a great grass. It takes off better than phalaris after rotational grazing in late spring on basalt soils, and continues to produce at the height of drought [February 2003]," says Rob.

Rob and Annabel are in the process of renovating the soils and pastures on 'Nant Lodge'. The heavy black soils along Furracabad Creek have received special attention, with a cropping rotation designed to improve soil organic matter, structure and chemical fertility prior to sowing pasture. On the black soils, Rob generally crops red clover (because it lays down a lot of organic matter) with oats as a fodder crop:

"Back in 1994-95, I started under-sowing oats with red clover in the heavy black soil paddocks. We graze the oats in winter, let it go to head and harvest the grain, then graze the clover and oats stubble periodically with cattle to put organic matter back into the soil. We also have the option of cutting red clover hay. After this, I plough and sow back to back soya beans as a cash crop followed by a pasture of chicory and plantain with phalaris, fescue and three or four types of clover direct drilled into the bean stubble on the black soils. The

A Landcare ethic

The Dulhunty's are passionate about helping to grow a strong, socially cohesive and supportive local rural community, to share in a prosperous, rewarding future.

In order to improve their farm's natural resource base, the Dulhuntys enthusiastically embraced Landcare, but found it positive in more ways than one. Coming from Sydney, Annabel found it great to get to know and work with local people. They both appreciate Landcare for the sense of community it has fostered, making connections with like-minded people, improving the local environment and accessing funds to assist them with environmental works.

Moving stock between the properties

Livestock movements between 'Nant Lodge' and 'Hillside' were facilitated by a negotiated land swap with a neighbour who owned land between the two.

The Dulhuntys traded their portion of the shared part of the creek on 'Nant Lodge' in return for a laneway from the public road on the western boundary of 'Nant Lodge', across the edge of the neighbour's land to 'Hillside'.

chicory and plantain provide valuable feed in the height of summer when the sown grass species tend to be dormant and help achieve maximum ground cover."

The Dulhuntys have installed a line of piezometers across 'Nant Lodge' to keep an eye on the shallow water table, which, in wet times, rises to within 1.8 m (6 feet) of the surface (although it is never saline). One of Rob's aims with pasture establishment is to use that moisture at depth:

"If I could establish a deep-rooted pasture, I could drought-proof the flat, so I am building up the organic matter in the black clays to relieve the soil compaction with red clover and oats, then establish a deep-rooted pasture to tap soil moisture."

On the lighter soils, oats are generally sown for 1-2 years prior to sod-seeding a New England pasture mix, depending on the season. Currently (spring 2004), a quarter of 'Nant Lodge' has been re-pastured and is back in full production. About a third is in the cropping phase or newly sown to pasture, and about a quarter remains to be done.

Above: Looking down onto part of 'Nant Lodge' from 'Hillside'. Photo courtesy of Karen Forge.

Fertiliser

Pastures on both 'Nant Lodge' and 'Hillside' are fertilised with superphosphate at 125 kg/ha, annually. Sulphur-fortified fertilisers are used, depending on price. Annual fertiliser doesn't seem to overly hurt the trees through dieback on 'Hillside'.

Grazing management

Rob's father was one of the pioneers of rotational grazing in the district, and Rob now adapts his grazing management according to situation, using the advantages of rest and brief periods of intensive grazing.

The re-fencing of 'Nant Lodge' into 15 ha paddocks with a laneway has facilitated rotational grazing, so 'Hillside' and 'White Rock' will receive the same treatment.

Where possible, Rob grazes different mobs in a short-duration, high-density grazing rotation with long rests. He avoids grazing by the calendar or to a set pattern, varying the rotation

Figure 2. The re-developed 'Nant Lodge' in 2004, showing paddock areas (hectares), tree plantings and wind breaks (cross hatching). Aerial photography courtesy of NSW Land and Property Information, Bathurst. Datum GDA Geocentric Datum of Australia. Grid: MGA94 (GDA94)Map Grid of Australia. Inset:'Nant Lodge' in 1989 prior to redevelopment, showing paddock areas (hectares). The paddock overlay was developed in Practical Systems' FarmMap *software.*

according to season, pasture growth and livestock needs. When pasture growth is at a maximum, the rotation is sped up. In dry times, it is slowed down.

Different enterprises and classes of livestock have different nutritional and management needs at certain times, so for the Dulhuntys, it is impractical to adhere to the rotational grazing plan across all the properties all of the time.

For example, the 3000 commercial ewes on 'Hillside' are rotated in one mob for most of the year, but are set-stocked for lambing between late July and October. On 'Nant Lodge', the young stud sheep are sometimes divided into 10-15 different mobs for breeding and selection purposes, so they have to be set-stocked.

"However, when there's an opportunity to run bigger mobs and rotate them, we do it. The ram lambs can be put in one mob and rotated, but closer to sale time, we have to divide them into sale and reserve mobs, maybe up to five or six little mobs and set-stock them," says Rob.

"Until this year, I had been using a leader-follower system with the cattle ahead of the sheep. On 'Hillside' and 'White Rock', we are still reliant on farm dams and the paddocks vary in size from 12 to 60 hectares. Since big mobs of cattle foul the water, and the feed grows so quickly, we found the leader-follower system was always compromising either the sheep or the cattle. Now we leave the cattle in small mobs in each paddock and rotate the sheep, moving them on earlier than we might have to leave something for the cattle. The cattle keep on top of the pasture so when the sheep come back, it's more ideal for them.

"We may be able to go back to a leader-follower system once we install troughs and re-fence both blocks," says Rob.

The value of rotational grazing became clear in the late 1990s when Rob was pushed for time and tried set-stocking. After 2-3 years, he saw a marked deterioration in pasture health and went back to rotational grazing.

Strategies for water & drought

Rotational grazing with large mobs means demand for water is high. This, coupled with two major droughts since 1994, motivated Rob to implement water and drought strategies as part of his whole farm planning solution.

A farm water supply & wetland

Along with livestock bogging problems, Rob has observed that sheep and cattle behave very differently around dams, and that cattle foul dams rapidly.

"Cattle lose the bloom in their coats when they are drinking bad water. I think the production losses are significant. They will walk past two dams to drink at a trough," says Rob.

"Sheep will trample their own dry pad down to the water's edge because they hate wet feet. Dam water quality can stay high with sheep only—except after heavy rain when all the dung from the paddock washes in as a result of overland flow."

Rob and Annabel's farm water supply and wetland enables them to pump clean water to a tank, and gravitate it from there to troughs, which provides high quality water for stock.

The water supply and wetland was constructed by damming and fencing out 6.5 ha of an eroding gully system. The sides were revegetated with native trees and shrubs, and the reservoir was engineered to provide multiple water levels for aquatic fauna and flora in addition to a deep hole for farm water purposes. Livestock are largely excluded in order to reticulate high quality stock water across the property.

Approaching the problem in this way has had a number of advantages:

- The gully is no longer eroding and adding sediment to the creek.
- The farm has a significant supply of clean water for every paddock.
- Wildlife benefit from the wetland features and native plantings.

Above: The wetland end of the 'Nant Lodge' water supply. Photo courtesy of Karen Forge.

Farm dams

The problems of stock bogging and poor water quality have led to a rethink about the farm dams on 'Nant Lodge'. Spending money to destroy rather than create enduring assets doesn't make sense. So Rob and Annabel plan to fence off and revegetate the surrounds of all the small farm dams to make habitat islands for wildlife.

A double gate access into each with basalt rock 'paved' stock access points will provide safe 'emergency' water supplies should a trough fail or the Dulhuntys spend time away.

From liabilities to assets

Paddock 2 on 'Nant Lodge' was covered in basalt floaters, being of the lighter basalt ironstone type of country, so prior to pasture sowing, the paddock was rock-raked.

Rob regards everything on 'Nant Lodge' as a resource. The 'gibbers' are now going into gully heads, making bridges, crossings and culverts over channels and creeks, and used as fill for gateways and around troughs to prevent boggy conditions in the wet.

- Stock production benefits from the high quality water.

As a result, Rob and Annabel will take the same approach at 'Hillside'.

During the 2002 drought, Rob observed closely the effects of two short grazing episodes in the wetland enclosure, saying "I am not sure this year's grazing has diminished the habitat value of the area much, and may have improved it."

He cites other advantages:

- The grasses have been mown back but tussocks will regenerate bushier rather than long and rank.
- Willows and blackberry that had volunteered have been reduced.
- The reduction in grass means I can get in and do work if necessary.

Parts of the eroding gully banks haven't stabilised or revegetated despite 5-6 years of stock exclusion owing to the self-mulching, crumbly black soil. Rob is therefore wondering whether the area needs occasional grazing to batter down the slopes and assist revegetation.

The reticulated water system across 'Nant Lodge' has started Rob thinking about new opportunities for supplementing livestock via their drinking water.

Dealing with droughts

Rob sees droughts as opportunities to learn and the 1994 drought taught him a lot about livestock enterprises. To that point, the enterprise structure had been solely breeding ewes and breeding cows, with the sale of weaner lambs and calves. Trying to sustain all the breeding stock in drought was a lot of work and cost a lot of money purchasing feed.

Rob learnt that in a drought, you are better off with sheep than cattle, and that it is prudent to have a 'buffer' of saleable livestock that can be sold instead of being fed: "Merinos are better adapted to dry climates than cattle, and you can always shear them and make money without having to sell them and lose your source of production. The wool is finer and freer of seed in dry times and often worth more, although that can be offset by reduced yields."

The gross margins for fattening cattle were also better than for breeding. Their current strategy is to stock to the maximum carrying capacity of land and to run Merino sheep and young cattle for fattening in the ratio of 60% to 40%, with cattle as the drought buffer.

"Trading cattle are a more liquid asset than breeders. You can sell young cattle virtually anytime, unlike cows. So, in a drought, I can always sell steers down to 60% of farm carrying capacity, without costing the business by selling valuable breeding stock."

Using this strategy, the Dulhuntys came through the 2002 drought well in terms of livestock and prices paid and received. However, Rob acknowledges that his pastures were hard-pressed. With the benefit of hindsight, Rob estimates that the 2002 drought set their pasture renovation program back 2 years, partly due to the stress the new pastures suffered.

Lessons Learnt

Property plans are important—having a property plan is not only useful when talking to your bank manager, it helps make sure you have considered all your wants and needs.

Biodiverse pastures save you in hard times—they fill seasonal growth gaps and balance out production across the year.

Use grazing as a tool to achieve pasture health—grazing management is best adapted according to situation, using the well-known advantages of rest and brief periods of intensive grazing.

Solution: Landscape repair

Tree & shrub corridors

About 17% of 'Nant Lodge' is managed for outcomes other than productive pasture, including the riparian zone, farm water supply and wetland, aerodrome, tree corridors, block plantings, driveway, homestead, outbuildings, shearing shed and associated yards.

Rob and Annabel have planted 30 000 native trees and shrubs in 9.5 km of tree corridors in the 10 years since 1994, in an attempt to re-create a milder, more productive tree and shrub micro-environment.

They began by planting 5-row windbreaks but were unhappy with the number of shrubs present. They now use Richard Morsley's (Greening Australia North-West NSW) 8-row planting design (Figure 3): the outer 2 rows are planted to shrubs, the third row on either side is planted to mixed shrubs and smaller trees, while the middle two rows are planted to tall trees. The tall trees are planted in a staggered fashion with the medium-sized trees and shrubs in the adjacent rows to best block the wind.

Rob and Annabel plant numerous species, but Rob is particularly enamoured with *Bursaria spinosa:*

"I wish I had planted it more widely, but it was practically impossible to find a nursery that would grow it. Having something like bursaria as part of the biodiversity mix that you don't have to fence from stock—well, you have to be ahead."

Grazing is excluded from the 20 m wide corridors, allowing tall grass to grow up. Rob sees a dual benefit of the mature grasses being present:

1. they provide a good wind-stop as the young trees and shrubs mature and thin out closer to the ground
2. they provide a valuable volunteer pasture seed source for the adjacent paddocks.

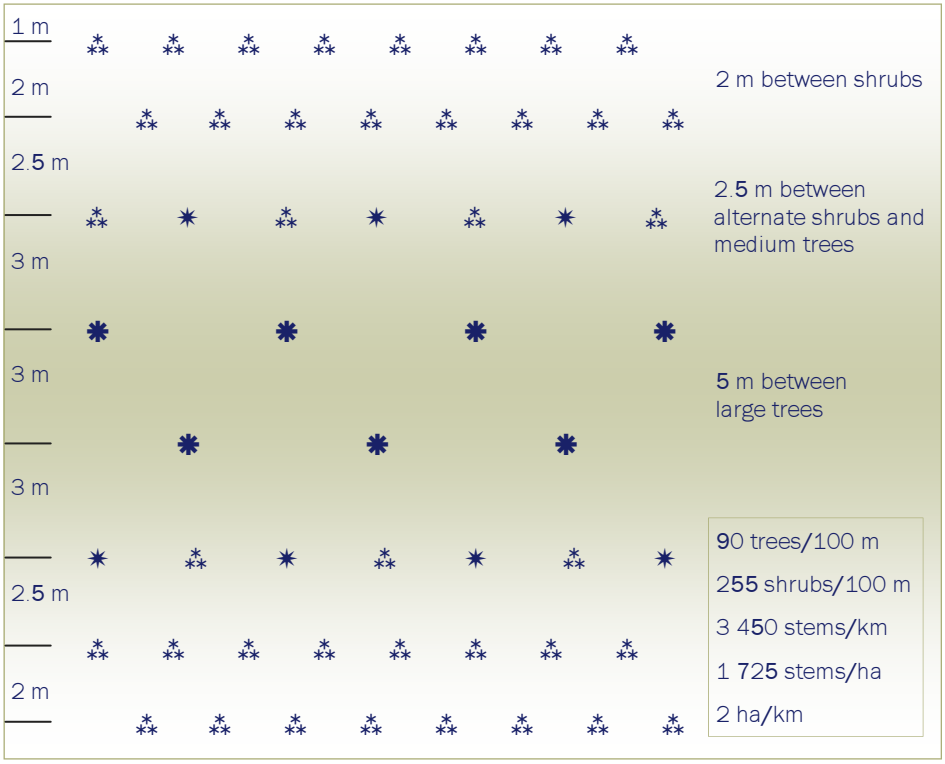

Figure 3: Richard Morsley's (Greening Australia) 8-row planting design for tree corridors, used on 'Nant Lodge'.

Riparian zones

Rob and Annabel fenced out Furracabad Creek to manage the riparian zone separately. The 1.5 km of creek frontage used to contain many floodgates; now there are only two to mend after each flood. Adjacent paddocks are watered by troughs from the farm water supply, and the riparian zone is managed for maximum ground cover and water quality using periodic grazing.

"Our original plan was to revegetate the whole creek by planting agroforestry plots above the flood line. We started at the north end with biodiversity plantings around the edge of the agroforestry plantings, which we locked up while the rest of the riparian zone was rotationally grazed. After 5-6 years, pasture density had declined in those areas compared to the grazed areas – there was more bare ground and more blackberry."

"I thought trees and shrubs were important to control stream-bank erosion, but not anymore, and I've concluded that grass needs to be eaten. I'm not a big fan of chemicals, so I now put the sheep and cattle in periodically to control blackberry and maximise grass cover. I restocked the northern planted section for the first time in winter 2002. There was some damage, but the trees are re-shooting."

The Dulhuntys manage 2.5 km of Reddestone Creek on 'Hillside'. They have decided to also fence this creek into smaller paddocks and use rotational grazing to manage for maximum ground cover and no streambank erosion.

Above: A revegetated corridor on 'Nant Lodge'. Photo courtesy of Karen Forge.

Above: The riparian zone along Furracabad creek is well vegetated with limited stock access. Photo courtesy of Karen Forge.

Pest & weed management

Blackberry and sweet briar have appeared in the planted corridors on 'Nant Lodge' over the years, and now up to 1 week per year is spent spraying. Rob points out that there are trade-offs in whatever you do:

"Stock exclusion in the wetland and tree lines means we have more blackberry, hares and foxes in those areas. The weeds and vermin in the tree lines are negatives, but you have to weigh them up against the benefits of shelter, biodiversity, birds and good growth of valuable grasses seeding into the adjacent pastures. The trees keep the grass right down in the tree lines but the grass grows tall between the outer rows of shrubs.

The Dulhuntys bait twice a year in April and August as part of the Landcare-coordinated fox baiting program in the region. On 'Nant Lodge', foxes have used the tree lines as refuge as they have established, but Rob is philosophical:

"Nothing is ever a complete win – foxes obtain harbour in the tree lines. However, they are creatures of habit and have defined pads where they pass into the shelter belts, so that's where I set the baits. It's better than previously when I didn't know where to bait."

A variety of vertebrate pests occupy 'Hillside' and 'White Rock'. According to Rob, it's open season on goats, deer and pigs all year. "We use whatever methods work—traps, dogs, and shooting," he says.

Kangaroos are an increasing problem on 'Hillside', and Rob uses a licensed shooter to keep numbers down:

"We normally live with the kangaroos—I adore them, but they become a real problem in drought years. Earlier this summer [2002-2003 drought], we counted 400 in Yarrabee paddock at the head of the rotation—so the 'roos are fat while the cattle are going backward. Kangaroos also severely damage fences, making it difficult to keep the sheep in because of roo holes."

Solution: Financial management

With a background in financial markets, business planning is one of Rob's strong suits: "I look at the economic or production value of everything we do and how it fits with our goals or vision."

"Undertaking Landcare works makes financial sense. The tax advantages, coupled with funding assistance, means that only 20% of outlays on improvements are a real cost. The increased capital value of the property alone means I am ahead, even assuming no production gains result.

"But I think there *are* production gains from fencing off water storages and reticulating clean water to stock, subdividing into 15 hectare paddocks, grazing rotationally, and establishing shade and shelter belts around every paddock that double as biodiversity corridors across the property.

"It's hard to calculate the dollar benefits of all these works because we have changed our livestock enterprises and their management considerably, as well. The bottom line, though, is that I spend money on things that I think are going to improve my productivity.

"Put simply, investing in improvements to our natural resource base flows through to improvements in productivity," says Rob.

Rob soon realised two Landcare taxation provisions, in particular, provided special opportunities: not only could major investments in Landcare on-ground works be written off in the year of expenditure, but the deductions could be attributed to either member of the partnership. If either partner in the business had significant off-farm income, their investment in the capital value and increased productivity and efficiency of the farm, was tax-effective.

Rob sees farm business opportunities where others see problems. When Rob bought into the farm business in in one of the worst drought years on record, he saw an opportunity in the low livestock prices: "Mum and I looked to expand the business when sheep and sheep country were at historically low prices and interest rates had come down to 8-9%. We looked at buying more country," says Rob.

Rob also sees off-farm investment as 'vital and critical', and illustrates the point by recounting a family tragedy just after the purchase of 'Hillside' in 1969: "Dad had a serious accident in 1970, which affected him for the rest of his life. Wool crashed in 1971, and after the bank insisted on major cattle purchases, the beef market crashed in 1974. The bank would have sold us up, except for our off-farm investments."

Acquiring 'White Rock' achieved economies of scale, since 'Nant Lodge' and 'Hillside' were too big for Rob to manage by himself effectively, but not large enough to put on a worker full-time. They now employ a full-time farm-hand, allowing Rob more time to work on the business as well as in the business. The purchase was financially opportune in other ways, too: in terms of capital value, it coincided with the start of a rising trend in the rural land market after years of stagnation.

The Dulhuntys' farm business performance over the past 5 years is summarised in Table 1. The indicators show a generally strong performance.

Lessons Learnt

Streambank erosion control—in most cases, good grass management is better for erosion control than planting trees and shrubs.

Pest management is inevitable but can be simplified—repairing the landscape will inevitably involve pest management, at least in the short term, but it may be simplified as a result of the environmental repair works—you know where your pests are!

Off-farm investment is a must—Off-farm investment can allow you to achieve your goals faster.

Table 1. Financial performance indicator summary for the Dulhuntys' farm business (averages for the past 5 years). Financial indicators and diagram taken from the NSW government's 'Farming for the Future' Farm Pack.

Indicator	Poor	Marginal	Satisfactory	Strong	*Average*
1. Ratio of liabilities to income	2.5	1.5	0.5		*0.26*
2. Farm business costs to business income	75%	65%	55%		*48%*
3. Farm finance costs to business income	25%	15%	7%		*2.1%*
4. Equity	40%	65%	85%		*97%*
5. Return to capital	-5%	0%	5%		*4%*
6. Return to equity	-5%	0%	5%		*3.9%*

The value of biodiversity for the Dulhuntys

Biodiversity is important to Rob and Annabel for a number of reasons.

Links to productivity

Biodiversity improves the sustainability of their farming operation:

"For instance, flocks of straw-necked ibis work the pastures, eating the pasture scarabs. That's good because I've seen evidence of pasture dieback due to scarabs," says Rob.

"Sawfly larvae used to strip the young eucalypts in the first plantings, but as the plantings have grown, there is more balance, with the trees providing habitat for the predators of the sawflies," he says.

"On 'Hillside', there's a much greater diversity of native pasture species, shrubs and trees, and therefore more even feed availability through the year. I see it in terms of better wool quality in the commercial flock," says Rob.

"Biodiversity adds to the stability of the system. Consider livestock with an ailment, faced with a suite of native vegetation containing all sorts of biochemistry and potential medicinal compounds – maybe sick animals can self-select the right forage plants to source nutrients not available in their normal diet. There is so much we don't yet know," he says.

More growth and more diversity

"There's lots of evidence on 'Hillside' and elsewhere, of stock eating bursaria, blady grass and even lomandra! On 'Hillside', the basalt flat tops are some of the highest carrying capacity country we've got – they are good grazing areas because of the shelter and biodiversity benefits from the fringing timber and bursaria scrub on the surrounding rocky drop-offs."

On 'Hillside's' sheltered country, it's naturally warmer in winter and cooler in summer, leading to a longer growing season. This also encourages the more palatable, year-long green, native grasses such as *Microlaena* beneath the trees. These conditions also make it ideal lambing and calving country. The timber areas carry higher stock numbers than the open hill country or the flats in the Furracabad valley.

Rob says, "Some industry experts love to simplify things and assume that farms are factories and that production just happens year after year like a machine. But it's not that simple. Seasons and feed availability and demand fluctuate all over the place, it's such a dynamic thing. So I was interested to see what pasture species were contributing to my production from one season to the next."

Rob undertook a pasture monitoring project with Dr Lewis Kahn (Agricultural Information and Monitoring Systems), for which the results are shown in Table 2.

*Table 2. Per cent composition and biomass of natural pastures along three 100-m transects near Reddestone Creek, 'Hillside'. Data are the average of two BOTANAL measurements in April and December 2001 (courtesy of Dr Lewis Kahn, AIMS). A total of 16 native and 17 introduced species were recorded at these sites; only the most abundant (average per cent composition > 1%) are listed. *Introduced species.*

Common name	Composition (%)		
	Tran. 1	Tran. 2	Tran. 3
Tussock poa	24	30	45
Redgrass	5	19	15
Kangaroo grass	26	0	12
Phalaris*	17	9	0
Fescue*	8	17	0
Wild sorghum	6	1	8
Paspalum*	4	10	0
Queensland bluegrass	1	0	8
White clover*	2	4	3
Cocksfoot*	5	1	0
Soft brome*	0	3	0
Parramatta grass	0	0	3
Native geranium	0	2	0
Dry Weight (kg DM/ha)	3294	2822	2673
Percent green (%)	70	71	68

The baseline data indicate a good mix of productive native and sown species in transects 1 and 2 and a native pasture at transect 3, assisted by a little white clover.

Special natural values

The extensive, healthy tracts of native timber on 'Hillside' and 'White Rock' have high conservation value as remnants of the original vegetation, since basalt country has been more heavily developed than other types of country in the region.

Fortunately, Rob and Annabel value these areas for their high winter production, and aim to conserve them for this reason alone. But they also appreciate the wallaroos, swamp wallabies, echidnas (common in the timber), and yellow-tailed black cockatoos that nest there.

In addition to the large areas of native timber, the basalt soils, high altitude and rocky drop-offs permit the occurrence of several interesting plant species, including candle bark gum (*Eucalyptus rubida* ssp. *barbigerorum*)—a threatened species that is also listed as ROTAP 3V—and other dry rainforest plants in the rocky country. Several kurrajongs are likely to be among the highest-altitude occurrences in NSW.

On 'Nant Lodge', the extensive native shelterbelts and wildlife corridors, some of which are now 8 m high, are attracting wildlife back. Kangaroos, wallabies and the black cockatoos are following the tree lines, and the wallabies are venturing into the garden.

"The increase in bird life in the tree lines and around the house has been terrific," says Annabel.

Platypus once occurred in Furracabad Creek, and there are still plenty of water rats.

Ground preparation for agroforestry plantings along Furracabad Creek turned up the biggest earthworms that Rob has ever seen, remarking, "The area has never been ploughed before, so it could be an unusual colony of some type of earthworm that's worth investigating further."

Tree planting or natural regeneration?

Although the Dulhuntys have planted thousands of trees, Rob likes to think the labour-intensive and costly nature of conventional revegetation and the need to fence out stock, prepare ground, plant tube-stock and control weeds, is not the only solution.

He prefers to work with rather than against nature, and wonders whether regenerating native trees and shrubs in grazed paddocks using livestock, fire, nurse plants such as bursaria, and even blackberry and dead timber wouldn't pay off.

"It's the wrong way round, having to spray everything out and then fence plants in to get them going."

At the same time, Rob doesn't like the idea of fencing off areas for 'public good' conservation, saying, "I don't necessarily agree that exclusion of livestock produces a better conservation outcome. I believe grazing management can be used very effectively as a tool to produce conservation outcomes, and we are currently working with the University of New England to investigate these issues.

"I would like a system where we are paid for all the things we produce on the farm including clean water, clean air, healthy soil and native biodiversity—not just wool and beef. These are the things most urban Australians consume for free and consequently take for granted. The production value of my land is too high to exclude livestock from all but a few very small areas."

Rob likes to think about regenerating valuable species and getting on top of blackberries at the same time:

"For instance, rather than controlling blackberry-infested gullies with chemical, clearing out the canes by hand, fencing off and planting shrubs and trees, why not broadcast acacia seed into a gully full of blackberries, burn the thicket, and let the acacias regenerate. The acacias would be protected from occasional grazing by the canes until they grow through and dominate the blackberry beneath."

A vision for sustainability

Rob and Annabel share a big-picture vision for a sustainable future for rural people in their region and around Australia.

The arrival of their eldest daughter, Lily, was the catalyst for some serious soul-searching about how to secure the future of their business and local farming community so that the children would have a home and roots to return to for the rest of their lives. They agonised over the social and economic pressures forcing so many people off the land—like some of their closest friends—and wondered how to make rural livelihoods sustainable in the long term.

"The average family farm generally doesn't have the resources to access skilled professional services required to underpin successful businesses in other sectors of the economy. If we could somehow make structural changes to our farm businesses and make better use of available resources, we could have better access to the skilled labour and specialist professionals needed to help make our family farm businesses sustainable economically, socially and environmentally," says Rob.

In recent years, the demands of business compliance have grown in areas such as quality assurance, occupational health and safety, risk assessment and public liability. The need for creative thinking to relieve the mounting pressure on family farms is growing. Unless they take care of some of these factors, most farmers are seriously exposed and at risk of losing considerable equity.

Rob and Annabel have analysed their positive experience with Landcare for clues. With the re-development of 'Nant Lodge', their level of involvement was high. The benefit of Landcare was more than just the good feeling of improving the environment and the productive capacity of the property, and the provision of funds to be able to do it.

Rob and Annabel greatly appreciated

Above: 'Hillside' has some special natural values that the Dulhuntys are confident contribute to better production outcomes. Photo courtesy of Karen Forge.

the strong social bonds, the positive sense of community, the recognition, and the sense of regaining control that the Furracabad Landcare Group forged in their local farming community. Landcare was a catalyst for getting people to work together, and to share resources and ideas more generally.

From these ponderings evolved Rob and Annabel's vision for 'clusters' of family farms operating under a kind of 'corporate' structure. The structure would enable the farms to work together to buy the skilled professional services required to manage successful, high performing businesses, and yet remain on the land to raise their children in a healthy environment.

Lessons Learnt

A biodiverse farm can be a very productive farm—the value of biodiversity is found in increased productivity.

Biodiversity provides resilience—biodiverse areas of the farm are more resilient and fare better in harsh seasons.

Biodiversity has beauty—special natural values that contribute to family "health and well-being".

There are still opportunities to find better ways of working with nature to take the hard work out of environmental repair.

They have encouraged the University of New England to undertake a study of the concept in their valley (Marshall 2004). Although there are lots of issues to be resolved, Rob and Annabel intend to keep chipping away at the cluster idea, for the sake of their children and, perhaps, that of rural Australia.

The triple bottom line

Rob and Annabel have achieved a great deal since undertaking the farm partnership together. The ambitious re-development program cost perhaps $400,000 in the 10 years since 1994, but the benefits are already clear to see. As Rob says, "There's been a huge difference in productivity and efficiency, the place is a pleasure to run now."

Financially, they have been able to turn their business around, expand the operation, develop a Merino stud, improve all the livestock enterprises, diversify their investment base, and achieve a high level of productivity despite two major droughts in 10 years.

Environmentally, they have transformed 'Nant Lodge' by restoring shade, shelter and healthy aquatic ecosystems to the property. All these initiatives have had both productive and beneficial environmental outcomes. Biodiversity is valued and actively managed for across all three properties.

Socially, the Dulhuntys have played an active role in the Furracabad Landcare Group, holding numerous executive positions. And all this while raising a young family, and managing the re-development of three properties.

All this work has not gone unrecognised. Numerous field days have been held at 'Nant Lodge' in recent years, and Greening Australia selected 'Nant Lodge' as a 'Best Management Practice Demonstration Site' for their *Super Solutions* project. 'Nant Lodge' was also the 2004 winner of the GLENRAC Resource Management Competition.

Rob is proud of their environmental and production achievements:

"At the same time I feel quite daunted by the task ahead, and I now appreciate, with the benefit of hindsight, what a big responsibility it is to be steward of so many valuable natural resources while operating with so few human and financial resources.

"Socially, it's a challenge. With so many people moving on, it can break your heart."

"However, I do feel very lucky to be raising three young kids in a healthy environment with a grounding in some really important values.

Below: Landcare Adventure participants visiting 'Nant Lodge' during May 2004. Photo courtesy of Karen Forge.

LandWater&Wool
Shaping the future
Australian Government Land & Water Australia
another australian wool innovation limited
native vegetation and biodiversity
improving farm profits through biodiversity

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Resourcing Landcare in our region

This project has been funded by the national **Land, Water & Wool** program—a joint initiative of Australian Wool Innovation Limited and Land & Water Australia. The Native Vegetation and Biodiversity sub-program of Land, Water & Wool aims to work with wool growers to show that biodiversity has a range of values, can add wealth to their business and can be managed as part of a productive and profitable commercial wool enterprise.

The **Land, Water & Wool Northern Tablelands Project** is led by Associate Professor Nick Reid of the University of New England, in collaboration with Southern New England Landcare Ltd and the Centre for Agricultural and Regional Economics (CARE). A project steering committee of local landholders and technical experts directs the project.

Disclaimer—the information provided in this booklet is general in nature. Practitioners should seek professional advice on their own situation before making decisions. The project leader, collaborators and steering committee will not be held responsible for the misuse of this information.

More information

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This brochure is part of a series produced by the **Land, Water & Wool Northern Tablelands Project**. From 2004 to 2006, a number of extension materials will be developed as a part of this project, including posters, brochures, booklets, and fact sheets. Field trips and tours to the Case Study Farms are also possible.

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