A WEB OF TREES

Reconnecting the landscape and the community

THE YAN YAN GURT CREEK STORY

Between 1990 and 2002 forest cover in the Yan Yan Gurt Creek catchment increased from just 6% to 21% of the total area. More than 20 families have planted trees on cleared farmland with at least 10 managing their trees for sawlogs production.

What makes the catchment interesting is not the scale of the revegetation that has taken place but its diversity. Such diversity is not contrived. It simply reflects the diversity of aspirations and interests amongst the landholders, industry players and their supporters.

Tree plantings owned by farmers, and dispersed through the farming landscape, are acceptable to this rural communitiy.

Family and farm forestry not only makes a significant contribution to future wood supply but also ensures that commercial tree growing has local community support, underpins sustainable agricultural production and delivers real environmental benefits.

FAMILY FORESTRY IMPROVES TRIPLE BOTTOM LINE

There are many studies documenting the social, economic and environmental impacts of large scale plantation development. Some conclude by suggesting that if a greater proportion of the plantations were owned by farmers, or dispersed through the farming landscape, forestry would be more acceptable to rural communities and local governments. This mix of forestry and farming is illustrated in one small catchment in the Otway Ranges where almost all the farmers and many other local families have planted new forests since 1990.

The Otway Agroforestry Network, set up by local farmers with government support in 1993, assists landholders design and manage multipurpose forests that best match their own interests. As the landholders vary, the plantings vary. The result is a mix of family and commercial forestry plantings that reflects landholder and community interests.

To help understand how this diverse ownership changes the impact of commercial tree growing, Lawrence Burk and Rowan Reid, School of Resource Management, The University of Melbourne, looked at the extent and impact of revegetation in the Yan Yan Gurt Creek catchment. The results suggest that family and farm forestry can not only make a significant contribution to future timber supply but may also ensure commercial tree growing has local community support, underpins sustainable agricultural production and delivers real environmental benefits.

YAN YAN GURT CREEK CATCHMENT

The narrow Yan Yan Gurt Creek Catchment runs through farmland from the Otway Ridge to the Barwon River. As it passes through the foothills it becomes saline, rendering once fertile flats unproductive.

By 1990, native forest cover had been reduced to just 5% of the total area. An additional 1% of the catchment had been planted to trees. The unprotected creek banks were easily eroded, adding sediment and nutrients to the flow. More than 80% of the landscape was devoid of any useful wildlife habitat or stock shelter. It was about this time that local farmers formed the local East Otway Land Protection Group and the regionally focused Otway Agroforestry Network. The emphasis of both groups has since been on assisting landholders in the design, establishment and management of multipurpose revegetation projects on their farms that not only reflect individual landholder aspirations, but also the interests of the wider community. Soon after, Midway Pty Ltd, and later other plantation companies, began establishing eucalypt plantations for pulpwood in the area.

By 2002, 281ha of forest had been established on cleared farmland increasing the forest cover from 6% to 21% of the total catchment area. Ninety hectares of this was conventional eucalypt pulpwood plantation on company owned land and a further 15ha was owned by a forestry company but planted on farmers' land. The remaining 175ha of new forest is owned by a minimum of 20 families.

Forest design and management indicates that at least 10 families are actively pursuing commercial timber production. Together they

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now own 147ha of commercial trees that represents 8% of the total catchment area. These plantings commonly include more than one species and are generally designed to provide land protection, shelter and habitat as well as timber.

Although the increase in forest cover from 6% to 21% in just 12 years is impressive, what makes this catchment unique is not so much the scale of the revegetation but its diversity and distribution across the landscape. This catchment, and the surrounding East Otway region, has become a show piece for highlighting the potential of family and farm forestry to contribute to significant landscape change supported by the local community, local government, timber industry and Corangamite Catchment Management Authority.

Based on the examination of aerial photographs *(pages 4 & 5)*, interviews with landholders and a review of the research, this study looked at the likely environmental and economic impact of 12 years of revegetation in the Yan Yan Gurt Creek Catchment.

DRYLAND SALINITY

Based on a study of land systems in the Otway Region[1] the salinity problem in this catchment is thought to originate from an area of Pliocene sediments that underlie around 45% of the catchment. These sediments were laid down during a period when the ocean covered the land suggesting this may have contributed to the high salt concentration in the sub soils. Additional salts blown in from the ocean could also have been trapped in the sub soil layers due to the low recharge rates below established native vegetation in this medium rainfall zone. In 1990 less than 1% of this land class was forested. Twelve years later this had risen to more than 17%.

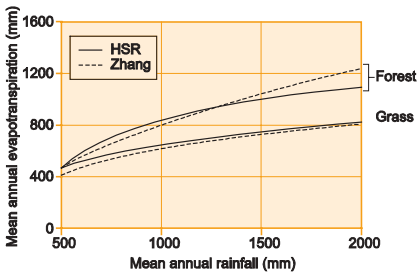

Fig. 2. Estimates of the evapotranspiration from areas of forest and grass across a range of rainfall[2]. (from Vertessey et al 2002).

It is possible to deduce the likely impact of the conversion of grassland to forest on deep drainage *(Figure 2)*. Reforestation can virtually eliminate recharge under grassland where the annual rainfall is less than 750mm. It is estimated that the 16% increase in tree cover across the Pliocene sediments could result in a reduction in runoff and deep drainage of around 13% from this land class alone. Whilst the impact of this on dryland salinity in the lower catchment is uncertain, the forest will significantly reduce the volume of salt leached from the sub soils into the underlying water table.

WATER QUALITY AND QUANTITY

Fencing and revegetation of drainage lines is likely to reduce the rate of erosion and minimise the risk of stock manure and fertilisers entering the waterways. Research[3] suggests that up to 98% of the sediment load and 70% of phosphorus can be trapped by forested riparian buffer strips. However, buffer strips of any type are less effective in trapping nitrogen because it is mostly in solution.

Only 7% of the defined drainage lines had protective riparian vegetation in 1990. By 2002 this had increased to almost 50%. Additional plantings on the steep clay slopes in the upper catchment are likely to help reduce the tunnel erosion problems thereby further reducing sediment loads. Much of this work has included the use of commercial native species that have been managed by farmers for sawlog production.

However, revegetation does reduce runoff and deep drainage and therefore the quantity of water flowing out of the catchment. Based on the research described in Figure 2, the total reduction in runoff and drainage due to the increase in forest cover across the catchment is likely to be about 7%. It is possible that the creek will now remain drier for longer into autumn.


1A - 1992


2A - 1992


3 - 1999


1B - 2002


2B - 2000


4 - 1997

A DECADE OF CHANGE

	1990		2
AREA OF CATCHMENT	1892 ha		
Forest cover	115 ha	6%	3
Native forest	92 ha	5%	
Planted trees	23 ha	1%	3
OWNERSHIP TYPE (planted)			
Company on company land	0		
Company on farmer land	0		
Family (blockl)	6 ha		1
Family (integrated)	17 ha		
AGRICULTURAL PRODUCTION			
Area of pasture	1777 ha	94%	14
Equivalent pasture shelter benefit	25 ha	1.4%	
Stock shelter availability		17%	
RIPARIAN VEGETATION			
Protected Riparian Vegetation	1.5 km	7%	1
DRYLAND SALINITY			
Trees on saline recharge area	4 ha	0.5%	1
Trees on the rest of catchment	111 ha	11%	2
BIODIVERSITY			
Number of connected patches	2	7%	
Area close to forest cover (<100m)	359 ha	19%	11
Interface of forest and pasture	12m/ha		4
Eucalypt pulpwood plantation (large block)	0		1
Indigenous non-commercial	4 ha	0.2%	
Multipurpose farm trees	19 ha	1%	
Remnant Native Forest	92 ha	5%	
TIMBER PRODUCTION			
Eucalypt Pulpwood			1
Native sawlog	6 ha	0.3%	
Exotic sawlog	7 ha	0.3%	
Total area of commercial forestry	13 ha	0.6%	2


5A - 1992


6A - 1993


7A - 1992


5B - 2000


6B - 1999


7B - 2000

In 2004 it is estimated that 75% of the defined drainage lines have protective riparian vegetation. OAN

2002	
96 ha	21%
91 ha	5%
05 ha	16%
90 ha	30%
15 ha	5%
04 ha	34%
96 ha	32%
96 ha	79%
78 ha	5.2%
	57%
1 km	49%
47 ha	17%
49 ha	24%
32	35%
54 ha	61%
m/ha	
68 ha	9%
40 ha	2%
84 ha	4%
91 ha	5%
83 ha	10%
60 ha	3%
9 ha	0.3%
52 ha	13%


8 - 2000


9A - 1990


9B - 1997

Eliminating grazing from water ways has encouraged the growth of reeds and other plants in the creek bed. This, along with the likely build up of wood debris in the water ways (especially in areas where thinning and harvesting is undertaken for timber production) and reduced runoff from forested areas, is likely to reduce the risk of spring flooding in the lower reaches as water is held back during periods of heavy rain.

It is possible that the reduction in fresh water runoff will result in an increase in stream salinity due to reduced dilution[2] well before there is any benefit from reduced saline recharge. Fortunately, the reduction in fresh water runoff and drainage from the high rainfall (over 1000mm) areas of the upper catchment is estimated to be only about 2%.

BIODIVERSITY

The increase in forest cover, from 115 ha to 396 ha, clearly provides an opportunity for a greater range of habitats to develop. However, area is not the only important factor. Other indicators of biodiversity value are: patch size, forest edge, connectivity, distribution, species composition, structure, management and location within the landscape.

Trees planted along watercourses and property boundaries can act as wildlife corridors for forest dwelling animals linking smaller patches into a network of habitat areas. In 1990, only two of the 28 patches of forest were within twenty metres of each other (7%). By 2002, the number of these connections had increased to 32 out of a total number of 91 patches (35%).

The distribution of forest was judged by using a four hectare grid placed over the map of the total area. In 1990, 19% of the squares contained forest. This increased to over 61% by 2002. Had the same area of forest being concentrated in a few large blocks this figure could have been less than 40%.

The forest edge provides different habitat values to that inside a large patch. The length of interface between pasture and forest increased dramatically over the study period, from 12m/ha to 41m/ha. Despite this, the proportion of edge to total forest area changed by less than 1% suggesting the balance between forest edge and interior habitat remains similar. Plantations can transform the habitat value of an isolated remnant forest by reducing the edge effect and effectively creating new areas of interior habitat.

Large monoculture Blue Gum pulpwood plantations total 168 ha. Compared with a native forest their habitat value may be limited due to their dense, uniform structure and short rotation before clearfelling. However, recent bird surveys on one farm in the catchment identified 24 species present in a Blue Gum pulpwood plantation suggesting that, despite their simplicity, these plantations do provide valuable complementary habitat benefits when integrated within a diverse landscape.

The non-commercial indigenous plantings that might be expected to provide the greatest quality habitat in the long term cover only 40ha and are mostly small plantings. Greater total biodiversity value may lay with the 84ha of multipurpose commercial plantings. Most of these include a number of native species and have relatively long rotations. They are commonly dispersed across the farming land in both large blocks and corridors. Thinning to promote sawlog production in these forests provides valuable dead-wood and opens the stand to light, thereby allowing more understorey growth.

Blue Gum and Blackwood grow naturally in parts of the catchment and are valued timber species. Most of the farmers planting for timber are now using local native stock purchased from local nurseries. However, some commercial growers (both big and small) use introduced 'improved' seed stock that contains genes from Tasmanian or Gippsland provenances. There is a risk that this may lead to genetic pollution of the local gene pool.

An additional risk comes from the introduction of non-indigenous native species that may hybridise with the local species or even become woody weeds. In this respect, the multipurpose farm forestry plantings may present the greatest risk as many landholders are experimenting with non-indigenous species for sawlog production.

> " . . . timber production is being undertaken on a total of 252 ha, 70% of which is on family owned properties . . . "

AGRICULTURAL PRODUCTION

During the study period 281 ha, or around 15% of the catchment, was converted from pasture to forest. Whilst large pulpwood plantations will essentially replace other agricultural production, most farmers would agree that strategically located tree cover can actually enhance pasture and animal production.

Using a model based on the anticipated tree height and the likely pasture response in adjacent paddocks (based on published research), it was possible to estimate the impact of increased forest edge on pasture production (Figure 4). Up to a point, as the length of forest/pasture interface increases, the shelter provided will result in increased pasture production on neighbouring land. Because pasture production along the edge of the forest is reduced due to competition, any further increase in forest/ pasture interface is likely to reduce pasture production. The response varies with the expected top height of the trees, suggesting that in high rainfall areas the optimal distance between shelterbelts is greater.

The response varied from a 7% increase where trees had been planted across exposed areas to a loss of more than 10% in already well-shelter areas. Over the whole catchment it was estimated that the shelter provided by the trees had the potential to increase pasture production by 1.4% in 1990 and 5.2% in 2002. This would reduce the effective loss of pasture production by almost 20% from 281ha to 228ha.

The availability of shelter for livestock was assessed on the basis of the distribution of forest cover across the agricultural areas. The proportion of pasture land in close proximity to forest rose from 17% in 1990 to 57% in 2002. How this translates into reduced stock losses or improved production will depend on the type of stock and their location during times of high risk. On the negative side, this distribution of forest may offer greater cover for foxes. In response one family now uses alpacas to protect their lambs.

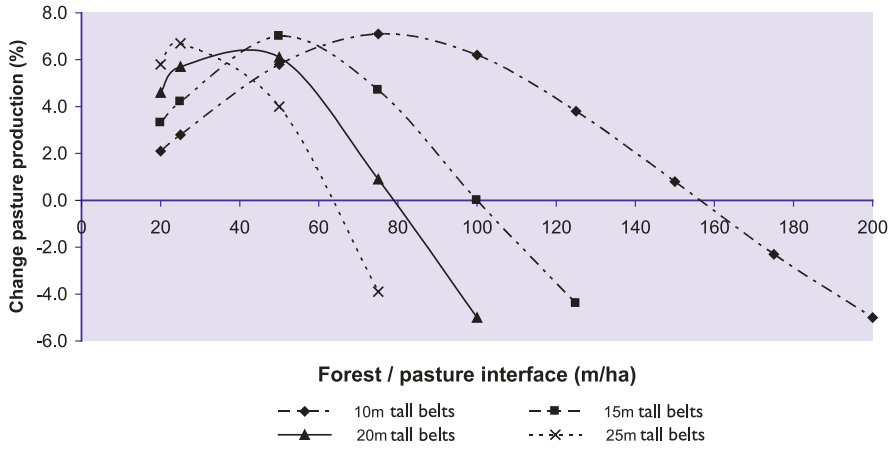

Figure 4: Estimated change in pasture production due the nett effects of shelter and competition along the edge of a forest based on the suggested pasture production pattern behind shelterbelts in Western Victoria[4].

TIMBER PRODUCTION

The total area of eucalypt pulpwood plantation is 183ha or 10% of the catchment. The largest eucalypt pulpwood plantation is owned by a prospectus company. Another company owns the trees, but not the land, on two farms in the catchment. Two eucalypt pulpwood plantations are owned by private landholders.

The two families who have established their own pulpwood plantations have also planted areas of native trees for sawlog production. Eight other farmers, all with significant areas of pasture for stock, are also actively managing planted trees for sawlog production. It is estimated that in 2002 there was a total of 60ha of forest being managed for native sawlog production by family forest owners. A further 9ha was planted to exotic species, largely pine, for sawlog production.

Timber production is being undertaken on a total of 252 ha, 70% of which is on family owned properties. This represents 13.2% of the total catchment area or over half the total forest cover. This is well above the Central Victorian Farm Plantations target for the region of 5.25%.

> "... a balance of family, industrial, government and community forestry provides the greatest potential to improve the triple bottom line and reduce risk."

RISK AND UNCERTAINTY

Fire is a concern to both residents and forest growers. Grazing through or around plantations may be the most effective means of reducing the risk. This is one advantage of dispersing plantations through farmland. Having neighbours with stock also makes it easy for absentee forest owners to arrange agistment.

CONCLUSION

Landholders in the Yan Yan Gurt Creek Catchment have received a great deal of support both from within and outside their community. The East Otway Land Protection Group was able to arrange financial support through the Natural Heritage Trust (NHT) to help pay for plantings along waterways including those involving native species planted and managed for sawlog production.

The Otway Agroforestry Network with financial support from the NHT, Central Victorian Farm Plantations and the Corangamite Catchment Management Authority, has been active in encouraging, demonstrating, training and guiding farmers through the process of designing multipurpose revegetation projects.

Participation in field days and conferences in the region by Midway Pty Ltd and other industry partners, are giving farmers greater confidence that their well-managed forests will be of commercial value in the future. Staff of the Corangamite Catchment Management Authority, Central Victorian Farm Plantations and State Government agencies have provided valuable support to the landholders and those who work with them. Since 2002, more trees have been established by landholders including a commercial seed orchard and an organic sawlog production forest (using no herbicides).

If we believe that this type of forestry development is attractive and represents a lower risk to the community and the environment, we must explore ways of facilitating and encouraging a high level of participation by landholders both big and small. Whilst industrial plantation forestry provides the scale of production necessary to underpin regional forest industries, family forestry provides the participation and diversity of forest types that can maximise the benefits, but soften the impact, of forestry development on the landscape and its community.

Encouraging this diversity requires extension programs and policy that are not prescriptive. Rather, they must acknowledge differences, encourage innovation and facilitate the design of unique forest management options that reflect each situation. The East Otway Land Protection Group and the Otway Agroforestry Network advocate such an approach and believe a balance of family, industrial, government and community forestry provides the greatest potential to improve the triple bottom line and reduce risk.

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