

Ten percent multipurpose tree cover for every farm: A low risk, high opportunity first step

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Abstract

Agricultural research suggests that farmers can confidently plant trees for shelter and land protection across at least five per cent of their farm without risking agricultural productivity or capital value. Most farmers could increase this to 7 or 8 percent by protecting native remnants, targeting land of low agricultural value and extending ornamental plantings. Farmer and community acceptance of the potential for these same trees to produce commercial products (agroforestry) could well justify the extra required to achieve ten percent tree cover across the farming landscape. Rather than threatening agriculture, ten percent multipurpose farm tree cover could reduce risk and provide greater opportunities for farm families and their local communities.

The key is to form a web of linear shelterbelts and riparian corridors across the farming landscape that links patches of remnant forest and small plantations established for land degradation control, wildlife habitat and income. With this goal in mind, the most important consideration will be the short term impacts of tree planting on farm management costs, agricultural productivity and land values. The promise of long term benefits, including environmental sustainability and any income from the sale of tree products and services, might be viewed as a bonus, icing on the cake or an investment in future generations.

Achieving widespread integrated multipurpose revegetation requires changes in the way our community invests in landscape change:

1. Government agencies and catchment management authorities must acknowledge that it is acceptable for farmers to establish and manage multipurpose forests for both conservation and profit.
2. Incentives for revegetation (both for conservation and timber production) should reward those who actually deliver the balance of environmental, social and economic outcomes sought by the community thereby encouraging innovation and efficiency.
3. Government and industry must take farm forestry seriously and invest in the research and development required to underpin the practicality and viability of integrated multipurpose forestry.
4. The farming community must get behind the workable solution of “10% of every farm – rather than 10% of farms”.

All or nothing is not good enough

Conflicts arising from the perceived social, economic and environmental impacts of large scale plantation development in agricultural areas are well documented^{1,2}. Rival advocates, purporting to represent farming, forestry, water resources or nature conservation, have now dug-in and often resort to hurling scientific reports, economic and social studies and personal narratives at each other in the rural press, at national conferences and even in senate hearings. The conflict stifles progress towards an agreed approach that can benefit all.

The different reasons for wanting to see more trees on farms need not be mutually exclusive. Trees grown for agricultural shelter and land degradation control can also enhance wildlife habitat and produce timber without threatening the viability of existing agricultural enterprises, rural communities or water supplies. Rather than pit forester against farmer, there is a view that “*integrated farm forestry*”³, “*tree growing within farming enterprises*”⁴, “*farm forestry on marginal land*”⁵ and “*integrated regional plantation forestry*”⁶ would be welcome by farming communities, the timber industry, local government and environment groups.

There is little point, in our mind, in trying to describe a vision for some future idyllic landscape of pastures, crops and forests. To do so is to deny the evolutionary nature of landscape change and the complexity of the social and economic forces that drive it. Instead, we are interested in the first step: where should the next tree be planted and for what purpose? If we get this right, then future farmers will be better equipped to provide for their own needs and continue to build a better future for their children

Ten percent tree cover - the first step

*What we are talking about here is not revegetating ten per cent of farms,
but ten per cent of every farm*

*Comment by Mr Bob Cameron, the Victorian Minister for Agriculture, after he had toured the
Otway Agroforestry Network's Web of Trees Project in 2005*

Ten percent tree cover on Victorian farms would amount to more than half a million hectares of trees providing land protection, biodiversity habitat, shelter for agricultural stock and crops, tree products and landscape amenity.

Ten percent tree cover across the farming landscape does not present a threat to the viability or social integrity of the existing agricultural industries and rural communities.

Ten percent tree cover, integrated with agriculture, could be targeted to control rising watertables and improve the quality of water in streams without jeopardising catchment water yields or the viability of underground water reserves.

Ten percent tree cover on every farm as a guiding goal (not a target) can help define the research, policy and incentive strategies required to engage more landholders in the establishment and management of more trees across more of rural Victoria for the benefit of all Victorians.

Balancing forests and agriculture

Possible relationships between percentage tree cover on a farm and agricultural profitability are illustrated in Figure 1. Across most of the range any increase in the area of tree cover will result in a proportional drop in agricultural returns. However, at the low end, where most Victorian farmers are currently placed, there is likely to be some potential to increase tree cover whilst simultaneously maintaining, or even increasing, agricultural yield, profitability and resilience.

Before exploring this concept any further it is important to review the choice of agricultural performance criteria. Agricultural *yield*, whilst important in the short term, is only one measure of economic performance. *Profitability* incorporates market prices and management costs and is an important basis for making everyday farm management decisions. *Economic resilience*

acknowledges the impact of market and climate fluctuations and risk on agricultural profitability over the medium to long term.

Since most of the benefits associated with growing trees accrue in the medium to long term, those farmers starting from scratch might be expected to be biased towards maintaining or enhancing agricultural yield and profitability: they will only be prepared to commit land to trees up to the extent that they believe the forests complement their current farming systems. If they are less dependent on agricultural income, have a personal interest in particular tree products or services, or are able to adopt a long-term view, they may be willing to increase farm tree cover to the point where it significantly compromises agricultural yields in the short term. For most Victorian farmers this point is some way off.

For now, it is important that we seek to identify opportunities for carefully targeted and managed revegetation to enhance agricultural production and profitability rather than replace it. If we know what it is we want, and what we would like to avoid, then it is simply a question of where do we start?

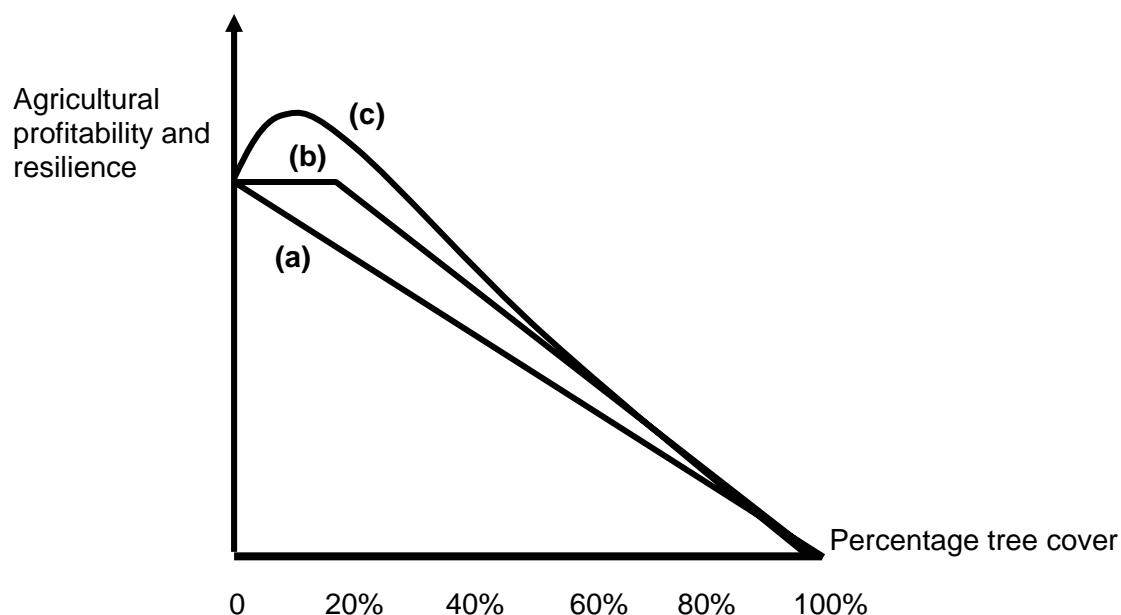


Figure 1. Various scenarios for the possible impact of increasing farm tree cover on agricultural profitability: (a) competitive: in any increase in tree cover results in a reduction in agricultural, (b) initially supplementary: increasing tree cover does not impact on agricultural production until a threshold is achieved, and (c) initially complementary: agricultural profitability increases with increasing tree cover before becoming competitive.

Starting with a web of trees

Although many farms do have small patches of remnant forest or block plantations these are usually concentrated in one area leaving most of the agricultural land devoid of tree cover. The integrated approach begins with identifying opportunities for trees to enhance agricultural production, protect assets or reduce the economic or environmental risk inherent in farming. This defers the point at which tree cover begins to compete directly with agricultural yield, or introduces a whole new set of forest-related risks such as the long wait for rewards, uncertainty regards productivity or future prices, fire, disease, harvest insecurity etc.

In recognition of the preparedness of many farmers to engage in conservation works along waterways we begin by reviewing the role of riparian vegetation and the area of agricultural land likely to be incorporated into such plantings. Then, acknowledging that most farmers see

a need for shelter we look at the areas of additional tree cover required to an effective network shelter network.

Riparian forests

The drainage density in farming areas varies with the climate, topography and soil structure but is commonly between 1 km of watercourse per square km on the plains to almost 5 km/km² in deeply dissected hill country^{7,8}. The most appropriate width of a buffer strip for soil conservation and water quality will vary from a minimum required for bank stability, to much wider belts where the soils are unstable or the overland flow rates are high. Research,^{9,10} focusing on the potential of buffer strips to trap sediments commonly involve grass or forested strips of around 10m. This would represent less than 5% of most agricultural landscapes (Figure 2).

The biodiversity value of vegetation cover along waterways is more complex. Tree cover has a moderating effect on water temperatures and forested waterways tend to retain more water in deeper pools during the dry months and contain more woody debris than open waterways⁷. Whilst they prefer wide strips, researchers¹¹ acknowledge that a narrow buffer of just 5m or so on each bank is likely to be effective in improving the aquatic habitat and as a corridor for small animals. In practice, the greatest initial environmental gain comes from the exclusion of stock grazing from the channel itself and from the shading of the waterway by the trees⁷ with only marginal, or species specific benefits, being derived from increasing the width of the belt over and above that required for soil conservation or trapping sediments.

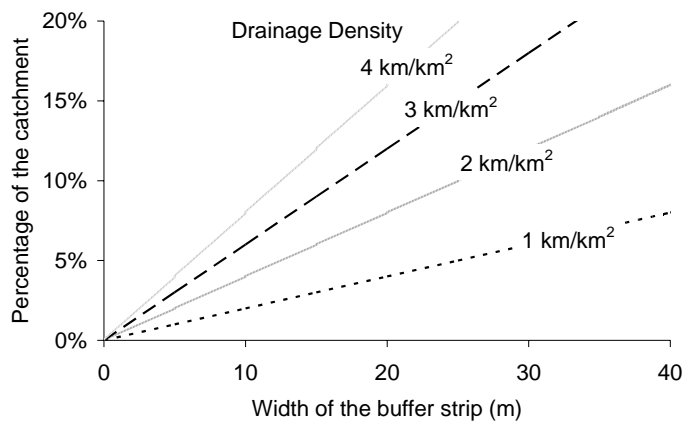


Figure 2. The percentage of a catchment that would be incorporated into a riparian buffer strip of different widths. Note that a 10m wide buffer would represent a 20m riparian corridor if both sides of the stream were planted to trees.



Shelterbelts

Most farmers recognise that exposure can directly impact animal and crop production and are willing to consider establishing trees in narrow shelterbelts¹². Response curves for pasture production behind shelterbelts show that although yields are impacted by trees along the edge of the belt this is more than offset by increases in the zone from 2 to 20 times the height of the tree belt¹³. The response in grain crops is varied and depends on climatic influences during the different stages of plant development.

Based on the anticipated pasture response curves in adjacent paddocks (Figure 3) it is possible to estimate the impact of increasing the percentage of farmland incorporated into shelterbelts of varying widths on pasture production (Figure 4). Narrow shelterbelts occupy little land and if planted across less than 1% of the farm may actually increase pasture production. However, increasing the area of farm dedicated to narrow belts can dramatically reduce agricultural yields. By contrast, shelterbelts that are as wide as the trees are tall can be planted over as much as 5% of the farm before agricultural production is reduced. The value of shelter for stock, particularly for off-shears sheep, new born lambs and lactating cows, is well established and can only increase the agricultural value of shelterbelts¹³. Wide belts are likely to be more useful for stock shelter, wildlife habitat and timber production and less susceptible to problems such as gaps.

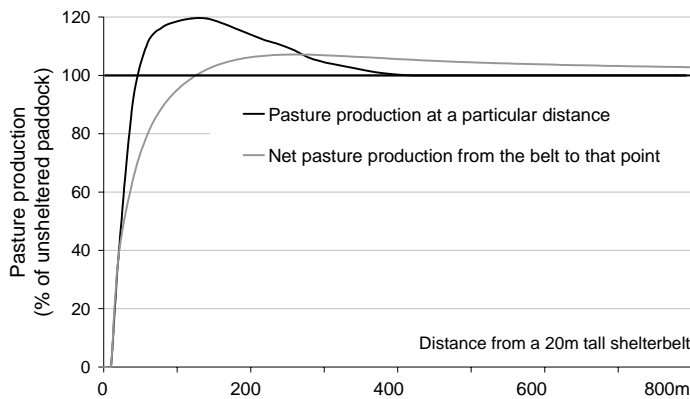


Figure 3 Relative pasture yield behind a 20 metre tall shelterbelt in Western Victoria based on research by Bird (1998)

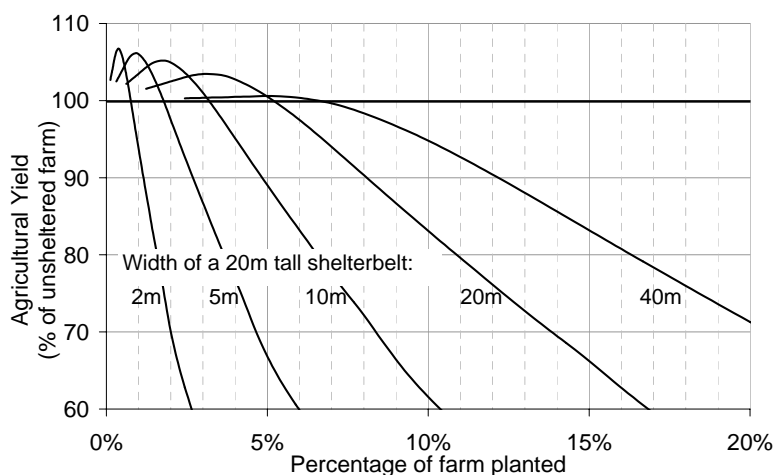


Figure 4 Anticipated percentage tree cover and pasture production impacts of 20m tall shelterbelts of varying widths across a flat open farm in Western Victoria (based on Figure 3).



The backbone: a web of trees for shelter and water quality

Corridors of riparian vegetation along waterways linking in with strategically placed shelterbelts to form a network of vegetation for shelter and land protection may constitute as little as 5% of the agricultural landscape. Those farmers with high quality land, all of which is accessible and available for agricultural production, may not be able to justify planting any more forest, but this is rarely the case. Landscaping and additional shelter around the homestead and sheds, the protection of remnant patches of native forest, occasional paddock shade trees and areas of marginal agricultural value would probably account for any additional 3 or 4 per cent on most farms without any risk of reducing agricultural production.

This brings the total to around 8% tree cover, all of which can be justified on the basis of short term agricultural benefits, the retention of existing native forest cover and enhanced amenity. The justification for more tree cover lies in the long term values.

The last 2%: Moving back the fence for future opportunity

With the right species selection, tree management, harvesting methods and marketing arrangements a significant proportion of the trees established in riparian buffer strips and shelterbelts, plus those on land unsuited to agriculture, can produce commercial forest products such as wood products, essential oils, bush food or Christmas trees. Whilst the notion of harvesting wood from forests established for conservation or shelter may at first appear incongruous there is growing practical and scientific experience that suggests it is not only possible but may also be economically and environmentally prudent.

Accepting that trees grown for conservation and shelter can be managed for production invites farmers to move the fence back a little more from the creek and widen their shelterbelts in anticipation of future income for themselves or their children. Economically, the costs of establishment and much of the maintenance can be justified on the basis of the non-timber benefits rather than needing to be recovered from the sale of products. The same is true for the land costs and, to a lesser extent, the time it takes to grow. Because of this, farmers commonly talk of the timber return being seen as a bonus. Growing species that are able to be used as firewood, posts or milled on-farm for fencing and building products overcomes problems of marketing.

The landscape scale impacts of 10% tree cover

Because, forests use more water than pastures there is evidence that large scale revegetation will impact on downstream water supplies². The impact is greatest when the trees are concentrated in high rainfall areas adding to concerns that the reduction in fresh water yields may also result in an increase in salt concentrations in waterways. Spreading the same area of trees across the agricultural landscape not only spreads the impact but also reduces the risk.

Based on studies of woodland birds in Victoria the extent of tree cover was found to be the most important predictor of species richness with a rapid decline likely to occur where tree

cover fell below a critical threshold of about 10%¹⁴. However, the degree to which trees on farms contribute to biodiversity conservation is very much more complex than simply achieving a minimum tree cover. Ten percent multipurpose tree cover, if integrated into the farming landscape, can provide greater connectivity, increase patch size and provide a range of vegetation types without threatening native grassland or woodland communities.

Concerns about the viability of timber production from multipurpose forests on farms reflect a history of timber-focused plantation development and a lack of research and development into appropriate small scale harvesting and timber marketing options. There is no question that, to be viable, the management and harvesting of integrated multipurpose forest will require different skills, tools, machinery and market mechanisms. Internationally, there are many examples of successful small scale forest operations. Hence the need for more research and development focused on our own environment.

What about the costs?

Tree establishment, protection and management are expensive and even more so when the forests are integrated into a farming landscape. On flat land, establishing 10 metre wide shelterbelts over 5% of the farm would require at least 100m of fencing and 50 trees and shrubs for every hectare of farmland. That is two metres of fencing for every tree planted! This would increase in undulating country, when fencing waterways or when establishing narrower belts. Waterways also provide watering points for stock and may be prone to flooding, both of which increase management costs if fenced. However, fencing may reduce the risk of stock losses due to exposure and waterway access, improved animal production, allow better grazing management and make mustering easier.

Reafforestation programs also raise concerns about fire, pests, property prices, loss of families and reduced on-farm employment opportunities. Although, for the same area of forest cover the costs will be greater for integrated revegetation, the economic, social and environmental risks, carried by individual landholders and the local community, are much lower than for conventional block plantation development.

Therein lies the challenge. Achieving some tree cover on every farm requires the involvement of tens of thousands of farming families, agricultural and forest industry groups, a range of departments across all levels of government, catchment management authorities, water interests and conservation groups. Rather than working independently, interest groups will need to work with and through the farming community in order to contribute to landscape change. Research and innovation is required that focuses on reducing the costs of tree establishment, management and utilisation of farm trees and improving the productivity of integrated systems. We also need to invest in the capability of farmers to design and manage forests on their land and to negotiate commercial arrangements with third parties seeking forest products or services.

Most of all, catchment authorities, government agencies and other interest groups willing to contribute to the costs of landscape change must do so in a way that encourages those who are prepared to invest in multipurpose integrated forests and fairly reward them on the basis of the environmental and social benefits they actually provide. No longer should there be an arbitrary division between trees for conservation and trees for profit. Trees can be managed to provide both, in the short term and for future generations.



What does ten percent look like?

Andrew and Jill Stewart manage the family's sheep and cattle farm near Birregurra. Since 1993 they have established multipurpose trees across more than 15% of the farm. This includes the full range of planting types from local native species through to joint venture pulpwood plantations. The mixed species sawlog planting along the eroded creek illustrates the potential for integrating all type of commercial forestry into a farming landscape for conservation and profit. The result is low in risk to the family, the community around them and the environment.

Their leadership, along with the Otway Agroforestry Network and the local landcare group, has inspired almost every landholder in the catchment to plant trees. Since 1990 the area of planted trees in the environmentally sensitive Yan Yan Gurt Catchment has increased from 1% to more than 16%. The Web of Trees¹⁵ is a study of the likely impact of many independent farm forest growers growing forests for a range of reasons on the environmental, social and economic integrity of the catchment. Not all farmers have planted 10% of their land, some have planted much more. The point is that many landholders growing trees for the reasons that they think are right for them results in a more socially and environmentally desirable landscape change than that occurring in areas of large scale industrial forest development.

Twenty years ago, in the next catchment, Rowan Reid established a riparian buffer strip with the intention of managing the trees for both conservation and timber production. Research conducted with CSIRO¹⁶ has demonstrated that it possible and economically feasible to selectively harvest high quality timber from multipurpose forests without threatening the environmental services they provide. In fact, timber management and harvesting appears to have promoted ecological diversity and environmental resilience.

These are compelling stories that defy convention and provide a realistic vision for farming communities across Victoria.

Making it happen

Achieving widespread integrated multipurpose revegetation requires changes in the way our community invests in landscape change:

1. Government agencies and catchment management authorities must acknowledge that it is acceptable for farmers to establish and manage multipurpose forests for both conservation and profit. All too often, whether through information, funding or legislation, there is a line drawn between forests that can be used for production and those that must be 'set-aside' or 'locked up' for conservation. Most farmers and scientists would acknowledge that it is not only

possible to achieve multiple outcomes from a forest but that there are also many potential synergies (ecological thinning, dead wood in waterways, gaps for biodiversity, etc).

2. Incentives for revegetation (both for conservation and timber production) should reward those who actually deliver the balance of environmental, social and economic outcomes sought by the community thereby encouraging innovation and efficiency. Direct incentives or cost sharing support for revegetation, whether for conservation or production can stifle innovation, discourage personal investment, encourage a welfare mindset around tree growing, reward neglect and mismanagement and lead to a situation where government has to contribute to the cost of every fence and tree¹⁷. The alternative is a system of reward payments from which farmers and their partners are able to profit on the basis of their innovation and efficiency in the delivery of the outcomes sought by government.

3. Government and industry must take farm forestry seriously and invest in the research and development required to underpin the practicality and viability of integrated multipurpose forestry. The Victorian Government has sought to support farm based commercial tree growing for many years with direct cost-share grants for timber plantations, extension support and industry development. Based on the lack of farmer interest in their cost-share programs government appears to have dismissed the potential of multipurpose farm based timber production suggesting that it will never be a significant contributor to regional timber supplies. In our opinion this ignores the fact that farmers are best placed to invest in the long term rotations required to produce high quality timber.

4. The farming community must get behind the workable solution of “10% of every farm – rather than 10% of farms”. The reaction against the social and economic impacts of large scale industrial forest expansion in some agricultural regions is understandable. Unfortunately, this has discouraged many farmers from considering integrated commercial tree growing as a viable enterprise and the opportunity arising from the development of the infrastructure, skills and markets arising from industrial forest development. Rather than react, the farming community should be looking to develop opportunities that benefit them and their communities.



16 year old eucalypt logs harvested from a riparian planting on Bambra Agoforestry Farm. The table is made from 10 year old eucalypts harvested from the same planting.

Future Information including reports and film: www.mtg.unimelb.edu.au

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