Science for Saving Species

Research findings factsheet

Project 6.3

Threatened Species Recovery Hub

National Environmental Science Programme

Landholders' participation in biodiverse carbon plantings

Scope of the research

This project investigated a range of factors that may influence biodiverse carbon planting program participation rates and their relative impacts.
The findings can help guide policy-makers to design programs that increase participation rates and appeal to the broadest possible range of landholders. Achieving this will maximise environmental outcomes from these programs.

The findings are also timely, as the Carbon Farming Initiative (CFI) is currently in transition, and the findings of this research could benefit the design of future programs. The CFI scheme was established in 2011 to help achieve a 5% greenhouse gas abatement target by 2020 by offering landholders the opportunity to sell sequestered carbon.

Private land: An important part of the landscape

More than 60 percent of land is privately owned or managed in Australia. Given this scale, how carbon and biodiversity are managed (or not managed) across private land can have significant environmental outcomes. In addition, Australia's designated conservation areas, on their own, are not able to conserve all threatened species and ecological communities. Many species depend on much broader areas of the landscape, including private land.

Increasing biodiversity and carbon on private land

Biodiverse carbon planting programs are being run to increase biodiversity and carbon values on private land. By planting trees, the programs store carbon to help tackle climate change. Biodiverse plantations can also increase the availability of resources for native wildlife, act as seed banks, support important ecological functions, help to manage salinity and water tables, and enhance the resilience of ecosystems against climate change and pest invasion.

The effectiveness and combined impact of any program will be strongly influenced by the area of land engaged by the program. As such, landholder participation rates strongly influence their success.

Biodiverse carbon plantings in North Central Catchment Management Authority in Victoria. Photo:Nooshin Torabi

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Strategies to increase participation

To date, biodiverse carbon planting schemes such as the CFI have primarily relied on financial incentives to achieve participation among landholders. However, whether this is the most effective approach has not previously been established. There are also potentially other approaches that could increase participation for less cost.

Our research focused on the social and environmental drivers of participation, some of which are not related to the actual design of the program. Examples of these include:

- The compatibility of programs with the primary land practices of landholders
- Landholder awareness of the environmental and productivity benefits of the program (i.e., landholders observing the participation outcomes of their peers)
- Active engagement in local Landcare groups (which also provide opportunities for social learning by landholders and progresses stewardship values that help them engage in biodiverse carbon planting schemes).

We also took into account factors that may inhibit participation. The key factors of carbon programs that we identified as potentially reducing landholder willingness to join are:

- Complicated administration processes
- High management requirements
- Especially in traditional farming landscapes, the legal obligation for trees to stay on properties for 100 years.

We also looked at the different financial incentives. Currently there are two main methods of creating financial incentives for landholder participation: bundling or stacking carbon and biodiversity credits.

Bundling refers to paying a premium price for carbon due to the additional biodiversity benefits. Stacking involves selling carbon and biodiversity credits separately in their related markets. In addition to the financial incentives offered by schemes, the existing financial resources of landholders (such as off-farm income) could affect participation.

We aimed to determine how participation could be increased by considering three factors: the socio-cultural drivers of landholders; program design; and the availability of financial resources. To assist with this, we developed a Bayesian Belief Network (BBN), a probabilistic graphical model that predicts landholder participation rates for any type of carbon-farming scheme. Our study considered different types of biodiverse carbon sequestration programs and a diverse range of landholder participants.

IMAGE BELOW: Biodiverse carbon plantings 2 in North Central Catchment Management Authority in Victoria. Photo:Nooshin Torabi

Bundling and stacking explained

Bundling involves selling the credits from carbon plantings into the carbon market. It holds the possibility of charging a higher price as a "premium carbon credit" due to the biodiversity co-benefits. Bundling owes its name to these co-benefits, as the credits "bundled" with them can't be sold separately in the markets. Bundling also provides buyers with the opportunity to achieve other objectives, such as environmental marketing.

Stacking of carbon and biodiversity credits from the same biodiversity planting, on the other hand, allows for separate sale in both carbon and biodiversity markets. For example, a stacked carbon and biodiversity credit may be sold once in a biodiversity market as a biodiversity offset, and then again in carbon market as a carbon credit.

Our methods

We chose to create a Bayesian Belief Network, as BBNs:

- are useful when combining qualitative and quantitative data
- can support decision-making and incentive scheme design by identifying key nodes and links that drive program outcomes
- can represent these causal relationships among variables in a way that is easy to communicate with stakeholders.
- can be modified and validated as new data becomes available, making them practical decision-making tools.

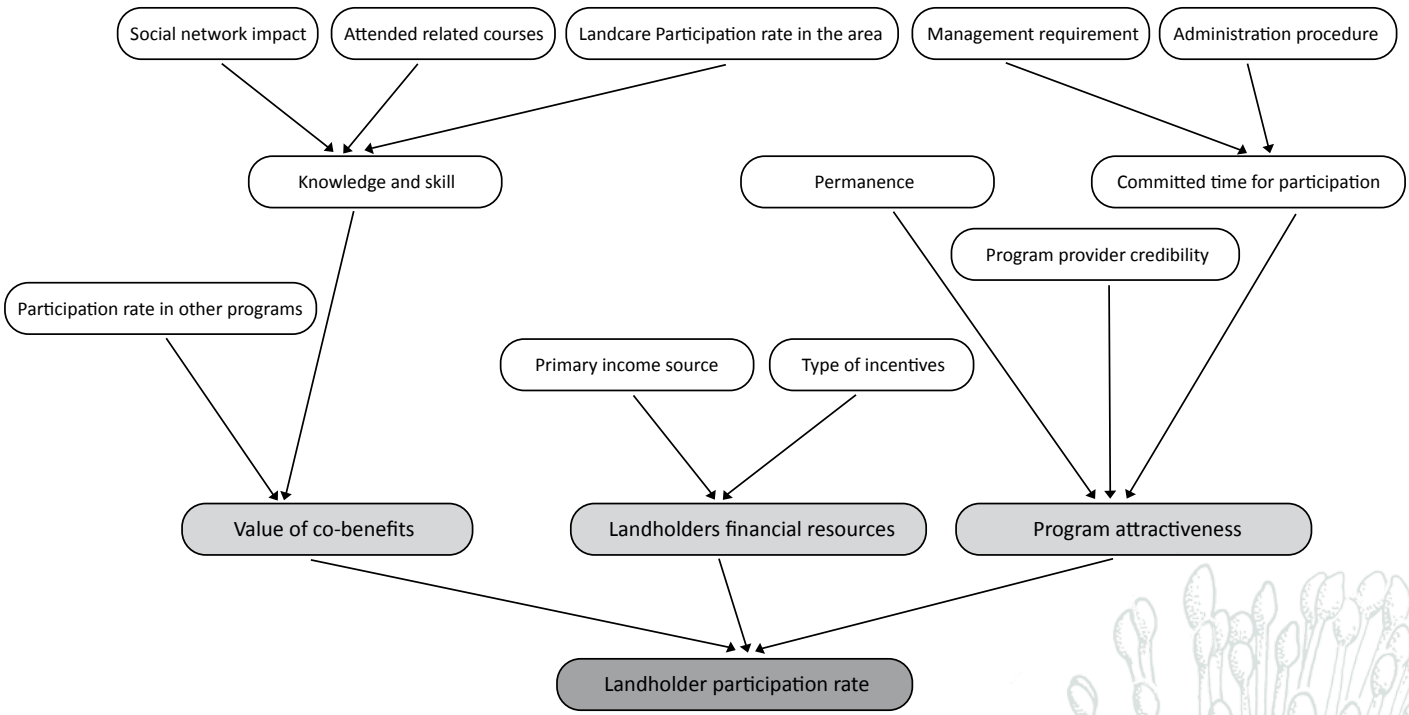
Three kinds of inputs went into our BBN: a literature review, surveys and interviews.

Our first step was to undertake the literature review on the factors influencing landholder participation in agri-environmental schemes, voluntary carbon plantings and conservation on private land.

Next, we conducted the surveys. We asked a diverse group of 17 landholders who participated in a voluntary biodiverse carbon planting program in Victoria (commercial farmers, semi-commercial farmers, hobby farmers, lifestyle landholders) about their motivations for participation in each stage of adoption.

Finally, we interviewed 14 science and policy stakeholders working in the field of carbon and biodiversity conservation in Australia about challenges and opportunities in bundling and stacking carbon and biodiversity ecosystem services. The interviewees were drawn from universities, CSIRO, government organisations and non-government organisations.

Through an expert elicitation workshop, we also examined the influence of nine different scenarios on participation rates. Each scenario represented a combination of an incentivising scenario (building, stacking or carbon-only payments) and a program permanence option (whether trees must be retained for 100 years, 25 years or had non-binding time frames). These nine scenarios have implications beyond Australia, where we tested them, as permanence agreements and financial incentives are common factors of bio-sequestration schemes worldwide.



Influence diagram depicting the causal web of key factors affecting landholder participation. The left-hand branch of the model indicates landholders' social drivers, the middle branch indicates financial factors and the right-hand branch refers to the specific elements of the program. Landholder participation rate is the proportion of landholders in a given region who are likely to agree to participate.

Our findings

Program design was revealed as the most important factor influencing landowner participation rates, followed by the value of co-benefits to landowners, with the least important factor being financial incentives.

The most effective scenario at improving participation was stacking carbon and biodiversity credits, and non-binding time frames for vegetation permanence. This scenario almost doubles up the participation rate in comparison with the carbon only payments and 100-year agreement.

The second-most effective scenario was bundling credits, combined with non-binding time frames.

The least effective scenario was the status quo, where a sole payment for carbon credits is offered to landholders with a long-term agreement. This scenario actually substantially reduced the participation rate.

Our exploration of different scenarios of financial incentives supports previous findings that these do not constitute the main factor influencing participation rates in biodiverse carbon plantings. While stacking credits was shown to have the greatest potential to increase participation, bundling may be more practical, given the additional hurdles of engaging in separate carbon and biodiversity markets. Bundling could be introduced as a premium carbon standard, offering higher pricing to recognise the biodiversity co-benefits of carbon plantings and assist landholders with transaction costs.

Programs with non-binding time frames are more attractive to landowners than those with set 25- or 100-year vegetation permanence commitments, and are likely to lead to higher adoption rates. When programs do specify a time commitment the difference between the shorter (25-year) and longer (100-year) agreements on participation rates was trivial.

Non-binding permanence arrangements may result in some landowners clearing the biodiverse carbon planting within short times frames, for example, after only 10 years due to a farm restructure, therefore reducing the environmental benefit. However, if the flexibility of non-binding permanence were to greatly increase participation rates, while the number of landowners that do clear replanting areas early is very low, the net outcome may still be a large increase in the area of plantings.

Our findings also suggest that social factors will be key to the success of biodiversity planting programs. Awareness of both conservation and non-conservation co-benefits was shown to influence program adoption. This awareness is principally learned through landholders' social networks (friends, family and community members) and through attending land management-related courses to develop their knowledge and skills. These factors have an impact on both the productivity drivers such as pasture improvement and establishment of windbreaks, and conservation-drivers, including improving wildlife corridors and improving biodiversity.

Work cited

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Further Information

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Recommendations

Increasing landholder participation rates is vital to achieving the landscape-scale biodiversity conservation and carbon abatement goals of biodiverse carbon planting programs.

Programs that combine stacking and bundling of financial credits with non-binding time frames will increase participation rates.

Both conservation and productivity-related co-benefits matter to landholders and influence participation, so communicating these effectively to landholders is important.

Adoption of these findings can help policy-makers to design programs that are more flexible and therefore appealing to a broader range of landholders.

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