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A CASE STUDY OF THE WALGETT CLUSTER PVP

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Executive summary

The Lower Pian/Pagan Creek Conservation Group's native vegetation management plan attempted to deliver environmental, economic and social outcomes at a landscape scale across 13 properties.

It was formulated and first considered during the transitional phase between the *Native Vegetation Conservation Act 1997* and the *Native Vegetation Act 2003*. Its landscape scale approach and proposed offsets were not easily dealt with under the new Act, which stipulated that clearing proposals be assessed at the property scale using the EOAM based software (then named 'PVP Developer'). Consequently the PVP Developer was applied to each of the 13 properties separately.

While the conservation and rehabilitation parts of the plan were approved, most of the proposed clearing for cropping was not. No landscape scale assessment was undertaken, and only 3 of the 13 landholders had an individual property PVP at the conclusion of the process. All 3 were unsatisfied with the terms of the PVP and one has not cleared any of the vegetation permitted due to the perceived onerous nature of the offset requirements. Most of the approved conservation and rehabilitation work has not been undertaken due to lack of funds and disappointment with the outcome. The landholders involved continue to argue that increased cropping is required for them to remain economically viable.

Background

The Minister for the Environment has appointed an independent panel to undertake a comprehensive review of the *Native Vegetation Act 2003 (NSW)*, *Threatened Species Conservation Act 1995 (NSW)* and related biodiversity legislation. The review has been requested out of recognition that a greater balance is needed between achieving environmental objectives while keeping rural economies and societies sustainable.

NSW Farmers Association received funding to undertake evidence based research assessing the *Native Vegetation Act 2003* ("the Act"), focusing on key areas of concern for the Association's members. Evidentiary Pty Ltd undertook this research and summarised the findings in a report titled "Review of the Native Vegetation Act 2003 – an evidence based review." Additionally Evidentiary has been asked to conduct a case study of the Walgett Cluster PVP, which is the focus of this report.

The Walgett Cluster PVP is often cited as an example of a regional approach that could have achieved triple bottom line outcomes, however little has been written about it in a formal manner. The purpose of undertaking this case study was to document the landholders' Cluster PVP proposal, the final outcome and what lessons were learnt in the process. Landholders that participated in the Walgett Cluster PVP (N=4) were interviewed, as was a representative of an independent statutory authority involved in the process. Staff from the North West LLS were contacted but declined to participate.

The case study

About Walgett

Walgett is located in north-west NSW near the junction of the Barwon and Namoi rivers. Despite being on a floodplain and having fertile black soil plains, native vegetation in Walgett has not been heavily cleared since European settlement due to its fairly low and variable rainfall.

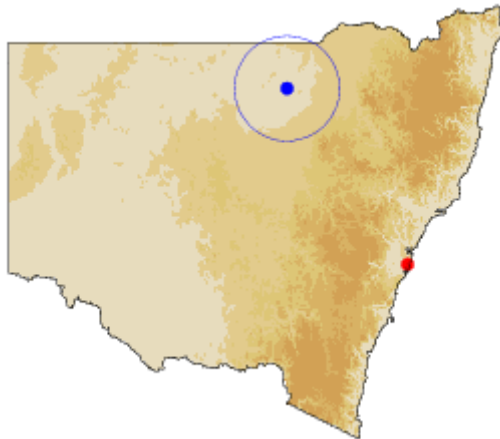


Figure 1: Location of Walgett in a map of NSW, Australia (Bureau of Meteorology 2014)

Walgett was settled by Europeans in the mid 1800's with most of the landscape involved in the plan being open grasslands. The area is prone to Invasive Native Shrub (INS) incursions and has a long history of managing them with fire and ring-barking in order to retain open grassland landscape. The land was predominantly used by farmers for sheep grazing until the decline in the price of wool, which saw the importance of cattle grazing and cropping rise (Lower Pian/Pagan Creek Conservation Group 2005)

Due to its rainfall, Walgett was considered marginal cropping country until the recent widespread uptake of no till farming. Using tramline farming systems and new technology, Walgett is now considered highly suitable for productive cropping. With low sheep and cattle commodity prices and much higher returns per hectare for cropping, many landholders in the region wish to undertake more cropping on their properties. They argue that this is necessary if their farms are to remain economically viable. In order to undertake more cropping, landholders would need to clear some native vegetation on land currently used for grazing.

The formation of the Lower Pian/Pagan Creek Conservation Group

In 2004 neighbouring landholders from 13 properties formed the Lower Pian/Pagan Creek Conservation Group ('the group'). Their goal was to develop and implement a landscape vegetation plan that covered their combined properties, which totalled approximately 40,000 hectares. The group had 3 main goals to address vegetation management issues that were consistent across the 13 properties.

Firstly, they wanted to manage certain areas for conservation (namely those unsuitable for cropping or grazing) and link these areas across the properties via wildlife corridors. Secondly, they planned to rehabilitate land that had been overtaken by INS. Finally, due to the substantial costs involved in undertaking conservation and rehabilitation work, and in order to keep their farming enterprises viable, they wanted to clear some native vegetation in order to be able to use suitable land for cropping.

The group received funding to undertake individual farm plans with the assistance of consultants and agronomists. These plans were very detailed and considered the different soil types and rainfall variability. They identified areas best suited for:

- landscape rehabilitation
- corridors, linkages and conservation areas
- windbreaks
- stock refuge areas
- thinning for grazing
- management of invasive species
- long-term cropping and grazing rotations.

After developing detailed individual plans, the 13 landholders met and overlaid their individual plans on a map of the entire area. They were pleased that the plans linked together very well. There was a wildlife corridor running across all the properties, with riparian vegetation and stock routes being maintained. Across the whole landscape there was a mosaic effect which served the group's 3 main goals of increased land for cropping, rehabilitation of degraded land and land for conservation. With the finer details of the landscape approach agreed upon, the group finished drafting the Lower Pian/Pagan Creek Conservation Group Landscape Vegetation Management Plan ('the plan') in May 2005.

The native vegetation legislative framework in 2005

The *Native Vegetation Act 2003* was gazetted in 2003, but did not come into force until late 2005. It took approximately 2 years to develop the corresponding regulations, along with the Environmental Outcomes Assessment Methodology (EOAM) and the PVP Developer software.

During this transition period, the *Native Vegetation Conservation Act 1997* was still in force, with some transitional policy arrangements in place. The group formed in 2004, with their written plan finalised in May 2005. The plan was therefore first considered during this transitional phase between the two Acts. All parties involved understood that the plan would be used to test the new PVP Developer software in order to ascertain how the tool would work with a landscape scale approach.

A technical panel was established to assess the plan and advise the Director General of the Department of Infrastructure, Planning and Natural Resources (DIPNR) on how it may be able to operate under the new Act. The *Native Vegetation Act 2003* had as its central policy position the prevention of broadscale clearing unless it improves or maintains environmental outcomes. A core feature of its implementation was reliance on the PVP Developer software to assess applications for clearing at the property scale.

In late 2005 the Natural Resources Commission (NRC) was asked by the government to examine the potential for landscape scale vegetation management plans to deliver better economic as well as environmental outcomes than single farm or small scale property vegetation plans. A number of landscape or multi-farm vegetation plans were examined by the NRC during its review, including the Walgett plan.

The plan

The plan proposed to introduce cropping in approximately 8% of the area, using conservation tillage techniques that can improve soil condition, along with a pasture/cropping system that would increase native grasslands in the pasture phase. A significant proportion of the native vegetation that would have to be cleared for this cropping was Coolibah-Box Woodland, the understory of which was in low condition and subject to continued grazing pressure.

Given that Coolibah-Box Woodland is listed as an endangered ecological community (EEC) under the *Threatened Species Conservation Act 1995 (NSW)* it was proposed to offset this clearing by managing 19% of the area for conservation. This included an area of higher quality Coolibah-Box Woodland than that proposed to be cleared, as well as more than 800 ha (200km) of riparian vegetation and areas of River Red Gum and Belah Woodland. It included wildlife corridors which ran the length of the total plan area.

Improved environmental management for 23% of the area was proposed which involved managing 3,494 ha of INS and rehabilitating 1,570 ha of native grasslands and 4,439 ha of native woodlands.

The plan met and exceeded some of the Namoi CMA 2005 targets, which were:

- To increase native vegetation and biodiversity by planting 350 ha of native vegetation. The plan proposed to plant 1,570 ha of native grassland.
- To conserve 3,100 ha through property vegetation plans. The proposal outlined more than 7,700 ha.
- To manage 125km of riparian vegetation for riverine ecosystem health. The plan put forward over 200km of riparian vegetation for conservation management.

The plan also proposed economic benefits for the landholders involved and the local community. It was calculated that the extra cropping would result in an additional \$60,000 annual income per farm and 8 additional full-time jobs, as well as likely contract and seasonal labour.

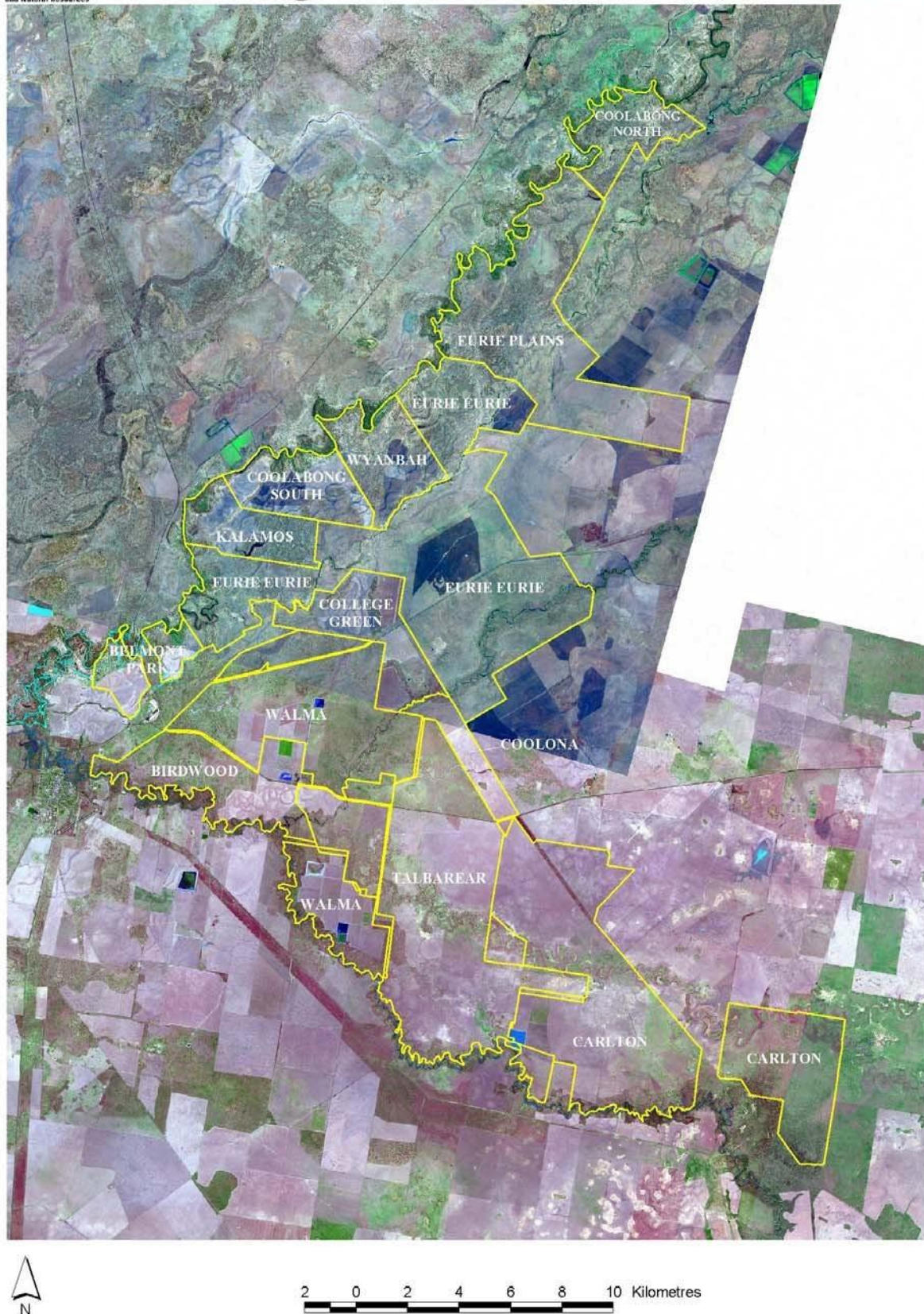


Figure 2: Map of the 13 properties and proposed area (Lower Pian/Pagan Creek Conservation Group 2005)

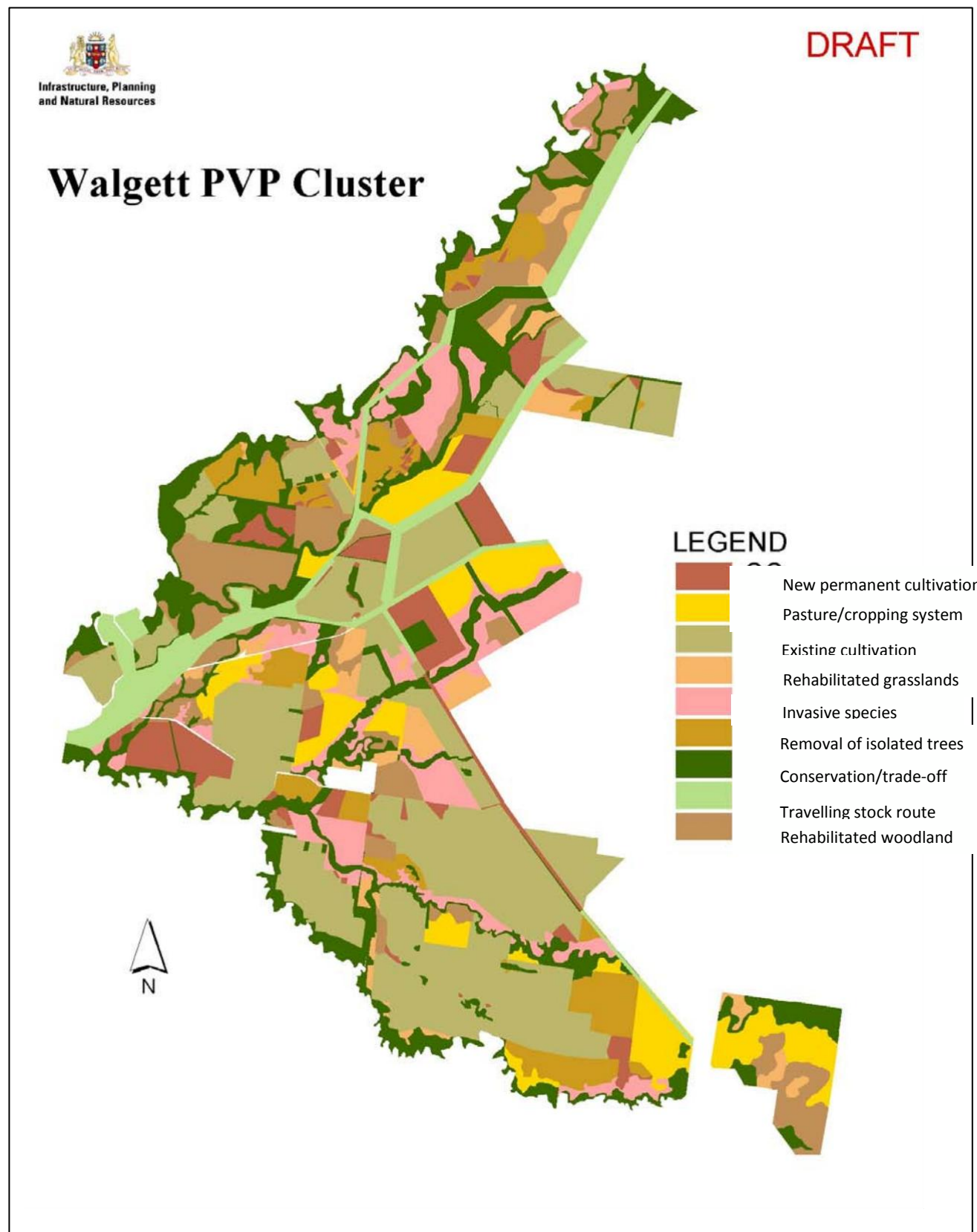


Figure 3: The proposed land use across the 13 properties (Lower Pian/Pagan Creek Conservation Group 2005)

Total project area:	40,887.4 ha	100%
Area of native vegetation:	26,332.0	64.4
Area of current cultivation (not including RIT):	11,640.9	28.5
Current cultivation applied for removal of isolated trees (RIT):	2,914.6	7.1
Area applied to be cleared for permanent cultivation:	2,803.0	6.9
Total:	17,358.5	42.5
Area of State Protected Land (SPL) (estimated as a minimum of 200 km of river with a 20 m buffer either side)	800 ha	2.0
Area applied to be cleared for pasture/cropping systems (to be primarily managed as open native grasslands):	3,342.9	8.2
Area of invasive species to be managed (to be primarily managed as open native grasslands or woodlands):	3,494.5	8.5
Area to be thinned-to-graze (to be primarily managed as open native woodlands):	4,439.5	10.9
Area of rehabilitated grassland (to be primarily managed as open native grasslands):	1,570.1	3.8
Area of conservation/trade-offs (including SPL):	7,707.8	18.9
Total:	20,554.8	50.3
Traveling Stock Route	2,974.2	7.3%

Table 1: Project Statistics (Lower Pian/Pagan Creek Conservation Group 2005)

The assessment of the plan

Vegetation clearing proposed under the plan was tested using (the then draft) PVP Developer by Namoi CMA staff (who would be the consent authority under the new Act.) The technical panel struggled with plan's multi-farm landscape approach. There was no scope within the legislative framework to consider the 13 properties as one single landscape, which was the cornerstone of the group's plan. At the time, PVP Developer also struggled to adequately assess large properties due to technical limitations in the software and datasets that underpinned the decision rules.

Another issue was the proposed offsets. The plan suggested clearing on some properties to be offset on other properties. How this would be managed if the property with the offset was sold and the new owners wished to clear it was one such issue discussed. It was finally assessed in accordance with the legislation and the PVP Developer software evaluated the clearing proposed for each individual property.

What was accepted – conservation, rehabilitation and paddock tree clearing

The proposed conservation areas were approved, with landholders asked to sign conservation PVP's which would bind these areas to conservation in perpetuity. The areas set aside for environmental management and rehabilitation were also approved. Landholders were permitted to clear INS, some of which was Coolibah as the individual species (*Eucalyptus coolabah*) is listed as an INS in the Namoi region and therefore permitted to be cleared under the *Native Vegetation Act 2003*. There were however, restrictions on how this area could be cleared and used given the

presence of an endangered ecological community (NRC 2007). The removal of scattered paddock trees was approved, but with offsets on the individual properties, and thinning of woodlands was allowed in accordance with benchmark densities (NRC 2007).

What was not accepted - clearing for cropping

The key issue with the plan was clearing to be undertaken for cropping and the proposed offsets for this clearing. A large part of the area that the group wished to clear for cropping contained Coolibah-Black Box Woodland, which was listed as an endangered ecological community under the *Threatened Species Conservation Act 1995*. The woodland's understory of native grasses was in poor condition and subject to continued grazing pressure. Part of the plan's proposed offsets involved conserving Coolibah-Black Box Woodland in a different area that was in better condition and also under grazing pressure. The PVP Developer prevented the lower quality ecological community being cleared and offset, because it did not deem it as 'low condition.' To be classified as low condition, the understory had to be below 50% native grasses, and the over-story above 25% of the benchmark stem density. While the understory condition was deemed as low condition by these criteria, the over-story was not (NRC 2007).

For the few areas that were permitted to be cleared, additional offsets were sought on the individual properties, given that offsets proposed on neighbouring properties were not considered. According to the landholders interviewed, these offsets ranged from 3 hectares of offsets for every 1 hectare cleared (3:1) to 6 hectares of offsets for every 1 hectare cleared (6:1).

Proposal	PVP result	Comments
Clearing native vegetation for permanent cultivation	Not approved	Vegetation is Coolibah-Box Woodland community and so is:
Clearing native vegetation for rotation between pasture and cropping	Not approved	<ul style="list-style-type: none"> Native vegetation not in low condition and occurring in a landscape that is > 70% cleared, and A native vegetation type not in low condition that is > 70% cleared, and A native vegetation community listed under the <i>Threatened Species Conservation Act 1995 (NSW)</i> and the <i>Environmental Protection and Biodiversity Conservation Act 1999 (Commonwealth)</i> and is not of low condition
Clearing of isolated paddock trees	Approved	Each property has sufficient area to cover their own offset requirements
Management of invasive native scrub to restore degraded open native woodlands	Approved	<ul style="list-style-type: none"> No offsets required Coolibah species are listed as invasive in Namoi region Minimal access to 3 in 15 year cropping treatment because vegetation not in low condition and is an endangered ecological community Blade ploughing or cropping can't be used in endangered ecological communities
Thinning woodlands	Approved	<ul style="list-style-type: none"> Thinning to benchmark densities is permitted

Table 2: Results of PVP Developer assessment of the Walgett Cluster PVP (NRC 2007)

Coolibah – threatened and invasive

The difficulty in clearing areas appropriate for cropping was largely due to the presence of Coolibah-Black Box Woodland Ecological Community, which is listed as threatened in NSW and nationally. Conversely the individual species of Coolibah (*Eucalyptus coolabah*) is also listed as an invasive native species (in the then Namoi CMA region) meaning it can be legally cleared or thinned under the *Native Vegetation Act 2003*. Therefore in assessing the plan, the PVP Developer and those using it had to distinguish between whether they were dealing with the threatened and therefore protected Coolibah-Black Box Woodland Ecological Community, or the invasive and therefore clearable Coolibah species.

Landholders found the practical outcome of this distinction difficult to comprehend. According to one landholder involved “they said in this location they’re threatened so you can’t clear them, but over here they’re not so you can clear some.”

The end result

At the end of the assessment process, only 3 of the original 13 landholders in the group signed a PVP for their property. According to those interviewed, this was because most landholders involved were either told that they were not permitted to clear at all for cropping, or that the little they were allowed to clear for cropping came with such a high offset ratio on their property as to make it unviable.

One of the landholders interviewed was permitted to clear 600 ha for cropping, after requesting to clear 2000 ha. This landholder was very disappointed with the outcome, but accepted the PVP on the grounds that 600 ha was better than nothing. Another landholder that signed a PVP was permitted to clear 60 ha for cropping, but had to offset that with a ratio of 6:1. This landholder has not cleared anything to date, claiming that the offsets are too high to proceed, thus their land use remains largely unchanged as a result of the process.

Despite 5 years in the planning and much time and effort expended, landholders felt that there was no real outcome. Most continue on properties where they are unable to increase cropping and receive the associated economic and social benefits. Very little that was proposed in terms of conservation and rehabilitation has been undertaken.

Would any outcomes be different now?

The process of assessing the group’s plan concluded in 2009. At the time of writing this case study in 2014, the regulations with regard to native vegetation have undergone various changes. Elements of the plan that then were approved under a PVP such as clearing paddock trees, managing INS and thinning of woodlands could now be considered a RAMA, or potentially be covered by the proposed self-assessable codes (but only if they met the self-assessable code criteria for the particular activity.) If biobanking credits were available to farmers, this could be a vehicle by which to enable offsets for clearing to occur on other properties. However, the software’s assessment of the clearing of the Coolibah-Black Box Woodland for cropping and the proposed offsets would remain the same. Also unchanged is the inability of the legislative framework to consider a multi-farm landscape proposal, with assessment at the property scale remaining.

Why were so few outcomes achieved?

According to landholders involved, the plan “went nowhere” with very little ultimately achieved. Certainly the native vegetation legislative framework at the time did not help. This novel multi-farm landscape scale proposal was being assessed at a time when the *Native Vegetation Act 2003* had finally come into force, after 2 years developing the EOAM and the PVP Developer. The plan did not fit in to this new legislative approach. It operated at a landscape scale, while the new Act stipulated that clearing be assessed at the property level. The plan had considered environmental, economic and social aspects in its proposal, and attempted to balance these outcomes, whereas the PVP Developer software only considered environmental outcomes in accordance with the EOAM underpinning it. The Act gave CMA staff a limited ability to negotiate with landholders, with the PVP Developer tool being the prime decision maker. The Act simply did not have the flexibility necessary to deal with such a proposal.

From the perspective of the landholders the failure of the plan represented far more than being inconsistent with the new legislative approach.

The breakdown of trust and cooperation

Landholders involved in the plan claim that over 100 people from government and other organisations came to Walgett and visited their properties, in order to see how the plan would work on the ground. Landholders noted that many of these officials would say to them off the record that their plan was a good one and made sense, yet when the same officials returned to their offices in Sydney they would say the opposite, or simply not act in order to make it work. There was a strong sense of frustration with this behaviour, with landholders feeling that they had their hopes raised only to be let down after 5 years of effort.

Landholders felt that they were flexible and were willing to compromise, but that in the end they were asked to do all the compromising. As the landholders put it, the government was happy to take all the conservation areas and rehabilitation work, but did not offer anything in return by not permitting additional clearing for cropping and not offering reasonable financial assistance to undertake the approved work. In terms of the conservation areas, landholders were asked to put them under a conservation PVP in perpetuity. This made landholders uneasy, particularly given that many had been offered nothing in terms of additional land for cropping.

Landholders repeated that they wanted to work together with government, but that the way in which their plan was handled led to a polarisation of the two parties. Landholders felt that throughout the process their knowledge and needs were not listened to and not treated with respect. This sentiment has led to a degradation of trust and good will between landholders in Walgett and the government.

Poor triple bottom line outcome

The PVP Developer did not allow most of the native vegetation on the proposed cropping areas to be cleared, due to the presence of heavily grazed Coolibah-Box woodland. Without allowing this clearing for cropping, the landholders involved had very little incentive to set aside other areas of Coolibah-Box woodland in higher condition. The end result was that the software preserved an already degraded ecological community with little future, which meant that the woodland in higher

condition would remain under pressure from grazing (NRC 2007). As the landholders interviewed claimed, without the additional funds available from increased cropping, rehabilitating land affected by INS and maintaining conservation areas would be extremely challenging for them to undertake alone. As a result of this, not only do landholders have very little incentive to undertake the environmental management and conservation work proposed in the plan, but they also miss out on an estimated \$60,000 extra income per farm per year, as well as the extra employment opportunities.

Inflexible and impractical

It was noted that the legislation was inflexible in that it did not take into account regional differences. Landholders regarded the listing of the Coolibah as being both invasive and a member of a threatened ecological community as an example of this. As landholder 1 claimed “it was so frustrating (being unable to clear for cropping) because we are not seeing the last of the Coolibah in Walgett.” Landholders noted the ever-changing, dynamic nature of their properties, which the Act did not seem to recognise. For example, a landholder interviewed recalled that in the 1970’s most of his property was open grassland with very few trees. Partly as a result of a succession of floods, it is now overrun with woody weeds including Coolibah regrowth and Bimblebox.

Even the approved conservation and rehabilitation aspects of the plan were inflexible in terms of how they could be undertaken. For example, the areas to be set aside for conservation had to be done so in perpetuity under a PVP, with conditional funding. The rehabilitation of open woodland degraded by INS was approved, but landholders were not allowed to use blade ploughing or cropping in these areas as proposed.

The fundamental impracticality of the outcome was that it left landholders with no extra income to fund the expensive rehabilitation and conservation work outlined in the plan. They argued that National Parks are funded to manage weeds and feral animals, yet the government expects farmers to do the same with no financial assistance. Although the rehabilitation and conservation components of the plan were approved, most have not been undertaken on the scale proposed in the plan, due to this lack of financial support.

What worked well about the Walgett cluster PVP

All of the landholders interviewed agreed that what worked best about their experience with the group and the plan was how well the landholders worked together. The way that the process was managed from the outset was key to its success. Instead of all being put into a room and asked to agree with each other, each individual farmer developed a property plan. The process of developing these plans was important, as they involved expert advice regarding what land use was best for different parts of the property. This advice meant that all of the landholders were well informed and prepared when they met as a group to determine the landscape plan. This expert advice was expensive, and the funding received to assist with this was helpful.

Armed with this knowledge, the process of determining the most appropriate landscape scale plan was straightforward. As landholder 3 claimed “by asking people first what they wanted to do, it was amazing how well the plans linked up.” Overlaying the individual property plans over the whole area, it became clear which areas were most suitable for cropping, conservation and rehabilitation based on the landscape.

The experience for those involved was a positive example of how landholders work well together. In this case, they were well informed, willing to be flexible and compromise and considered how the landscape worked in order to balance conservation and production.

Discussion

The Walgett Cluster PVP was an attempt at a landscape scale approach to native vegetation management. The proposal aimed to deliver environmental, economic and social outcomes, however few of these proposed outcomes eventuated. Landholders involved in the plan voiced their frustrations with the legislation's inflexibility, which resulted in inappropriate and unworkable outcomes. The feeling that they were no longer working together with government but rather being dictated to by an inflexible partner resulted in polarisation and reduced trust. Their experience echoes key findings of Evidentiary's "Review of the Native Vegetation Act 2003 – an evidence based review" which examined the *Native Vegetation Act 2003* and its impact on landholders.

That report found that:

- The Act overall has not achieved triple bottom line outcomes.
- The Act's adversarial approach has alienated landholders and created mistrust and resentment towards the government. Fundamental to building a new workable system of native vegetation conservation on private land will be the rebuilding of this trust.
- Landholders overwhelmingly feel that their knowledge and perspectives on native vegetation management, along with concerns about the practical impact of the Act, have been ignored. The policy has a far greater chance of long term success if landholders consider it legitimate.
- Managing native vegetation on a regional scale is preferable than doing so at a property scale, because it can more effectively consider the appropriate extent, quality and type of native vegetation that needs to be conserved for that area, tied in with local LLS salinity, water and biodiversity targets.

The Walgett Cluster PVP case study is demonstrative of the potential problematic outcomes of the Act's application. In this case, a number of perverse outcomes resulted. These include:

- Landholders have no incentive to conserve high quality Coolibah-Black Box Woodland, which continues to be grazed.
- Much of the approved conservation and rehabilitation work has not been undertaken.
- A landholder interviewed noted that they were losing hectares per year to INS, but that they do not clear it because they do not want to have any contact with the LLS in order to request a clearing PVP. Consequently the breakdown in the relationship between landholders and government has resulted in poor environmental outcomes.
- Landholders continue to experience financial pressure because they are unable to increase cropping

Conclusion

This case study highlights issues raised in the wider discourse on how to best balance the retention of native vegetation to support biodiversity with productive agriculture and viable agricultural communities. It demonstrates that landholders can work together cooperatively, and that well informed, community developed plans at a landscape scale can propose triple bottom line outcomes. It also shows some of the flaws of the current regulatory approach, including its inflexibility and impractical end results and its failure to reach satisfactory environmental, economic and social outcomes. In this case, these flaws also worked to create feelings of distrust and resentment from landholders towards government.

Native vegetation needs to be retained, as well as managed and re-established in order to support biodiversity and other ecosystem services. If this is going to happen on a long term basis, it requires ongoing management actions and the long term commitment of landholders. The current legislation has taken a polarising approach, with a focus on 'prevention' of clearing by landholders, rather than on promoting positive action or cooperation. Effectively balancing native vegetation conservation with productive agriculture has a far greater chance of long term success if landholders regard the approach and the outcome as legitimate. For native vegetation laws to be regarded as legitimate, they need to be tailored to suit the local environment, for which there needs to be local input and respect for local knowledge. These necessary elements appear to have been lacking in the Walgett Cluster PVP case study.

Biochar and INS – the potential for triple bottom line results?

Biochar is a carbon rich (charcoal) material obtained from the slow pyrolysis (heating without oxygen) of biomass. Given the need to reduce carbon emissions as a result of climate change, interest in biochar has spiked. This is due to its ability to sequester carbon in the soil, which would otherwise be released into the atmosphere (Department of Primary Industries 2014).

Recent research undertaken by Victoria's North East CMA has investigated whether the application of biochar to soil can lead to productivity gains for farms. If this were the case, biochar could help landholders to achieve both environmental and economic outcomes, especially where cleared INS was used as the biomass (Campbell et al. 2013).

The 'Biochar Capacity Building Project' aimed to measure the impact of willow biochar on the nutrient content and water holding capacities of different soil types throughout north east Victoria and southern NSW. It also aimed to measure the growth of crops, vines and pastures where willow biochar had been added to these soils (Campbell et al. 2013).

In 2012, five replicated field experiments were established at five sites to evaluate the project's aims. The sites involved a high-altitude vineyard at Tumbarumba NSW, a dairy farm with Italian ryegrass pasture in Greta South, crop paddocks at Rutherglen Victoria and Rand NSW and a perennial pasture on a Talgarno beef property. The willow biochar was applied to each of these sites (Campbell et al. 2013).

The preliminary findings after the first year of the project showed that the growth of crops, vines, and pasture in the field experiments showed no noticeable response to biochar in terms of productivity. However the preservation of moisture in the soil was notable, even in areas where biochar was applied in low rates. Landholders involved in the experiment noted that preservation of moisture can assist with increased crop production, and were interested to see the results of the second year of the trial (North East Catchment Management Authority 2014).

It is too early to draw any conclusive link between biochar application and increased productivity, however if this link was shown then landholders in NSW (particularly those in areas prone to INS) could use the resource to increase triple bottom line outcomes.

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