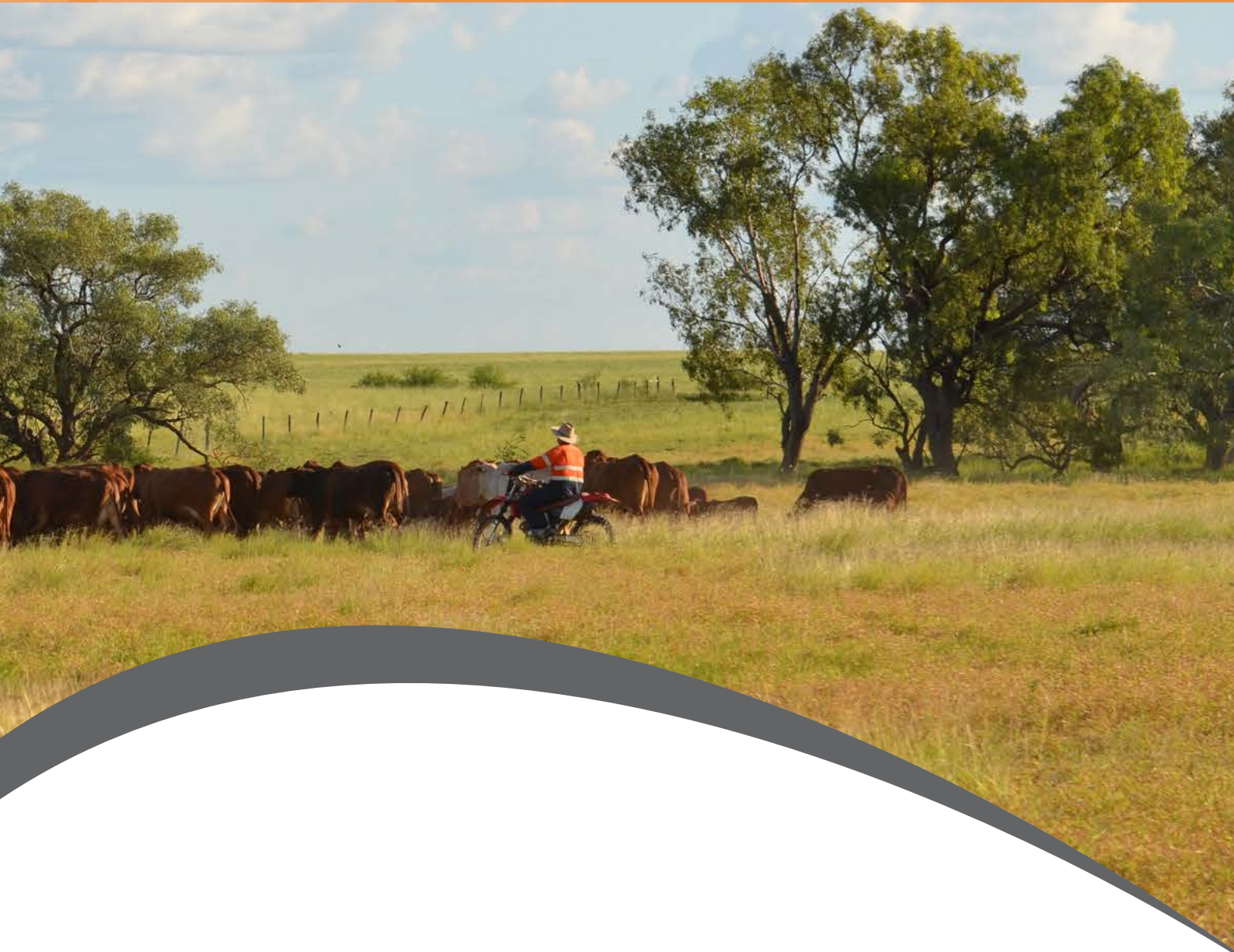


Potential for contractual biodiversity conservation by pastoralists and graziers | Final report

By Romy Greiner



National Environmental
Research Program

NORTHERN AUSTRALIA HUB



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Photos by Romy Greiner.

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Contents

Introduction.....	1
Pastoralists have a critical role to play in biodiversity conservation in northern Australia.....	1
Pastoralists are willing to sign up to biodiversity conservation contracts	4
Conclusions	7
References	9

Introduction

Protected areas provide the cornerstone of biodiversity conservation. In many situations however, the protected area estate is too small and/or unrepresentative to safeguard biodiversity. Here, a more pluralistic approach is required which involves partnerships with other landholders, in particular pastoralists and graziers. While some pastoralists and graziers may be intrinsically motivated to conserve biodiversity on their land, systematic participation can be encouraged by providing pastoralists and graziers with financial incentives in the form of 'payments for environmental services' (PES).

Empirical research was conducted to provide insights into pastoralists and graziers' willingness to sign up to voluntary conservation agreements. The research employed a choice experiment as a way of gauging likely business decisions in the absence of observable market behaviour. Such research is vital for the design of conservation programs and tailoring of conservation contracts to a given context — after all, voluntary conservation programs only make a real contribution to the conservation effort if there is sufficient up-take by pastoralists and graziers, resulting in a consolidated and systematic conservation effort across all types of land tenure.

Pastoralists have a critical role to play in biodiversity conservation in northern Australia

Australia's tropical savannas are a vast landscape of grasslands, open eucalypt woodlands (see photos below), and extensive floodplains and wetlands covering almost 2 million square kilometres of land between approximately Townsville and Broome, and to the north (TS-CRC, 2014). The rich diversity of ecosystems supports high species richness. Land use options are limited by soil fertility, water availability and climate. Apart from areas reserved for National Parks and Indigenous Protected Areas tropical savannas are predominantly used as rangelands for low-intensity grazing using Brahman-style cattle.



Tropical savanna landscape — Einasleigh Uplands.



Tropical savanna landscape — Mitchell Grass Downs.

Tropical savannas may appear relatively intact; however, there has been extensive biodiversity decline since European settlement through a combination of factors including over-grazing, changed fire regimes and spread of exotic plants and animals (Woinarski *et al.* 2007). While there are some large conservation reserves (including public, private and Indigenous managed areas) particularly in the wet tropical savannas, these are not large enough, on their own, to maintain viable populations of many endangered species and the ecological processes necessary to sustain them in the long term (Parr *et al.* 2009; Woinarski *et al.* 2010).

The opportunity may exist to engage graziers and pastoralists to assist in halting the decline of at least some species and recovery of others. Pastoral enterprises tend to be large, typically between 100 and 10,000 square kilometres, and there are fewer than 700 across the tropical savannas. This means that, potentially, each pastoralist's actions can have notable implications for biodiversity — native plants and animals and the ecosystems that support them. Therefore a consolidated effort of the pastoral industry is critical to the conservation endeavour. Pastoralists could achieve a great deal by undertaking preventative and restorative measures and adopting species-friendly grazing land management practices.

As business owners and managers, pastoralists pursue financial objectives, but many northern pastoralists are also intrinsically guided in their decision making by stewardship and lifestyle motivation (Greiner and Gregg 2011). This in turn has been shown to be positively correlated with the level of adoption of conservation practices. Elsewhere too, empirical links have been shown between farmer attitudes and motivations and farmland biodiversity (Ahnström *et al.* 2013). However, good intentions are often hampered by financial and human resource constraints. Some jurisdictions have introduced legislation to ensure land management meets minimum environmental standards. In Queensland, pastoralists and graziers have an environmental duty of care towards the environment, but this statutory provision is too generic to secure targeted biodiversity outcomes (Greiner 2014).

Among conservation policy options, pastoralists prefer positive financial incentives as a mechanism for helping them achieve more biodiversity conservation on their properties. PES-style policies and programs may therefore provide a mechanism to secure a discernible level of industry contribution to landscape-scale biodiversity conservation (Fig. 1, Greiner *et al.* 2009). Examples of this would be ongoing stewardship payments for vegetation restoration or changed burning regimes where there is a clear biodiversity outcome contiguous with the carbon benefit. While PES-style policies and programs are used to pursue biodiversity conservation objectives in many countries and in southern states in Australia, none to date exist in the tropical savannas.



Cattle mustering on North Head Station (Georgetown) is done on horseback

To be effective and efficient, the design of PES-style programs cannot solely be based on ecological, production and economic information but needs to consider a wider suite of factors which influence program participation, including attitudes, preferences and motivations of the land managers.

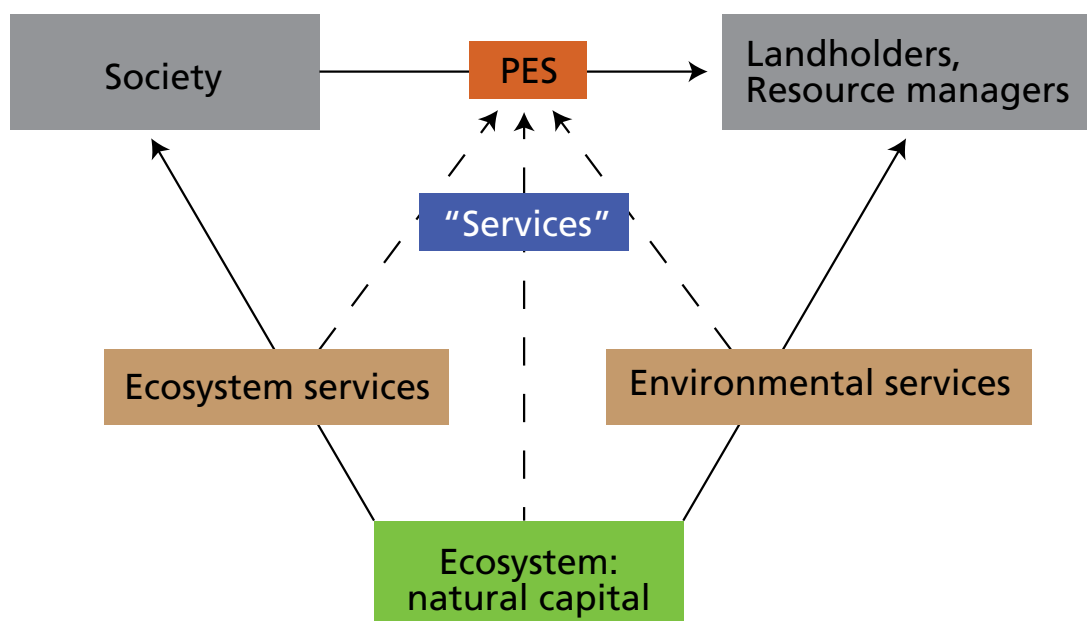


Figure 1: The concept of PES (Greiner *et al.*, 2009)

Pastoralists are willing to sign up to biodiversity conservation contracts

The purpose of the empirical research was to gauge the likely response of the northern Australian pastoral industry to the availability of PES-style programs. The questions were, firstly, would pastoralists want to sign up to voluntary contracts if they received stewardship payments to manage parts of their land for biodiversity conservation, and under what conditions, and secondly, how much land would they enter into such contracts? During 2013, a face-to-face survey was undertaken of pastoralists across the tropical savanna rangelands (Fig. 2). Survey respondents included 104 pastoralists — property managers and owners. Property sizes ranged from 20 to >15,000 square kilometres and included enterprises owned by families and corporations, including Indigenous-owned corporations. Respondents were spread across Queensland, the Northern Territory and Western Australia and across all northern natural resource management regions and bioregions.

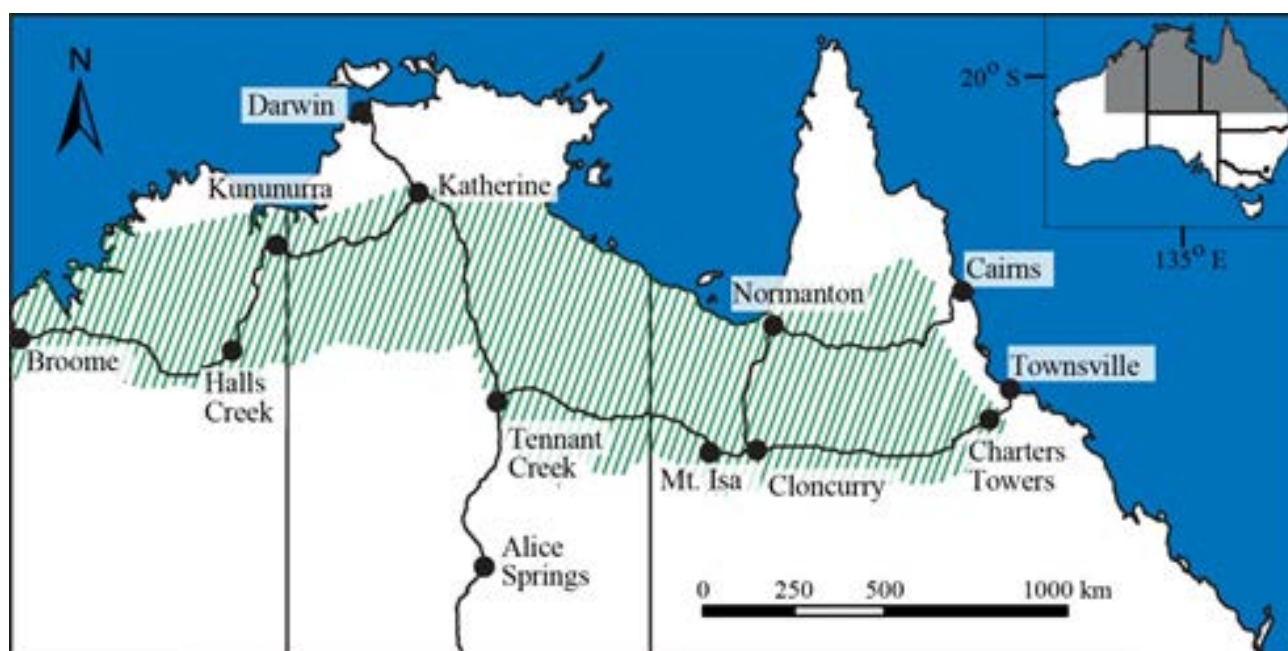


Figure 2: Map of research area, indicating tropical savannas with a long-term annual rainfall of <1000 mm.

The survey included a choice experiment to determine pastoralists' willingness to sign up to hypothetical voluntary biodiversity conservation contracts and their preferences for contract attributes (Greiner *et al.* 2014). As part of the choice experiment, each survey respondent was asked to complete six choice tasks. Each task contained a discrete and a continuous question. The discrete question asked the respondent to choose his/her preferred alternative from among three hypothetical conservation contract alternatives and a 'none' option, which represented the voluntary nature of PES-style programs. If a contract alternative was chosen, the continuous question asked how much land the respondent would offer to subscribe to the chosen contract. The minimum area was set at 400 hectares. To put respondents in the best possible position to make informed choices, the survey questions preceding the choice experiment explored the property's grazing system and production economics.

Each hypothetical contract alternative defined the conservation action that the pastoralist would have to provide and stipulated an annual per-hectare stewardship payment. Other attributes included contract length, monitoring arrangement and 'flexibility'. There were two types of conservation actions, (i) removal of cattle from the contract area for the entire contract duration or (ii) rotational grazing based on biodiversity needs: Cattle would be excluded from the contract area during times each year when the target species/ecosystems were most sensitive to cattle impact, for example during the breeding season of ground-nesting birds. Land subscribed to a contract had to be actively managed, fences maintained, stray cattle mustered, and weed and feral animal control undertaken as required by environmental duty of care. Action (i) possibly required the introduction of a burning regime. Contract length varied from five to 40 years. Monitoring was conducted either by the funding organisation or the pastoralist, in which case random spot-checks applied. Some contracts offered 'flexibility', others did not. Flexibility meant that the pastoralist had the right to negotiate with the funding organisation a one-year contract suspension in 'exceptional circumstances'. A request for contract suspension could be granted if, despite best grazing and herd management practices, an unavoidable situation had arisen which threatened the economic sustainability of the property, but could be fundamentally resolved if the pastoralist was able to move cattle onto the contract area during a time when the contract required cattle to be excluded. If granted, the pastoralist would not be penalised for breach of contract conditions, but would forego that year's stewardship payment. This provision could be enacted no more frequently than once in any five-year period and only applied to contracts with a minimum length of ten years.

Respondents showed great interest in being involved in PES-style biodiversity conservation programs. There were only four protest responses, meaning of pastoralists surveyed, more than 96% were prepared to consider participating in a voluntary contract. Ninety two respondents found at least one conservation contract option in the choice experiment that would fit within their business context. The preferred choices were not just about the size of the stewardship payment on offer, but were also significantly influenced by other contract attributes, opportunity cost (i.e. cost of foregone cattle production and additional cost incurred to meet contract obligations) and pastoralists' motivations and attitudes towards biodiversity.

The discrete choice data were analysed using random parameter and latent class modelling (Greiner 2015a, Greiner 2015b) and the key findings were:

- Across the pastoral industry, higher stewardship payments significantly increased the likelihood of participation, as did flexibility provisions.
- If contracts stipulated total exclusion of cattle, participation was significantly reduced.
- Rotational grazing that caused loss of cattle production also reduced likelihood of participation, but to a lesser extent.
- Longer contract periods reduced likelihood of participation.
- External monitoring was slightly favoured over self-monitoring.
- Among property and respondent factors, higher land productivity was found to influence participation negatively, meaning that stewardship payments on better land have to be higher to entice participation.
- Property size, type of ownership, age, gender and previous participation in conservation contracts did not significantly influence participation.
- In line with the literature, pastoralists with a positive intrinsic attitude towards biodiversity and those who regarded PES as an effective policy instrument were significantly more likely to participate.

The research indicated significant heterogeneity of preferences around each of the contract attributes, meaning that some contract conditions worked well for some pastoralists and less so for others. Preference heterogeneity is illustrated in Table 1, which shows the average marginal willingness to accept (WTA) for each contract attribute and the 95% confidence interval. These values represent the average additional stewardship payment required to secure contract sign-up. To be able to put these estimates into perspective, average per-hectare cash earnings of pastoral properties from cattle were calculated using national farm survey data (ABARES, 2014; average is for years 1990-2013; values in 2013/14 dollars). Over the past two decades, pastoral properties in the Kimberley had a cash income of \$4.22/ha/year, approximately \$7.50 in the Barkley, Victoria River District and Katherine region, Cape York and the Queensland Gulf, and \$15.14 in central north Queensland. The results thus show that stewardship payments need to exceed average opportunity costs in most instances for contracts to be attractive to pastoralists. One reason is the large variability in cash income, with coefficients of variation ranging from 35% (Queensland Gulf) to 55% (Barkly Tablelands). This gives a measure of the income risk of pastoral enterprises and means that in good years pastoralists make a lot more money from the land than average returns suggest. Pastoralists possibly reference stewardship payments against those higher returns.

Table 1: Estimates of average willingness to accept (n=598 observations, from Greiner, 2015)

Contract attribute	Summary description	Mean WTA	95% confidence interval
			(\$ per hectare per year)
TOTAL EXCLUSION	Contract requires cattle to be excluded from the area for the duration of the contract (compared to a rotational grazing system that does not cause any loss of cattle production)	\$11.08	(7.45 — 14.47)
LONG SPELLING	Contract needs to be spelled every year for an extended period of time, resulting in up to a 50% loss of cattle production from the area (compared to rotational grazing system that does not cause any loss of cattle production)	\$ 3.45	(0.71 — 5.95)
YEARS	Adding one year to the contract duration	\$ 0.41	(0.31 — 0.53)
FLEXIBILITY	Introducing into contracts the possibility that a grazier can negotiate to suspend the contract in 'exceptional circumstances', but no more than 1 in 5 years	-\$ 5.90	(-8.54 — -3.47)
MONITORING	Moving from an external monitoring system to monitoring being undertaken by the grazier (with occasional spot checks)	\$ 1.17	(-.52 — 3.02)

The continuous choice component (land area offered for a chosen contract alternative) was analysed using ordinary least squares modelling. As expected, the land area that respondents suggested they would offer into a contract was significantly and positively influenced by the enterprise size and by the stewardship payment. Other contract features were not significant. Respondents who had previously participated in conservation programs were offering more land into contracts.

Conclusions

The research offers empirical insights into key factors and considerations influencing pastoralists' decisions to participate in contractual biodiversity conservation. The research is based on the premise that conservation of many species of animals and plants in the tropical savannas is compatible with grazing, provided grazing land management respects the needs of these species (Woinarski and Ash 2002). The research findings give potential investors in biodiversity conservation a foundation for the design of PES-style programs and a reference point from which to commence conversations with interested landholders. Equally, it gives pastoralists confidence in the validity of PES-style programs and provides a reference point for negotiations.

When implementing PES-style programs in the tropical savannas, competitive approaches such as tenders and auctions are unlikely to work very well because farms are so large and the number of pastoralists who can effectively contribute to the conservation of specified biodiversity assets or target ecosystems may be small or even limited to one property. Thus negotiated approaches are important and contract attributes need to respond to pastoralists' opportunity costs, risk perceptions, preferences, motivations and attitudes.



Cattle on well managed grazing land in the Ord River Valley in the Kimberley.

Conservation actions need to be tailored to biodiversity conservation requirements and consider in particular whether and to what extent the species and ecosystems to be protected may be able to co-exist with grazing activity. The likelihood of participation will increase if grazing can be accommodated and the required stewardship payment will be less.

When considering the level of stewardship payment, it is important to consider that opportunity cost associated with conservation action is only one consideration that pastoralists apply. They inherently apply a risk premium and trade off other contract attributes against the payment. For example, most pastoralists will require higher stewardship payments if they are to sign up for longer contracts. They also implicitly account for transaction costs such as those associated with being required to undertake monitoring. One aspect of the risk premium can be gleaned from the large reduction in annual payment sought if the contract offers ‘flexibility’, such as the type of provision considered in this choice experiment.

The research provides empirical evidence that vast sections of the northern Australian pastoral industry are ready, in principle, to participate in PES-style programs and commit to undertaking biodiversity conservation action on their properties in return for stewardship payments. This bodes well for the co-existence of native biodiversity and pastoralism into the future and for the feasibility of a comprehensive northern Australian conservation estate across all land tenures.



The brolga (*Grus rubicunda*) is one species that could benefit from contractual biodiversity conservation on pastoral land.

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