

## **Notes for House of Representatives Inquiry:**

### **Public Good Conservation – Impact of Environmental Measures Imposed on Private Landholders**

#### ***Introduction***

These notes are provided by staff within the Sustainable Rangelands Systems Group (N2) of Tropical Agriculture. The material draws on experience from conducting the Grazed Landscape Management Project that is developing ecological principles and thresholds for the sustainable use of grassy eucalypt woodland ecosystems within sub-tropical eastern Australia (McIntyre *et al.* 2000). The principles, while addressing broad issues of landscape conservation, including preservation of both local and regional biodiversity, place a heavy emphasis on limiting tree clearing and promoting the retention of remnant native vegetation on private holdings. Where there is an acceptable level of empirical evidence available to support a particular threshold, such a threshold is recommended (e.g. tree clearing limits to prevent accelerated die-back and reduce risk of dryland salination). However, there are many unknown or poorly defined elements and linkages at play within these complex grazed ecosystems (e.g. the role of birds and insects in suppressing plant disease and predation, grazing compaction on soil invertebrates and nutrient cycling). For this reason, many of the principles are necessarily grounded against the application of the precautionary principle of conservative development. This necessarily restrains their status to that of testable management hypotheses.

Theoretical approaches to land management, while important to informing practice, are not likely to provide sufficient incentive to wide-scale adoption by private landholders. To address this issue the project is being conducted against a background of involvement with four grazing enterprises acting as case studies in southeastern Queensland. Three panels of experienced landholders (Auburn-Eidsvold, Mundubbera, Crows Nest-Anduramba) have voluntarily formed to discuss the principles with the research team with an emphasis on the practical and economic implications of their attempted implementation. This work has provided a reasonably solid basis for understanding the impact of particular environmental measures on private landholders in an extensive livestock grazing context. This is generally consistent with the terms of reference of the inquiry, which is specifically interested in the impact of public good measures, rather than the merits of the measures themselves in achieving conservation goals.

In the following sections, some issues are canvassed concerning: the nature of certain public good investments by beef producers in southeastern Queensland; uncertainty surrounding the distribution of benefits and costs between producers and the wider community; some indicative data on the potential scale of economic costs of providing conservation benefits; and feedback from the producer panels on the feasibility and imposts that may be associated with the adoption of some public good conservation measures.

#### ***Public Good Conservation***

The nature of public good conservation measures as typically defined by resource economists warrants consideration. In economic theory, a public good is described as a non-excludable good

whose production (e.g. by a landholder) cannot be appropriated for exclusive use (e.g. by a willing buyer). These public goods have two essential characteristics – consumption of the good by one party cannot exclude consumption by others, and the potential cost of excluding non-payers exceeds the value that any one consumer might place on the good (and be willing to pay for it). These two characters combine to create a market failure whose resolution usually requires multi-lateral bargaining, as opposed to the more typical bilateral market transaction for private goods. In the context of beef cattle production, any livestock turned off or timber sales are typically private goods, whereas the environmental benefits associated with sustainable production investments (e.g. clean water, wildlife habitat, scenic and cultural amenity) are more usually identified as public goods. Economic theory suggests that landholders may (or may not) over-supply private goods, but are more likely to under-supply public goods in the absence of appropriate incentives or regulations.

The preceding definition of a public good is generally consistent with the inquiry's definition of the outcome of private conservation activities "which bring environmental benefits to the community at large". The private conservation activities might carry either negative or beneficial outcomes for the private landholders undertaking them, their provision having been an obligatory response to legislation. An issue for the cattle grazing industry in Queensland is the extent to which landholders are actually being forced to produce such public goods, at present, by either the state or Commonwealth governments.

An important issue that is related to the provision of public goods, especially when environmental management considerations are central to their production, is determining the extent to which private self-interest is also being catered to. A naïve assumption underpinning much economic theory is that private producers will at least cater optimally to their own self-interest. Moreover, this will be done within an environment of near-perfect (or well-informed) knowledge of the transformation processes that link the outputs to all of the inputs associated with production. However, in the case of the environmental inputs to beef production, these linkages are neither well-defined or known with any certainty. In extremes cases, land and water degradation that impacts both on private and public interests remain issues of continuing concern. Therefore, part of the return to investments in environmental management, whether imposed or voluntary, will be captured by the private landholders themselves. Whether this private gain (insurance) is substantial or not is not really known. This raises an issue that is a source of major contention with private landholders when defining and exploring the impact of providing public goods. Many landholders accept that there is necessarily a "duty of care" to maintaining their land resources in good condition and they do place private values on certain ecosystem services (e.g. clean water, shade, shelter, soil fertility, wildlife, rural amenity etc). Indeed, most landholders aspire to pass their resources on to future generations in better and more productive states than when they were acquired by the present generation of managers. It remains an open question, therefore, what is the magnitude of the flows of benefits that would fairly be apportioned between the private landholders and the wider community were these respective private and public values known.

Identifying some of these values and their distribution is the focus of a major national research initiative on ecosystem services that is presently being co-ordinated by CSIRO Wildlife and Ecology (Cork and Shelton 2000). For the present, and despite some creative pioneering work by

others to value environmental benefits (e.g. Lockwood and Walpole 1999), much remains unknown.

The economic costs associated with investments that may provide public good outcomes from private cattle properties in southeastern Queensland are better known. Some of these are detailed in a following section.

### ***Imposed Environmental Measures***

The inquiry is clearly focussed on the impacts of conservation measures imposed upon landholders by either State or Commonwealth governments. Nevertheless, the committee has also requested that information on costs of conservation measures voluntarily adopted by landholders with potential public good outcomes also be considered.

In Queensland at present, and to the best of our knowledge, there are few (if any) substantial legislative mechanisms that oblige private beef producers to provide public good conservation measures on freehold land. The case for leasehold land is different, and for most of the major bio-regions there are State-imposed vegetation management guidelines in place that limit the location and extent to which timber can be cleared on individual holdings. The recent proposal by the Queensland government to both revise the guidelines and have them extended to cover both leasehold and freehold land has been associated with a substantial amount of controversy and concern both within and between various groups with a perceived stake in vegetation management. The impasse has not been resolved and the guidelines remain restricted in their application to leasehold land. The Commonwealth government has no policies that directly impose the adoption of environmental measures on private beef producers in Queensland.

### ***Cost of Conservation Measures***

The ecological principles for the sustainable management of grassy eucalypt woodlands that have been developed by the Grazed Landscapes Management Project have essentially been advanced for voluntary adoption by private landholders, irrespective of whether their holdings are subject to freehold or leasehold title. Therefore, these measures do not strictly fit within the inquiry terms of reference of “imposed” measures, but are consistent with “voluntary” measures for which the committee also sought insights. Some of the recommended thresholds are consistent with the state vegetation management guidelines on leasehold land and so the following material can offer insight to the impact of their application. A significant difference, however, is the state guidelines place limits on further clearing, whereas the CSIRO principles are advocating restoring timber in cases where previous clearing has exceeded particular thresholds. The latter are likely to be conservative than the former.

Three key principles contained in the CSIRO recommendations that are relevant to the inquiry and which can give insight into conservation costs associated with tree clearing limits and native vegetation retention relate to (a) maintaining tree buffer strips along watercourses consistent with state leasehold tree clearing guidelines (40-100 metres depending on stream order); (b) retaining a level of native timber cover across 30% of each holding, which has the structural characteristics of an open woodland (9-12 m<sup>2</sup> tree basal area/ha), and (c) limiting the extent of intensive pasture

and cropping development to approximately one third of the area of each holding. The intent of these principles is to maintain the natural functioning of the landscape in a relatively intact state while still allowing a significant degree of development for livestock grazing to proceed (e.g. one third improved pastures and extensive grazing on cleared woodland pastures on almost 70% of the remaining area). Protection of riparian zones and their associated ecosystems is a priority area, especially for limiting downstream and offsite impacts on other stakeholders, as well as maintaining viable habitat and connection for regional wildlife populations. To accomplish this outcome, it is recommended that the buffers be fenced out and access to stock grazing limited to strategic periods to maintain the buffer integrity. This investment, in turn, would also provide the major source of public good as riparian zones are typically keystone ecosystems which integrate flows of water, sediment, nutrients and other materials from the adjacent landscapes. Tree retention is recommended on all major land types within holdings and this would include the more favourable soil types that have traditionally been targeted for clearing and pasture development. In the case of some vegetation communities (e.g. brigalow, vine scrub), pasture development and grazing would not be feasible without prior and extensive timber and brush removal. Public good works of this nature necessarily carry significant costs as demonstrated below.

For example, a major activity associated with the development of the CSIRO landscape management principles has been an assessment of the potential economic costs that might be incurred by private landholders if they elected to implement them in full. This was done against the background of the four case study beef enterprises. Resource assessments were conducted for each property against each of the landscape management principles and the general finding was that the soil and pasture resources were, in each instance, in a good condition, especially following the severe seasonal conditions that had been experienced in southeastern Queensland over most of the early 1990's. Maintaining soils and pastures in good condition through appropriate grazing and fire management is generally consistent with many producers' acceptance of a "duty of care" and has been a major extension message in Queensland for much of the past two decades. The landholder panels felt that this finding vindicated much of their claim to responsible management of their land resources.

The case of tree retention across the major land types on holdings and the status of riparian zones is a more contentious issue between researchers and landholders. While three of the four case properties did have woodland cover in excess of 30% of their total areas, the actual distribution of these trees was heavily skewed away from the more productive soil types, especially those of the lower slopes and riparian areas. This is illustrated for one case property in the following table:

Land type	Area (ha)	% woodland cover (6-12+m <sup>2</sup> ha)
Clay soils on flats	321	0%
Clay soils on slopes	313	26%
Erosive phase soils	855	23%
Granite soils	2073	31%
Texture contrast soils on slopes	746	16%
Shallow-rocky soils	1214	83%
Total	5523	37%

The extent of existing tree and shrub buffers in riparian zones on all four case properties was also below that which would be consistent with the state tree clearing guidelines for the relevant stream orders. In each case, reconstructing and fencing out the riparian buffers would carry a significant capital and management requirement, as illustrated by the deficits and perimeter values for each of the four case properties in the following table:

Case Property	Buffer required ha	Existing buffer ha	Deficit %	Riparian perimeter km
Case 1 – Mundubbera	510	174	66%	140km
Case 2 – Mundubbera	81	40	51%	21km
Case 3 – Crows Nest	191	140	27%	52km
Case 4 – Crows Nest	355	144	60%	72km

The task of replanting landscapes and restoring the riparian buffers is clearly a major one, and is likely to represent an insurmountable barrier to action by private landholders, especially when replanting (250 seedlings/ha @ \$3-10/ tree) and stock exclusion options (fencing \$1500-2500/km, off-river waters @ \$500-1000/waterpoint) are required. This message has been sent to the research team from the three landholder panels in unambiguous language. As noted before, a major concern of the panels centres on the magnitude of such private costs and the distribution of the potential benefits – seen largely to accrue to the general community. Duty of care is seen to be consistent with maintaining well-grassed channels and banks and some timber on the high bank for stability. This is revisited in a following section on barriers to adoption of public good investments.

The approach taken to assessing the economic cost associated with shifting from the present resource use to one consistent with the CSIRO landscape management principles involved an assessment of opportunity costs. Firstly, the present pasture feed utilisation and economic returns for the existing operations was calculated for each of the four cases. A revised estimate was made of the feed supply that would be consistent with an altered landscape arrangement involving 30% woodland cover and full restoration of the riparian zones. Livestock numbers were then adjusted to meet the revised feed supply and a re-assessment made of the economic potential of the four properties.

The results are illustrated in the following three tables.

Estimated pasture production (TDM = total dry matter) on each case property under existing management and longer-term seasonal conditions:

Case property	Pasture production Tonnes/ha TDM	30% Woodland cover % of present TDM	Riparian buffers % of present TDM
Case 1 – Mundubbera	14584	89%	88%
Case 2 – Mundubbera	1874	83%	82%
Case 3 – Crows Nest	955	93%	85%
Case 4 – Crows Nest	2128	92%	91%

If total livestock numbers are reduced on each case property in direct proportion (ie. 9-18%) to the projected change in forage production that would result from the augmentation of tree cover and riparian buffers, the following economic outcomes as measured by total gross margins (TGM = gross returns less variable costs) would result:

Case property	TGM Present Management	TGM Revegetation scenario	Difference %	Difference \$
Case 1 – Mundubbera	\$361,005	\$318,095	88%	\$42,910
Case 2 – Mundubbera	\$87,742	\$81,343	84%	\$13,621
Case 3 – Crows Nest	\$70,369	\$62,070	86%	\$8,299
Case 4 – Crows Nest	\$90,960	\$81,779	91%	\$9,181

The effect on the welfare of the four individual case households that would follow from this magnitude of income decline will be dependent on many situational considerations including, for example, the level of overhead costs, the household dependency structure and the original income base. While the absolute decline is less for the three smaller properties (Cases 2-4), in all four cases it represents a significant proportion of the pre-change profit. In two cases this income is actually shared between two generations of a family unit that is solely dependent on the property for their income needs.

The effect on bottom line profitability (net profit) is assessed by removing overhead costs and providing an allowance to meet family living expenses using the ratio of overhead and imputed family labour costs (80%) derived by ABARE (1999) for specialist beef enterprises in Queensland from the total gross margin estimates:

Case property	TGM Revegetation Scenario	Overhead & labour allowance	Net Profit \$
Case 1 – Mundubbera	\$318,095	\$249,057	\$ 69,038
Case 2 – Mundubbera	\$81,343	\$63,689	\$ 17,654
Case 3 – Crows Nest	\$62,070	\$48,599	\$ 13,471
Case 4 – Crows Nest	\$81,779	\$64,030	\$ 17,749

The average level of interest paid by specialist beef producers in Queensland in 1997-98 was approximately \$15,000 with a range \$5,000 to \$30,000 (ABARE 1999), commitment of which would consume most of the remaining profit. The estimate in these tables supports a general picture of tight economic returns for contemporary beef production enterprises. Clearly, revegetation would place significant strains on individual landholders if they either wished to, or were compelled to, undertake non-compensated work on these scales for public good purposes. Their position would be made more acute when viewed within a context in which they believed that their grazing and fire management was already maintaining their soil and pasture resources in good condition. That is, most of the landholders believe that the present earning capacity of their holdings (reflected in the pre-adoption TGM) is consistent with both sustaining their pasture resources in a manner conforming to local best practice and meeting a “duty of care” obligation to the public and their own dependants.

A more substantial issue arises when the capital and management investments that are required to effect the changes are considered. This is less easily accommodated within the present management systems and the position of the landholders becomes considerably more difficult. This can be illustrated using Case 4, where excluding livestock from riparian zones by fencing and providing off-creek waters would require the construction of 70 km of cattle-proof fencing, and the provision of 8 additional artificial waters. This work would cost around \$150,000 with no allowance for tree planting and management for their survival. Such a project would also introduce many other management considerations, including changed stock movement, weed and fire management and the need to regularly check and maintain the fences and artificial waters. As more capital and management inputs are required, the absolute commitment to conservation increases and less resources are available for other aspects of good property management (e.g. herd management, weed and pest control). The majority of cattle enterprises in the region are already operating with limited labour inputs (e.g. none of the four case properties employ permanent staff) for normal stock work and infrastructure maintenance. Moreover, it is doubtful that finance could be obtained from commercial sources to effect the work, particularly when present financing commitments to existing property operations are also taken into account.

These issues underlie a good deal of the landholder resistance to undertaking significant management changes to promote public good vegetation management goals – especially those seen to provide substantial and non-compensated social benefits (e.g. urban water quality, regional wildlife conservation etc). A challenge for the community is to explore creative ways to overcome the more gross economic and management barriers to action that the preceding figures are highlighting. The CSIRO landscape management project is seeking to do this through the dialogue with the case property owners and three landholder panels. While some progress is being made there are not likely to be many easy options in the absence of major incentive structures.

### ***Barriers to Adoption of Public Good Investments by Private Landholders***

The economic theory related to public good provision suggests that, even in the presence of perfect knowledge, private landholders will be reluctant to promote public good outcomes beyond a point which is also consistent with their own self-interest. However, economically rational limits are not the only barrier to public good investment. Many serious management and personal factors are also involved.

The task of identifying various barriers and opportunities to implementing vegetation conservation principles has been an ongoing aspect of the CSIRO landscape project from its early stages. The ecological management principles have been canvassed with the case property owners and the landholder over a series of meetings since 1998. During these meetings discussion has been encouraged to explore the acceptability of the principles with landholders and to identify constraints or opportunities to specifically incorporating them within contemporary property management. A series of individual face to face interviews with the panel participants was conducted earlier this year.

The general thrust of private landholder opinion can be summarised as follows:

- The landholders, with few exceptions, genuinely accept the need to improve the general standard of grazing land management on both their own properties and across the region. Nevertheless, they feel that their land management standards are better than they are being given credit for.
- They are keen to pursue “realistic” alternatives that can guarantee a sustainable future for their enterprises.
- While recognising the extent of land degradation in temperate Australia, they felt that the situation in Queensland was not a direct parallel and that this should be recognised within national strategies for vegetation management.
- Economic constraints and management practicality loom large as major constraints to adoption of conservation measures
- There is a general acceptance that tree clearing has been excessive at some times and on various parts of their holdings. Again, they also feel that they are being unfairly depicted as having limited care for timber management which is seen as a major economic impost.
- They are prepared to consider retaining trees and, to a lesser extent, re-establishing tree cover in many parts of the landscape.
- Any recovery of tree populations will need to come via re-generation as they are adamant that large-scale planting is not a viable option and will not be considered.
- Establishing riparian buffer strips consistent with local tree clearing guidelines is generally rejected in favour of maintaining well-grassed banks with some stabilising trees on the immediate bank area.
- They feel that thick timber stands abutting lower order streams (gullies) will be trampled and grazed out leading to sheet erosion and accelerated gullying.
- In the case of higher order streams, especially larger creeks and rivers (e.g. Burnett, Emu Creek), they feel that there is very little that individuals can do without concerted effort on the part of upstream landholders – a characteristic of local water courses is an extreme variations in flows which have potentially destructive impacts on localised stabilisation works (e.g. tree planting and pumps for off-creek waters).
- They are generally unconvinced of the ecological function of riparian tree strips (e.g. 40m from the high bank) in terms of preserving the long-term productivity of their pastures.
- They acknowledge that wide riparian tree buffers may enhance wildlife habitat and other amenities (urban water quality) but see these as providing social benefits which are excessively expensive to provide and for which they are not fairly compensated.
- Providing ecosystem service amenities consistent with the full application of the principles is seen to exceed a ‘reasonable’ expectation of duty of care.
- Fencing riparian buffers and large tree clumps is regarded as being both economically and ecologically defeating (high cost, grazing opportunity lost, stock entrapment, weed and pest management, likely loss to fire and flood).
- Fencing and tree establishment for conservation purposes is competing with a major backlog of infrastructure commitments that have been exacerbated by low beef returns and a recent history of serious drought.
- If conservation and production infrastructure can be jointly established without significant reductions in management opportunities, it will be seriously considered – if it clashes, it will not be considered unless it is of a generally restricted nature.



- Even if the landholders accept the importance of certain management limits (e.g. 30% woodland cover, 30% limit on intensive land uses, 10% wildlife priority), they are frustrated at a lack of clear guidelines on the appropriate locations and patterns that are required – general and vague guidelines are not regarded as being very useful to inform decision-making.
- Present incentives for tree retention and planting, while appreciated, are totally inadequate for the purpose of promoting large-scale investment in conservation on private land.
- Wildlife and natural treescapes are important to the landholders, but are valued within definite limits. Where the major beneficiary is the protection of regionally endangered species or ecosystems they believe it is inequitable to expect individuals to carry the cost without fair compensation.

### *Sharing Costs of Public Good & Compensation*

The CSIRO landscape project has identified a range of factors which will either limit the potential voluntary investment by private landholders in conservation work that carries significant public good benefits, or exaggerate their resistance to such measures if mandated by government. The economic gap between present management systems that many landholders feel is consistent with a reasonable expectation of “duty of care” and the application of principles that research is suggesting would be consistent with longer term conservation of major ecosystem functions is potentially large. The feedback from the three landholder panels also points to considerable resistance to the full adoption of the principles within property management without further conviction of their technical and economic efficacy and/or reasonable compensation.

One term of reference for the inquiry specifically seeks information on appropriate mechanisms to establish private and public good components of government imposed environment conservation measures. At present there is no clear answer to this question as the incidence of the potential benefits and costs between private landholders and other community interest groups remains sufficiently unclear to prevent an equitable allocation of costs.

During the face-to-face survey of individual members of the three panels and their families (approximately 50 people), questions was asked of the issue of compensation within the context of the proposed State limits on timber clearing on freehold land in Queensland. The issues canvassed included:

- Whether there should be limits on private action to manage timber on freehold land.
- Who should be involved in making decisions concerning management of timber on these lands.
- Whether compensation should be paid in lieu of removing free rights to clear timber on freehold land; and
- What form should the compensation take.

All of the people interviewed strongly felt that individual landholders should have the right to clear and manage their resources consistent with their private interests, although abusive

management by a perceived minority should be regulated against. How this might be effected was not clear – other than the need for any regulatory backup to have some mechanism that seriously included the views of experienced landholders in such a process. In all cases “fair” compensation was seen to be essential to restore equity where timber management rights were to be removed from private landholders. How this might be achieved was also not specified by any of the respondents. They collectively recognised that the issues surrounding compensation and provision of public good outcomes were complex. Older producers, in particular, argued that the imposition of significant timber control limits would prevent present generation producers from achieving viable income flows for holdings on which they had made a living and successfully raised families. This group felt very strongly about any mechanism needing to be fair across generations.

However, they were quite clear on three issues:

- (a) compensation should be an annual and ongoing arrangement to compensate for reduced incomes over the longer term (whereas one-off payments might be seen as a bonus for a while they would likely be used for deferred consumption with little lasting compensatory effect for permanently reduced flexibility and income generating potential),
- (b) it had to be seen to be “fair” to all parties including the taxpayer, and
- (c) they genuinely did not want to be seen to be receiving something to which they were not fairly entitled.

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