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Perspectives on tradable development rights for ecosystem service protection: lessons from an Australian peri-urban region

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Competition for land between agriculture and urban uses is a global problem. Until recently, planners and policy makers have relied on regulatory 'command and control' planning approaches; however, there is growing interest in the use of market-based instruments to address natural resource management issues in complex and highly contested peri-urban environments. Tradable development rights are one type of market-based instrument. While tradable development rights have been used extensively in the United States, their application in Australia has been limited. Yet, in Australia, population growth and development in peri-urban areas is placing extensive pressure on natural resources and productive agricultural lands. These pressures are particularly acute in Australia's fastest growing metropolitan region, South East Queensland. By using a case study approach we explore stakeholder perspectives on the value of this tool to protect peri-urban landscape values. Whilst current planner and stakeholder perspectives suggest there is considerable support, there are substantial political, institutional, knowledge, resource and legislative barriers that need to be overcome before this tool can be a viable, realistic and acceptable option for land use planning in peri-urban regions such as South East Queensland.

Keywords: urban sprawl; sustainability; market based instruments; environmental planning; regulation

1. Introduction

The rapid urbanisation of natural and semi-natural landscapes located on the periphery of major metropolitan areas – the peri-urban – is generating significant social, economic and environmental challenges for planners and policy makers worldwide (Kaplowitz *et al*. 2008). In particular, growth and development is placing extensive pressure on the natural resource base and productive agricultural lands. While agricultural production generally occupies highly disturbed landscapes, it is important to note that these areas are still highly prized for the provision of many ecosystem services (Matson *et al*. 1997, Kremen 2005, Goldman *et al*. 2007). Many important ecosystem services can be provided by peri-urban areas, which remain in agricultural production, including: regulation of flood waters; storm protection; provision of biodiversity corridors; waste absorption; and fulfilment of cultural and spiritual needs (Swift *et al*. 2004). Despite the known benefits, poor land

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management practices and ongoing encroachment of urban and rural residential development continues to threaten the provision of these services that are critical to human well-being (Cocklin *et al*. 2007).

One of the key challenges facing planners is to manage growth sustainably and prevent urbanisation and rural residential development from degrading peri-urban landscape values and diminishing the supply of ecosystem services. Traditionally, governments have relied on regulatory approaches (e.g. zoning, growth management boundaries) to manage development and minimise environmental impacts; however, economists continue to promote the use of market-based instruments (MBIs) to deliver more efficient outcomes to environmental problems where regulatory approaches have largely failed (Hahn and Stavins 1992, Stavins 1998, Balmford *et al*. 2002, Whitten *et al*. 2003, Cocklin *et al*. 2007). While MBIs are gaining acceptance as a viable alternative to regulatory based approaches – there are often a range of conceptual and practical difficulties in implementing them. Evidence from wetland banking in the United States suggests that while successful in many ways it has been subject to "regulatory turbulence and failed to fully address losses of wetland function" (Robertson, 2006, 297). Thus, there is debate as to whether the benefits outweigh the costs involved in their establishment and implementation (Whitten *et al*. 2003). Nevertheless, the use of market based approaches to resolve complex and highly contested environmental problems are likely to increase as planners and policy makers become increasingly convinced of the power of markets to resolve environmental concerns (Robertson 2006).

Tradable development rights (TDRs) are one type of MBI that have been used extensively in the United States to preserve farmlands and natural resources (Pruetz 1997, Daniels 1999); however, their application in Australia has been *ad hoc* and largely limited to preserving cultural heritage in urban areas (Ryan 2004, Williams 2004, Lawson 2008). Despite the widespread adoption of TDRs in the United States, evidence suggests that they are not always the most effective tool to achieve planning outcomes (Messer 2007, Kaplowitz *et al*. 2008). TDR has both advocates and critics. On the one hand, proponents argue that they can be a flexible tool that promotes equity amongst landholders whilst achieving strategic land use aspirations (Miller 1999, Williams 2004). On the other hand, critics argue that TDRs can increase overall development (Levinson 1997) and where markets do not function effectively, ultimately fail to preserve valuable ecosystems (McConnell and Walls 2009).

Research indicates that a mix of both regulatory and incentive based instruments is required to manage the complexity inherent in peri-urban areas (Daniels 1999, Daniels and Daniels 2003, Bengston *et al*. 2004). However, it is important to note the success of a particular planning instrument or suite of instruments in one peri-urban locality may not be effective in another (Daniels 1999, p. 184). As a result, an intricate understanding of the endogenous and exogenous forces that shape and influence peri-urban areas is required for each locality. While TDR is unlikely to be a panacea in its own right, its application in the broader context of managing biodiversity and ecosystem services in highly contested peri-urban landscapes warrants further investigation.

The purpose of this paper is to gain a better understanding of the perceived constraints and opportunities to implementing a TDR programme to manage landscape values in a peri-urban context. In doing so, this paper adopts a case study approach that considers key stakeholder perspectives rather than an 'objective' assessment of the efficiency or suitability traditionally employed in the evaluation of

market-based instruments through resource economics. As such, the value of TDR as a planning tool to manage growth pressures and protect peri-urban landscapes for the provision of ecosystem services is expressed through the views of current policy makers and practitioners in the planning and management fields. From the findings we highlight implications for re-thinking the use of these instruments in the preservation of agricultural land and provision of ecosystem services in peri-urban regions.

The paper is divided into the following sections. First, it provides a brief literature review on the following themes: peri-urbanisation, ecosystem services and TDRs. Second, it outlines the research methods used for data collection. Third, it provides an overview of stakeholder responses, followed by a discussion and concluding comments.

2. Peri-urbanisation

There is a large literature which focuses on the ''outer suburban regions of large cities and their immediate hinterlands'' (Burnley and Murphy 1995, p. 123). Burnley and Murphy (1995, p. 123) have described this area as the ''peri-metropolitan region'', which includes the zone between the outer edge of expanding cities to the outer limit of the commuting zone. While there is no universally accepted definition of the peri-urban region, it is generally understood that it is highly transitional landscape that sits between contiguous urban areas and the rural countryside, having relatively low population density and a range of land uses (Thomas 1990, McKenzie 1996, Ford 1999, Nelson 1999, Allen 2003). Rakodi (1998) has described the characteristics of the peri-urban as:

> A dynamic zone both spatially and structurally. Spatially it is the transition zone between fully urbanized land in cities and areas in predominately agricultural use. It is characterized by mixed land uses and indeterminate inner and outer boundaries, and typically is split between several administrative areas. The land area which can be characterized as peri-urban shifts over time as cities expand. It is also a zone of rapid economic and social structural change, characterized by pressures on natural resources, changing labour market opportunities and changing patterns of land use. (p. 8)

While recent research has identified that peri-urbanisation occurs across a range of landscape settings (Low Choy *et al.* 2007), this paper does not attempt to distil this information, but instead will adopt the term 'peri-urban' to describe the dynamic zone located on the periphery of major metropolitan areas. However, this recent work has confirmed the process of peri-urbanisation as:

> a dynamic urbanising process that can involve the closer subdivision, fragmentation and land use conversation of former rural lands. It involves high levels of non metropolitan growth and results in a blurred transitional zone comprised of temporary mixes of urban and rural activities and functions. The resulting peri-urban land use activities exhibit a high degree of heterogeneity, continual change and conflicting values. (Low Choy 2007 *et al.* p. 20)

There is a well established and growing international literature which focuses on the impact of peripheral migration and settlement on agricultural land (Daniels 1999, Gillham 2002, Allen 2003, Ryan and Walker 2004, Kaplowitz *et al.* 2008, Gill *et al.* 2010) and fragile ecosystems and surrounding natural environments (Nelson and Dueker 1990, Burnley and Murphy 1995, Sinclair *et al.* 2003). While the planning and management of peri-urban areas have received relatively little attention in the

Australian policy context (Bunker and Houston 2003), there is a discrete but growing body of research which explores the planning and natural resource management challenges inherent in peri-urban areas (Buxton *et al*. 2006, Low Choy *et al*. 2007, Mendham and Curtis 2010). The need to accommodate population growth and maintain ecological integrity is a significant challenge facing planners and policy makers. Once rural land is converted into urban purposes it may never revert to agricultural land again and the values that were once attributed to productive agricultural lands will be lost forever (Sinclair *et al*. 2003, p. 27). These values include the provision of ecosystem services.

3. Ecosystem services

Natural ecosystems, including those modified by humans, provide many goods and services that are essential to humankind (Matson *et al*. 1997, Kremen 2005, Goldman *et al*. 2007). Ecosystem services can be broadly described as the benefits humans receive, directly and indirectly, from ecosystems (Costanza *et al*. 1997, Daily 1997, Boyd and Banzhaf 2005). The most widely accepted definition on an international scale is that used in the Millennium Ecosystem Assessment (MEA). The MEA (2005, 40) defines ecosystem services as ''the benefits people obtain from ecosystems including provisioning, regulating and cultural services that directly affect people and supporting services needed to maintain the other services''. Table 1 provides a more detailed summary of the four categories of ecosystem services as defined in the MEA (2005).

Ecosystem services are critical to human well-being. Yet a large proportion of these services are generated from private lands, and there are significant limitations to ensure their sustainability for future generations. As no one 'owns' or has 'rights' to these ecosystem services and others cannot be excluded from benefiting from these services, there is little incentive for landholders to manage them sustainably (Freeman 1993, Dasgupta *et al*. 2000, Goldman *et al*. 2007). As a result, land use change tends to favour the production of priced goods and development options (i.e. urban and rural residential) rather than production of ecosystem services (Daily 1997).

Table 1. Classification of ecosystem services.

Provisioning Services	Products obtained from ecosystems, including food, fresh water, fuel, fibres, ornamental resources, genetic resources, bio-chemicals, natural medicines.
Regulating Services	Benefits obtained from regulation of ecosystem processes, including air quality, climate regulation, water purification, erosion control, human disease control, biological control, pollination, storm protection.
Cultural Services	Non-material benefits that enrich the quality of life, including cultural diversity, religious and spiritual values, knowledge systems (traditional and formal), inspiration, aesthetic values, social relations, sense of place, cultural heritage values, recreation and ecotourism.
Supporting Services	Services needed to produce all other services, including primary production, production of atmospheric oxygen, soil formation and retention, nutrient cycling, water cycling and provision of habitat.

Source: Millennium Ecosystem Assessment (2005), 40.

While ecosystem services are broadly recognised and valued by society, the market does not provide the incentives to signal their value (Stoneham *et al.* 2000). The absence of market signals to promote certain behaviour is often referred to as 'market failure'. When market failure occurs, government and non-government organisations may intervene (Hahn and Stavins 1992). The promotion and adoption of market based instruments is an attempt to address market failure and provide incentives to promote socially optimum outcomes (Stavins 1998).

While there is growing recognition that private landholders should not be expected to meet the costs of supplying ecosystem services that are benefited by the broader community (Productivity Commission 2004), there is also acknowledgement of the need to establish a new policy setting that promotes primary production as well as provision of ecosystem services from private land management (Cocklin *et al.* 2007). Recent research conducted by Cocklin *et al.* (2007) revealed that landholders' preference regarding policy tools to deliver effective land management outcomes is based on a hierarchy – where strongest support was expressed for voluntary and education-based approaches, followed by market-based instruments with regulatory command and control approached least preferred. These findings suggest the need to move beyond the reliance on regulatory command and control planning approaches to engage with private landholders and deliver effective and efficient land management outcomes, particularly in highly dynamic and contested peri-urban landscapes.

4. Tradable development rights

4.1. Brief overview of TDRs

TDRs are market-based planning tools which seek to protect land and compensate landowners who forego their future development rights (McConnell *et al.* 2003, Walls and McConnell 2007, Kaplowitz *et al.* 2008). In return, landholders receive a tradable development right which they can sell to developers or other landholders in designated receiving areas. Receiving areas are generally nominated because of the existing services and infrastructure which can support the additional development potential (Pruetz 2002). The sending areas represent the area which the community and government wish to preserve and protect (Kaplowitz *et al.* 2008). The sending areas may include: agricultural land, forested areas, open space, historic sites, wetlands, floodplains, coastal areas and scenic landscapes (Machemer *et al.* 2000, Pruetz 2002). When development rights are sold or transferred to the receiving area, the land in the sending area is then placed under a conservation agreement or restricted covenant to permanently restrict future development (Walls and McConnell 2007). The acquired development rights in the receiving area usually allow development at a greater density than would otherwise be permitted.

4.2. History of TDRs

The concept of TDRs first appeared in the New York City Landmark Preservation Law in 1968 (Pruetz 2002). TDRs have been used in New York City as a way of protecting historic landmark buildings whilst compensating landowners for the lost development potential (Pruetz 2002). By using a TDRs programme, owners of heritage buildings are able to transfer wasted floor space to adjacent properties (see Figure 1). This allowed the adjacent properties to develop at a higher density than

would otherwise be permitted without the use of TDRs. Thus, the owners of the heritage buildings were compensated for lost development potential. In Australia, the TDR concept for built heritage conservation was adopted in Sydney in 1971, Adelaide in 1986 and Brisbane in 1989 (Ryan 2004, Williams 2004).

Apart from heritage conservation in urban areas, TDRs have also been used throughout the US to protect open space, agricultural land and ecologically sensitive areas (Pruetz 2002). Using TDRs to protect open space operate in the same context of preserving built heritage, except they allow the transfer of lot densities rather than floor space to redirect development pressure (see Figure 2). Over 400,000 acres of

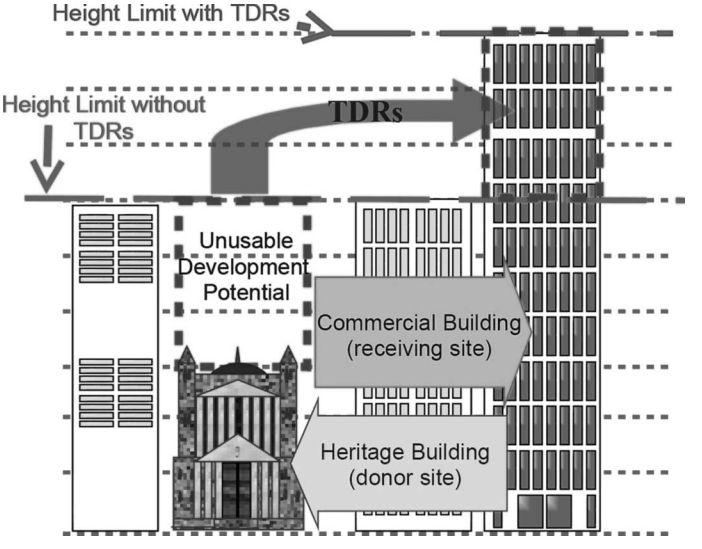

Figure 1. The use of TDRs to conserve heritage buildings.
Source: Ryan (2004).

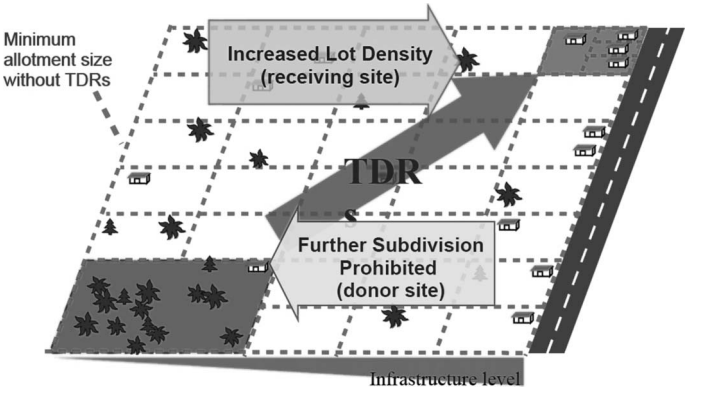

Figure 2. The use of TDRs to conserve natural heritage.
Source: Ryan (2004).

natural areas, farmland and open space has been protected in the US since the first TDR programme in 1968 (Pruetz 2009).

4.3. TDR success factors in the United States

TDR programmes are capable of creating win-win-win outcomes by: (1) compensating landholders who forego future development rights; (2) permitting purchasers of TDRs to profit from additional densities; and (3) protecting areas of high conservation value at minimal cost to government (Pruetz 1997). Despite the benefits, TDR programmes in the US have had varying degrees of success (Pruetz 2003). As a result, researchers and policy makers have attempted to understand why certain programmes have been more successful than others (Pruetz 2003, Kaplowitz *et al*. 2008, Pruetz and Standridge 2009). A recent study by Pruetz and Standridge (2009) evaluated the top 20 US TDR programmes against the 10 most commonly cited 'success factors'. The 10 'success factors' considered in the analysis were: demand for bonus development; customised receiving areas; strict sending area regulations; few alternatives to TDRs; market incentives; certainty of use; strong public preservation support; simplicity; promotion and facilitation; and a TDR bank (Pruetz and Standridge 2009). The research concluded that the first two factors were considered essential, the following three as being important, and the remaining five as being helpful but not imperative to TDR success. Where TDR programmes have failed to work adequately demonstrates that there is no single formula that can guarantee successful implementation and productive outcomes. Thus, every circumstance is unique and will require careful thought and consideration when designing and implementing a TDR programme.

4.4. Implications for TDR in Australia

An essential element of any TDR programme is the legal and administrative framework that establishes the necessary procedure for the transfer of development rights (Machemer *et al*. 2000). Thus, the development of a TDR programme in Australia would need to be consistent with the provisions of the relevant state land use planning legislation. It is important to note that the Australian land use planning system has largely moved away from a prescriptive approach to a more flexible performance-based planning. It has been suggested that this flexibility is perhaps at odds with facilitating a TDR programme which requires certainty and a rigid zoning structure (Ryan 2004).

Moreover, any consideration of TDR must also take place within the context of clearly defined property rights (Williams 2004). There is a clear difference between the US and Australia in terms of property rights. Property ownership in the US is often expressed as a 'bundle of rights' that is attached to the land in which landholders have the right to subdivide and develop the land accordingly (Williams 2004). In Australia, these land use rights are somewhat different. At least there is a perceived right to develop land (this may be the case for single detached dwellings and other developments based on the applicable statutory planning controls) – but in fact there are no legal rights to develop land, only merely the right to lodge a development application to the administering authority which is then assessed on its merits (Sinclair 2002). Implicit in the statutory planning controls is a perceived probability of gaining development consent (Williams 2004). As a result, the concept

of TDR has been adopted by several local authorities in Australia. The major use of TDR in Australia has been to preserve heritage buildings in urban areas (Williams 2004, Lawson 2008). However, its application has also been used or trialled in rural and peri-urban settings. Nevertheless, these programmes have not always been successful (Evans 1993, Williams 2004). It is perhaps these fundamental differences in property rights and the failure of past attempts that explain why there may be a tendency for stakeholders to be adverse to these types of instruments that were not designed to fit within the Australian planning system.

While the removal of development potential may be pertinent to landscape preservation goals, it is important to note that it will not ensure that agricultural production continues and ongoing management of the land is maintained (Williams 2004). As a result, the establishment of a TDR programme would need to work in combination with other planning tools and mechanisms such as incentive based programmes to encourage the ongoing management of the landscape. Importantly, this will be context specific and largely driven by local circumstances and community aspirations.

5. Methods

The research strategy involved a review of the literature, exploratory case study and semi-structured interviews. This enabled the exploration of insight based on people's perception and beliefs by identifying a study area, selecting a sample population and conducting semi-structured interviews with key informants to obtain the necessary data (Kumar 1999, p. 81). The application of an exploratory case study research approach can provide valuable insight into what is "going on" (Bouma 2000, p. 91) and is also an appropriate means of collecting data relevant to a particular theory or concept within a "real life context" (Yin 1994, p. 38, Burns 2000, p. 460).

The case study area was chosen using a criteria-based approach as defined within the limits of the theoretical framework derived from a review of the literature (Burns 2000, p. 465). The criteria used to select the most appropriate case study area were: location and convenience; characteristics of peri-urbanisation; heterogeneous land uses; fragmented landscape; and rapid population growth. The case study area chosen for analysis was the Rocky Point cane landscape at the Gold Coast, Australia.

5.1. Study area

The Rocky Point study area is located within Australia's fastest growing metropolitan region, South East Queensland (SEQ). More specifically, the study area is located approximately 40 km south-east of Brisbane and is within the jurisdiction of the City of Gold Coast (Figure 3). The study area forms an important part of the inter-urban break between the cities of Gold Coast and Brisbane. It is anticipated that by 2031 an additional 143,000 dwellings will be required to accommodate the expected population growth for the City of Gold Coast (Queensland Government 2009). While the government remains committed to protecting the Rocky Point study area, (Queensland Government 2009), its close proximity to Brisbane and the Gold Coast makes it extremely attractive in terms of development potential for various land uses, including rural residential and future urban.

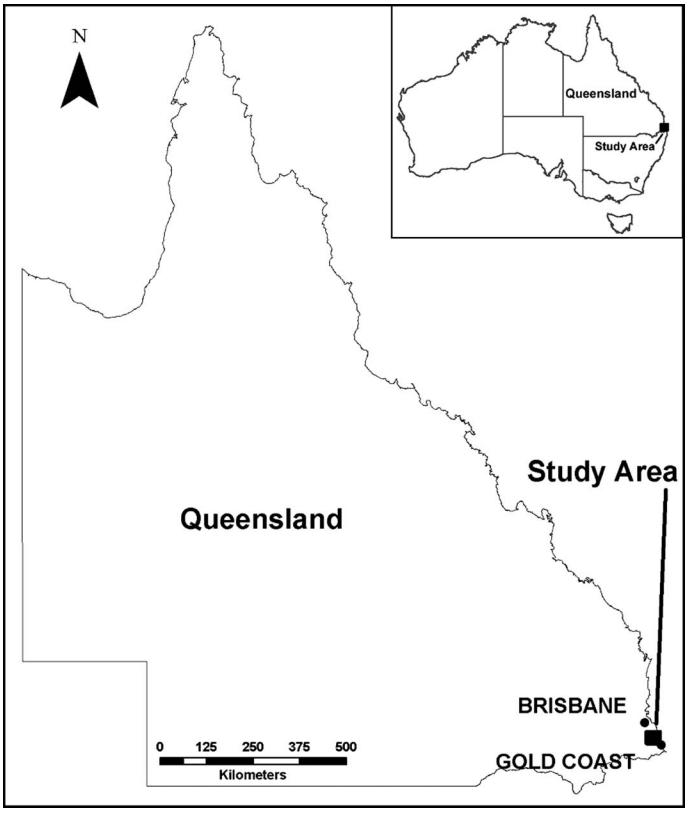

Figure 3. Rocky Point study area.

The study area is highly fragmented with a variety of land uses, including but not limited to, horticulture and cropping, aquaculture, extractive industry and rural residential. The dominant rural activity is sugar cane production, which is centred on the privately owned Rock Point sugar mill. The landscape fragmentation and lack of opportunity for the sugar cane industry to expand continues to threaten the long-term viability of the sugar industry at Rocky Point (Hildebrand 2002). The decline in traditional growing areas for the production of sugar cane further jeopardises the ability of the industry to produce the critical mass required to remain viable. With limited opportunities to bring more land into production there is the prospect that the mill may close. In the event of mill closure, some 5000–6000 ha of land would more than likely cease production, leaving the landscape vulnerable to the pressures of rural residential and urban development (Pearson *et al*. 2007). An increase in development potential will continue to place additional pressure on the already fragile ecosystems, thus, increasing the risk of diminishing the capacity to provide essential ecosystem services for broader public benefit.

5.2. Sampling

A purposive sampling technique was used to select the key informants for the semi-structured interviews. In addition, the snowballing technique was employed to ensure that the most appropriate key informants were chosen. From this process five

main stakeholder groups were identified and chosen: landholders (cane farmers); local and state government representatives (planners and environmental policy makers); industry representatives (Queensland Cane Growers Organisation Ltd (trading as CANEGROWERS) and Urban Development Institute of Australia); and a legal representative who had knowledge and past experience in TDRs (Corrs Chambers Westgarth).

In total 12 interviews were conducted in June 2006. The duration of the interviews ranged between approximately 45 minutes to 1 hour. All interviews were audio-taped and transcribed verbatim. The interview questions focused on three main themes: (1) the management and provision of ecosystem services; (2) peri-urban issues and challenges; (3) constraints and opportunities for TDRs. The transcripts were sent to the key informants soon after for comments to ensure accuracy prior to analysis. The data collected during the interviews was then summarised under each of the questions asked in relation to the above themes. This approach was adopted to avoid duplication of responses provided by the interviewees. Moreover, to avoid excessive repetition the responses were also grouped rather than presented on an individual/sectoral basis. However, in some instances responses were listed individually to assist in highlighting a point or to illustrate that there are differing opinions and views held between government, industry and landholders.

6. Results

6.1. The management and provision of ecosystem services

The responses provided by the stakeholders indicated that there is a fairly broad understanding of the potential ecosystem services provided by agricultural lands in peri-urban areas. The most common responses were open space, scenic amenity, cultural values and flood mitigation. While the concept of ecosystem services was generally regarded as being in its infancy stage, all interviewees acknowledged that there were already a number of initiatives underway which set out to achieve environmental protection to ensure the provision of ecosystem services, even if the intention was not explicitly stated. As one local government representative noted:

> There are rate levies which, in a way, you could think of as an ecosystem service levy, and they're used for purchasing land of particular ecological values.

While green levies exist at the local level they are generally used to protect areas of high biodiversity values; hence, there is currently less scope for protecting highly disturbed peri-urban landscapes for the provision of amenity and open space based values. While agricultural practices have long been criticised for their destruction of natural habitats and the decline of environmental health, the landholders' responsibility towards minimising environmental degradation was evident, as one landholder stated:

> My role is to ensure that the farm is managed well ... for example, that fertilizers are applied at an appropriate rate to minimise off-farm losses ... so we can actually say: well we're doing our little bit for the environment.

The majority of stakeholders stated that a stewardship payment system was required to encourage landholders to rehabilitate and rejuvenate the landscape to ensure the provision of ecosystem services that benefit the wider community. Landholders were particularly vocal about the need to provide stewardship payments to ensure that

farmers continued to farm while providing an ecosystem service to the broader community. While state government interviewees supported a stewardship payment system, it was also acknowledged that landholders should not be compensated or rewarded for not fulfilling their obligations under 'environmental duty of care' provisions. It became apparent from discussions with the key stakeholders that 'environmental duty of care' provisions were vague to most and required greater clarification to enable an effective reward system. While landholders were aware of their environmental responsibilities, they strongly believed that the wider community should pay for the provision of ecosystem services that are generated from private land management. As one landholder stated:

> Now if we're a farming operation and we can't make a sustainable and viable living off the land and somebody is telling us that we need to stay there and continue to do that particular operation or wish us to do a particular operation then I think there needs to be a subsidy or some sort of benefit for actually providing that service.

This would indicate that landholders are perhaps willing to provide the broader public benefits from privately owned land provided that it is a viable production system. This has important implication for the design of planning policies and land management programmes that target land preservation for ecosystem service provision.

6.2. Peri-urban issues and challenges

The strategic intent and importance of preserving peri-urban agricultural lands in close proximity to major urban areas was a recurrent theme in the interviews. The most common responses provided by the key informants were for reasons of food security, peak oil, climate change and ecosystem services. As one state government respondent commented:

> I think that the climate change and peak oil agenda is coming over the mountain and it's imperative that we continue to have, from a food security point of view, a resource closely available to major populations ...

One local government representative commented on the need to look beyond short term social, political and economic imperatives for strategic land use planning:

> ... I think it's really important just in terms of, you know, especially from a land use planning point of view because once those sorts of broad scale land uses such as agriculture and conservation are compromised by more intensive development it's really difficult to retrieve them, and because we should be planning for the long term we don't know what form our cities will take in the future so it's certainly – it's critical in my view that we have nearby agricultural and other sort of broad scale land uses available in terms of just, you know, transport costs and all that sort of stuff might be really different in the future.

While it was recognised that securing peri-urban agricultural lands was important, there were differing opinions amongst the stakeholders in relation to whether current planning and policy responses were capable of protecting agricultural land to ensure the provision of ecosystem services. While most acknowledged the statutory regional plan (Queensland Government 2005) as an important planning tool, it was also apparent, to them, that declining terms of trade and 'big city money' would continue to fragment the study area through an increase in rural residential development and urban encroachment over time. It is important to note that these pressures exist

because of past planning decisions and subdivision allowances prior to the release of the statutory regional plan. This represents the latent rural residential potential if the farmer was to abandon farming and sell each lot separately for single detached dwelling purposes.

Landholders were of the opinion that government incentives or rewards to farms were simply inadequate to ensure that farming practices continued. At a state level, while there was some confidence in the current planning system, it was understood that preventing further fragmentation of the landscape would be a difficult challenge due to significant growth pressures and demand for rural residential living. Consequently, it was believed that other planning tools, such as TDRs, needed to be explored as one state government respondent commented:

> ... some people are opposed to TDRs because they think it will actually encourage development ... but the fact is we already have the development in train. It's latent in the landscape now, and in cases, not all, but cases like Rocky Point, that potential is a real threat to the remaining industry ... good planning outcomes aren't going to give rise from that because the *ad hoc* development is so well advanced even though it hasn't been taken up yet, we've got latent rural residential development across that landscape ... without any subdivision. That's what we're dealing with. The impact of that has to be offset against the costs of doing some of the alternatives, and I think, when you do that sum my gut feeling is it will prove quite a viable and valuable option but we haven't done that work yet.

6.3. Constraints and opportunities for TDRs

Despite the limited application of TDRs in Australia to date, all the respondents suggested that they were familiar with the term TDR. Landholders indicated that they are looking beyond current land uses that capitalise on ecosystem services. They were supportive of TDRs as a potential planning tool to protect ecosystem services and ensure equity amongst the landholders. In general, they were hopeful that in the future, development rights would be allocated to enable broad scale land preservation and equity among landholders. According to one landholder this would create win-win-win outcomes:

> I would like to think that the major beneficiary would be the farmer. The second beneficiary would be the developer ... and the third one would be the wider community ... I think if it's properly executed I think everybody's position is going to be enhanced.

While landholders and industry were somewhat supportive of the statutory regional plan for providing certainty it was believed that it clearly disadvantaged some growers, as one industry representative stated:

> ... well essentially the rules have been changed, and the rules are that you can't subdivide below 100 hectares ... those changes of rules have obviously disadvantaged some growers. There's no doubt about that.

Although landholders and industry argued that the statutory regional plan had diminished rights and obligations, the state government interviewees were clear to point out that the regulatory provisions of the plan had actually preserved landholders' legal development rights. However, it was noted that perhaps their expectations had been diminished with changes in minimum lot size provisions, as one representative stated:

> I think the problem was that many people thought that their legal right was to subdivide their land. That was never the case. So the plan didn't extinguish any rights although it has the provision to do that, but I think in many instances that's been overstated, but their rights have not been diminished, although certainly their expectations have been diminished and there may be some confusion in many people's eyes ...

The state government respondents were supportive of TDRs as a planning tool but were unsure how it would be implemented and indicated that it would need substantial effort (i.e. both political and institutional). The state government respondents believed that perhaps one of the greatest challenges relates to the fact that TDRs are based on an American planning model where property rights are substantially different from the Australian land tenure system. Perhaps then, in Australia, there is a need to alter the concept of title to include development rights and obligations to provide greater opportunity to trade development rights on a much wider scale than the present system allows. As one state government respondent stated:

> Yes. But it would need a lot of [expletive deleted] work ... mainly because of the culture within the Government ... and a large part of that culture is about the legislative framework that we operate in and the validity of the framework based on the English model ...

Given the perceived complications of TDRs within the Australian land tenure system it was suggested that there may be other planning tools and policy options which are easier to implement (i.e. lower transaction costs) and result in similar or more favourable outcomes. While industry was also supportive of a TDR programme, it was also understood that there was a logical inconsistency between the use of TDRs and the performance based nature of planning. While the legal representative also acknowledged the enforcement and compliance issues of TDRs under the performance based nature of planning, it was believed to be technically possible provided it was well designed and avoided ambiguity:

> I think you could have a TDR system provided it was well designed and it could be in the codes and it could be in policy or assisted by a planning scheme policy and it would work the majority of the time.

Nevertheless, it was acknowledged that TDRs would fail if developers could achieve a higher density without the need to purchase a TDR permit under the performance based planning approach. Consequently, it may be difficult to establish a mandatory TDR programme. Therefore, it was suggested that there was perhaps greater scope for a voluntary programme that relied on negotiations between council and individual developers on a case-by-case basis. Overall, the legal respondent believed that:

> ... it's technically possible ... the question is the political will and whether it is the best mechanism to achieving your objectives ...

At the local level there was some concern over the capacity of local government planning schemes to implement a complex TDR programme. Again, the flexible nature of the legislative framework was thought to be a major barrier to effective implementation. As one local government representative provided these comments:

> There's potential there but again it's tied back to how legislation is structured and how we structure our planning.

> ... my inclination would be to set it up in local government with state government backed policy and legislation ...

The need to provide some certainty through the aid of more stringent planning and policy frameworks was also a view held by a state government respondent, who commented:

> ... I think planning schemes will work but there has to be some tight and immovable objects in the system ...

The need for planning reform to enable local government planning schemes to function effectively in a TDR market was also a view held by industry, as one respondent commented:

> It probably would need the mechanism, either IPA [Integrated Planning Act – Queensland Government 1997] to be amended or, a piece of the legislative mechanism put in place to allow the TDR process to go ahead under particular circumstances ...

While the same respondent acknowledged that there were perhaps cheaper and easier planning mechanisms to achieve similar outcomes, they defended the use of TDRs because it takes pressure off public coffers. In particular, the respondent made this comment:

> I don't doubt that there's cheaper and easier and quicker and more efficient ways. At the end of the day someone is going to pay for it though, and so either you pay for it with your green levy or you try to devise a way that has a more limited cost on the public purse, and the TDRs to my mind have a much more limited cost on the public purse. There are a number of developers that I speak to who say they'd absolutely be delighted to see a TDR process put in place. That's whether it's to protect heritage or whether it's to protect, you know, green sites or agricultural land or whatever, a fairer more rational process than the current lottery of planning.

The state government respondents felt that the complexities of the arrangements, in particular the legalities behind TDRs and the cost of administering a TDR programme, are the biggest barriers to successful implementation. All of the respondents identified that there was potentially some resistance within government regarding the adoption of TDRs. It was also believed that there was a lack of understanding by the government of the long-term benefits of TDRs. This resistance was also acknowledged by local government who believed that TDRs do not have a good track record because they are resource hungry to administer. It was stressed that several conditions needed to be met to ensure successful implementation. In particular, one of the respondents made this comment:

> ... it's relatively untried so there's a hesitancy to take up those new things when there's not really a good understanding and because of the legal, sort of unknown.

Given the perceived complexities of implementing a TDR programme, there was strong support for the need to ensure 'simplicity' when designing and establishing a TDR programme, as one local government interviewee commented:

> I think a successful TDR program will be one that's more focused, tries to set up arrangements that work between contiguous blocks on common uses and doesn't try to take on too much.

7. Discussion

The findings reported here have important implications for the planning and management of peri-urban areas. In general, there was strong support for the long-term preservation of peri-urban lands in close proximity to major metropolitan areas. The results also indicate that most were familiar with the broader ecosystem services provided by peri-urban agricultural lands that remain in production. In addition, landholders were aware of their environmental responsibility to manage the land to minimise degradation and impact on ecosystem function. While most interviewees acknowledged the importance of current planning polices, there was widespread agreement that additional planning tools were required to manage development pressures, most notably, the rural residential development potential that was considered to be latent in the landscape and awaiting activation through increased demand for quasi-rural living. Landholders were supportive of TDRs as a potential planning tool because it allowed them to receive capital while removing rural residential development pressures.

While TDRs can be an effective tool to protect agricultural land in perpetuity, it is important to note that they are a one-off transaction and will not ensure that agricultural production continues or the ongoing management required for ecosystem service provision (Williams 2004). As a result, TDRs work best when used in conjunction with other planning tools. This has important implications for the design of programmes that attempt to target landscape preservation and ecosystem service provision goals in non-productive landscapes. In most circumstances it is the non-productive landscapes that are under increased pressure from rural residential development and tend to have a diminished capacity to provide ecosystem services (e.g. diminished landscape amenity through influx of pests and weeds). Areas where development potential has been surrendered and ongoing management is needed to ensure that ecosystem services are not compromised will require the establishment of a stewardship or ecosystem service payment system.

There was strong support for the need to establish an effective stewardship or ecosystem service payment system to enhance landscape function. While this view was also held by state government respondents, it was believed that landholders should not be compensated or rewarded for not fulfilling their obligations under 'environmental duty of care' provisions. It was apparent that 'environmental duty of care' provisions were not clear to most and greater clarification would be required to enable an effective reward system to be implemented. Establishing a clear and unambiguous baseline (i.e. environmental duty of care) that is well understood would allow land managers to be rewarded where they are seen to be acting over and above their obligations under duty of care. A review of the literature also suggests that understanding landscape variables in peri-urban contexts (e.g. social fabric, spatial and ecological characteristics) is extremely important in the design of any scheme or programme that attempts to engage private landholders in the management and provision of ecosystem services for broader public benefit (Hollier *et al*. 2003, Goldman *et al*. 2007, Gill *et al*. 2010).

The results also suggest that there was wide support for TDRs as a potential planning tool to manage the peri-urban landscape. This support further indicates that the current planning system needs improvement, and different planning and management approaches are required to manage the complexities inherent in peri-urban landscapes. While most respondents were aware of the potential benefits of

TDRs, there were mixed opinions regarding the likelihood of success and how implementation would occur. Most interviewees acknowledged the potential weaknesses of the current legislative framework (Queensland Government 1997) and clear differences between actual and perceived development rights.

There was also a view that there was reluctance within government to take up new initiatives that have had little traction in the past. It was suggested that there would need to be substantial changes to the legislative framework to facilitate a more effective broad scale roll out of TDRs in Australia. Without significant changes to the planning legislation it was believed that there was greater scope for a voluntary based TDR programme that is simple to administer and is focused within a single jurisdiction. A voluntary TDR programme would rely on negotiations between developers and the administering authority. While there is perhaps greater scope for a voluntary TDR programme under the current planning system, it is important to note that fragmentation will continue because it is not mandatory. Nevertheless, without political support, tools such as TDRs will lack the necessary traction to support broad scale land preservation.

8. Conclusions

The planning and management of peri-urban areas is confronted by many social, economic and environmental challenges. The increasing popularity of coastal and near metropolitan peri-urban areas is degrading the natural resource base and diminishing the supply of important ecosystem services. In the past, planners have relied on command and control planning approaches to manage growth and the supply of important ecosystem services. However, there is growing recognition that these approaches are failing to manage diverse interests and pressures in high growth peri-urban areas. Economists continue to promote the use of market based instruments, such as TDRs, to manage the natural resource base and provide more socially optimum outcomes.

This study has provided valuable insights into the perspectives held by key stakeholders in relation to the value and use of TDRs as a planning tool to protect peri-urban agricultural lands for the provision of important ecosystem services. This paper has demonstrated that while there is strong stakeholder support for TDRs, there are substantial political, institutional, knowledge and legislative barriers that need to be overcome before TDRs are considered a viable and well-established land use planning option in Australia. While it may be difficult to implement a mandatory TDR programme within the current planning system, there is greater scope for the adoption of voluntary based programmes. While TDRs are capable of preserving large tracts of land in perpetuity, protecting many of the values attributed to peri-urban landscapes, including ecosystem service values, they require multiple tools and policy responses. An intricate understanding of the internal and external forces that influence peri-urban areas is critical in the design of planning and policy responses.

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