PERI-URBANISATION AND BIOSECURITY: A PLANNING PERSPECTIVE

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ABSTRACT

Biosecurity issues in rural areas including the rural-urban fringe have been on the national government agenda for decades. However, these issues are rarely linked to the land use pattern and the planning processes that frame the peri-urbanisation process. International, national, regional and localised stressors leading to each new biosecurity threat seem to constantly overshadow the ongoing technical advances and knowledge building. This paper proposes that it is time for land use planners to take a serious look at one of the stressors within their sphere of influence: management of the peri-urbanisation process.

There is growing evidence connecting the land use patterns and natural resource management activities of the peri urban zone to various outbreaks of exotic and infectious organisms. It is also evident that the diverse range of biosecurity issues that emanate from, and are exacerbated by, activities within the peri-urban zone, is ever-increasing. Building upon the governance and land use challenges already present at the rural-urban fringe, this paper suggests a framework for land use planning to make a contribution towards addressing biosecurity threats in peri-urban areas. It highlights the need to incorporate a management response for biosecurity issues into peri-urban planning (pre-incursion) and through the land use planning process, facilitate the execution of the management response (post-incursion).

Keywords: biosecurity, invasive species, peri-urbanisation, land use planning

Purpose of the paper – This paper addresses the following research question: why should land use planning address biosecurity issues in peri-urban landscapes and how might this task be approached?

INTRODUCTION

Public discourse about biosecurity typically focuses on international biosecurity threats and quarantine practices at national borders. The outbreaks of Foot and Mouth disease in the UK, Bovine Spongiform Encephalopathy (BSE) in Europe and North America and H5N1 avian influenza are three well-publicised biosecurity incursions with major impacts on international trade, human health and localised food systems. Australia's geographic isolation from international biosecurity threats and unique natural ecosystems have enabled and necessitated tight international quarantine practices at our aviation and shipping ports.

Biosecurity, however, is not just about protecting our borders. We (and our domesticated animal friends) share our backyards with pest animals, invasive weeds and potentially infectious diseases everyday. Biosecurity Australia's definition of biosecurity is *"protecting the economy, environment, and people's health from pests and disease"* (Australian Government 2010). In urban environments, our close proximity to these threats is primarily a health issue, while in urban-rural fringe areas and rural environments, these threats also have significant impacts on people's livelihoods and the integrity of our natural systems. It is widely appreciated that the trans-boundary ecologies (Fiege 2005 in (Klepeis, Gill and Chisholm 2009)) of invasive species make biosecurity a collective resource issue requiring comprehensive and coordinated prevention and response mechanisms (Meyerson and Reaser 2002; Klepeis et al. 2009; Kruger, Stenekes, Clarke and Carr 2010a; Low Choy and Harding 2010).

The Australian government has long been aware of the substantial role that primary producers and land mangers play in biosecurity as well as the particular challenges faced in rural-urban fringe areas. Biosecurity science continues to shine new light on ways that land use patterns facilitate and impede biosecurity. The peri-urbanisation process in particular is creating a number of significant landscape management challenges that complicate biosecurity prevention and responses to incursions. The authors of this paper believe that the planning profession has an important role to play in Australia's biosecurity through their land use decision making and landscape management activities.

This paper is grounded in a collaborative research project "Change and Continuity in Peri-urban Australia" undertaken 2005-2007 by researchers from Griffith University's Urban Research Program and RMIT University's School of Global Studies, Social Science and Planning and funded by Land and Water Australia

and the Commonwealth Department of Environment and Heritage. Detailed research findings can be consulted in four monographs produced (Buxton, Tieman, Bekessy, Budge, Mercer, Coote and Morcombe 2006; Buxton, Tieman, Bekessy, Budge, Butt, Coote, Lechner, Mercer and O'Neill 2007; Low Choy, Sutherland, Scott, Rolley, Gleeson, Sipe and Dodson 2007; Low Choy, Southerland, Gleeson, Sipe and Dodson 2008). This paper builds upon biosecurity issues identified in one of the project's key case study areas: South East Queensland (SEQ).

This paper links together existing research on the peri-urbanisation process, invasive species, biosecurity threats and the roles and responsibilities of various actors involved in peri-urban biosecurity. The first section of the paper will highlight some of the types of biosecurity risks Australia is currently facing and outline the link between peri-urbanisation and biosecurity. The ongoing threat of Hendra virus is a pertinent illustration of the importance of the issues this papers raises.

The paper will then move on to discuss the stakeholders who are actively involved in biosecurity. The planning profession represents a significant gap in the collective response to incursions, as well as (perhaps most importantly) prevention. Within the peri-urbanisation process, we identify opportunities for policy and planning interventions that could significantly minimise threats to biosecurity. Research and media repeatedly demonstrates the broad-scale disruption of biosecurity threats beyond local communities and therefore, everyone (landholders, visitors, industry and government; including the planning profession) is responsible for maintaining the integrity and quality of our landscapes. There is a great deal of research calling for consistency between actions at different scales and the planning profession is well-positioned to act in the public interest by drawing together biosecurity science with land use planning, decision-making and landscape management activities.

PERI-URBANISATION

Peri-urbanisation is a dynamic process that typically involves the closer subdivision, fragmentation and land use conversion of former rural lands into a blurred transitional zone between distinctly urban and rural land uses. Urban population growth combined with spatial planning and development policies are key factors that drive or inhibit the peri-urbanisation process. Low Choy et al (2007: 15) note that there is limited planning for peri-urban areas and "*the strength of land use planning controls on the fringes of Australia's capital and regional cities varies considerably."* Other drivers of peri-urbanisation in Australia include:

- *Lifestyles and affluence*: including changing societal values, changing community priorities, and greater access to finance
- *Demographics*: including the baby-boomer retirees, an ageing population, and interstate and intra-state migration
- *Work arrangements*: involving greater diversity of work arrangements and more flexible leisure time
- *Urban housing*: increasing housing costs and decreasing availability of affordable housing in urban areas
- *Government policies*: involving national and state programs (e.g. the Roads to Recovery program) and the implementation of regional plans
- *Outdoor recreation*: changing lifestyles and leisure activities of urban residents, leading to increasing demands for outdoor recreation opportunities in peri-urban areas
  (Low Choy et al. 2007)

The peri-urban landscape is typically comprised of temporary mixes of urban and rural activities and functions. Peri-urban land use activities exhibit a high degree of heterogeneity, continual change and conflicting values. It is common to see a jumble of commercial, rural-residential and varied agricultural land uses: such as suburban housing, rural residential lots, intensive or shed based agriculture, vineyards, equine facilities, resource extraction, major urban infrastructure utilities and services (airfields, landfills, schools), churches, retail premises, tourism and recreation.

The social, economic, environmental and spatial attributes of peri-urban areas also vary significantly from place to place. To reflect this, a wide suite of attributes and land use classification techniques have been used to describe peri-urban areas. Property sizes of 1-100ha or 1-200ha (Maller, Kancans and Carr 2008) are commonly used, however some studies have found it necessary to include all landholders in a defined geographic area to adequately capture the peri-urbanisation (Gilmour, Beilin and Sysak 2011). In Australia, peri-urban areas are the focus of significant non-metropolitan growth. This growth not only occurs at the metropolitan fringe but can also occur around smaller urban areas, non-metropolitan regional centres, and cluster along growth corridors, transit routes or amenity landscape areas (Houston 2005; Low Choy et al. 2007; Maller et al. 2008). Other terms for peri-urban include the urban fringe, metropolitan fringe, rural-urban fringe, urban-rural interface, the near-urban, the pre-urban, peri-metropolitan, exurban or urban

hinterlands (Buxton et al. 2006). The history of peri-urbanisation is well documented. Like any 'change' process, academics have been fascinated with understanding land use transitions and the associated spatial, economic, demographic and functional characteristics. More recently, some studies have attempted to quantify the value of ecosystem services in peri-urban locations.

BISOECURITY

> "*While robust response arrangements are in place to combat outbreaks, preventing pest and disease incursions in the first place, remains a national priority".* (Australian Government 2010)

Australia's current approach to biosecurity is best outlined through the Engaging in Biosecurity project led by Australia's Bureau of Rural Services (see Kruger et al 2009 and Thomas et al 2009). The main critiques of the current biosecurity engagement programs (Kruger et al 2009:6):

1. predominantly top-down approach
    a. national government focus on quarantine,
    b. national primary industry bodies focused on industry standards and biosecurity-response mechanisms, and
    c. state/territory primary industry agencies focused on community engagement and media awareness.
2. narrow species focus (on those easiest to identify, such as the European red foxes (*Vulpes vulpes*), feral cats (*Felis catus*), feral goats (*Capra hircus*), feral pigs (*Sus scrofa*) and feral rabbits (*Oryctolagus cuniculus*) recognised in the *Environment Protection and Biodiversity Conservation Act (EPBC) 1999*)
3. one-way communication (information provision only) without any support for the creation, interpretation, implementation of biosecurity knowledge within communities
4. limited opportunities for feedback between on-the-ground action and program proponents

There have also been a number of independent comprehensive reviews that offer rigorous comment on Australia's approach to biosecurity (see Beale et al 2008).

Biosecurity research is also typically focused on individual species that pose a threat to the integrity of natural systems or the productivity of managed systems. These studies seek to understand the 'trans-boundary ecologies' (Feige 2005 in (Klepeis et al. 2009)) of the 'problem' species and then propose or justify certain management responses (see (Long and Robley 2004)). Scale is a significant factor in biosecurity research, with pre-border and post-border biosecurity threats receiving different levels of attention and funding.. In the last…. Decade(s) emerging infectious diseases (EIDs) have received lots of attention based on the severity of health risks and level of disruption for national economies based on primary exports.

A number of factors are making biosecurity issues more complex and increasing the level of risk in certain areas (those of particular relevance to this paper are in bold):

- Globalisation: integrating the world economy and increasing the volume and range of products traded internationally;
- **Urbanisation of rural regions, leading to a heightened risk of pest and disease incursions and zoonoses (that is, animal diseases capable of transmission to human populations) due to the increasing interaction of urban communities with agricultural production areas;**
- Emerging shortage of highly qualified plant and animal pest and disease professionals—partly associated with 'baby boomer' retirements and partly the result of competing career alternatives;
- **Intensification of agriculture, affecting the ability to contain and limit the spread of a pest or disease once an incursion takes place;**
- Increases in the international movement of people and goods (including tourism growth) which increases the risks of exotic pest and disease incursions despite the best efforts of border security;
- **Increasing global movements of genetic material as farmers endeavour to increase productivity, which places particular demands on pre- and post-border biosecurity services;**
- Potential risk of agri-terrorism involving animal rights extremists or political terrorist organisations;
- **Climate change increasing the numbers of viable natural pathways for exotic pests and diseases to enter Australia (expanding range or habitats, changing migratory bird patterns, and weather events supporting the spread of disease vectors);**
- Physical constraints for border interception activities, especially at major passenger airports; and
- Financial constraints, as governments allocate scarce revenue among many competing demands.

(Beale, Fairbrother, Inglis and Trebeck 2008:xiii-xiv,3)

THE PERI-URBAN BIOSECURITY LINK

"These 'new' rural landscapes have an increasingly heterogeneous mix of landholders and land uses"
(Klepeis et al. 2009:381)

In Australia, "… peri-urban regions, which comprise less than 3% of land used for agriculture in the five mainland states, are responsible for almost 25% of total gross value of agricultural production." (Houston 2005:210). The good quality soils and access to water and markets makes it possible to achieve high levels of productivity and support a wide range of production- and conservation-based land uses; including cereal crops, pasture, horticultural crops (e.g., vineyards, olive groves and orchards), remnant native vegetation, niche markets in organic or biodynamic produce, diverse stock (e.g. alpacas) and native produce (e.g. wildflowers and native foods).

However, amidst fluctuations in primary production markets, improved access to urban services and rising land values, traditional farming properties are being converted to smaller lifestyle blocks and rural residential properties ("the peri-urbanisation process"). This subdivision of the landscape decreases average parcel sizes and dramatically alters the spatial pattern of land use. First and foremost this increases the number of property boundaries. While invasive species are sensitive to natural landscape features, such as topography and climate, they are completely insensitive to socially constructed boundaries, such as national, state and property boundaries. This creates a significant landscape management challenge.

As each smaller lot is sold, the number of landholders with diverse land use goals and values also increases. When trying to coordinate biosecurity activities, differences in the landscape management knowledge, skills, motivations, resources and practices of peri-urban neighbours present a significant challenge (Klepeis et al. 2009; Low Choy and Harding 2010). As each landholder creates their productivist or post-productivist (amenity) land use dream, the former homogeneous landscape (with farming, grazing or conservation land uses) is transformed into a heterogeneous mix of adjacent land uses. This creates a closer interaction between humans, domestic species, native species and invasive species, and increases the likelihood of domestic animals escaping into the wild (Low Choy et al. 2007:xix), disease transmission (Hodgson 2002), and compromised ecosystem services (Harman and Low Choy 2011:631).

It is also pertinent to acknowledge the spatial mobility of people, vehicles, machinery and other products between and within urban, peri-urban and rural landscapes. Vehicles for stock movement, stockfeed sources and types, and service providers can all serve as vectors for the spread of invasive species and disease. Parthenium (a weed of national significance) is a prime example, being spread through the transportation of produce, livestock, feed and water. Parthenium causes sever allergic reactions for some humans and is toxic to cattle and recent flooding in Queensland has rapidly dispersed the weed to areas that were not previously affected (ABC News online 2011a).

Furthermore, species adapt to the primary land use and therefore as the landscape changes, some species are favoured at the expense of others (Luck 2010:110). Weed management in peri-urban areas is poorly understood and under-resourced. There is little information on the level of weed management that is undertaken by owners of smaller acreage properties. Resources for the ongoing control of invasive weeds and the monitoring of new and emerging weeds have traditionally been focused on large-scale commercial properties. Luck (Luck 2010:103) recognises that "changes in agricultural land use will increasingly dictate future ecosystem dynamics".

Hendra Virus

At the time of writing this paper, Hendra virus continues to be a major concern and challenge for Australia's equine industry. Hendra virus is a good example of the connections between biosecurity, peri-urbanisation and land use planning.

When a horse becomes infected with Hendra virus, the entire property is quarantined while a series of three tests is undertaken on all horses and staff to account for the 11-16 day virus incubation period (Queensland Government 2011). Obviously this initial response has a direct economic impact on the property as well as causing disruption to intrastate, interstate, and international breeding programs (see Thoroughbred Breeders Australia and Queensland Horse Council (QHC) resources for further detail). In addition, it is equally important to recognise the wide range of indirect and ongoing impacts. ABC News articles highlight several current examples:

- disruption to recreation facilities offered on the property e.g. quad bike riding on Blazing Saddles Adventures property near Kuranda, west of Cairns (ABC News online 2011c)
- disruption to tourism activity in affected area (especially when outbreaks correlate with peak tourism season for farm-based activities from July – August)

- authorities urge horse owners to keep their animals away from fruit-producing fig trees (ABC News online 2011b)
- bulldozing of fruit trees on horse properties to remove habitat for the flying foxes that carry the disease (e.g. Craigslea Stud at Kenilworth) (ABC News online 2011b)
- reassessment of ecological status of flying foxes (ABC News online 2011b)

It is evident that a single incursion can lead to conflict between (and re-prioritisation of) the diverse land use values in peri-urban areas (recreation, tourism, production, conservation). The heterogeneity of land use activities is both a positive, in terms of diversified economic interests, and a negative, in terms of the clash of adjacent land uses. The close proximity of neighbouring properties often makes it difficult to effectively quarantine infected premises (IPs), especially when disease transmission is airborne (Hodgson 2002). Where the underlying land use pattern exacerbates, rather than minimises, incursions it is common for temporary spatial zoning systems to be put in place. This was the case in NSW during the 2007 Equine Influenza (EI) outbreak. The imposition of Restricted Areas (RAs) (10km) around infected premises was considered to be "highly effective as a primary response to stop EI becoming widespread across Australia. However, it did not prevent spread to properties contiguous to IPs in areas of high horse density and small property size, especially in peri-urban areas" (Scott Orr 2011:113). This not only suggests that peri-urban land use patterns can be highly vulnerable to disease transmission but also suggests that land use patterns could be just as important for biosecurity threat prevention as it is for biosecurity responses.

PERI-URBAN BIOSECURITY STAKEHOLDERS AND MANAGEMENT RESPONSIBILITIES

The Bureau of Rural Sciences provide a generic overview of the key stakeholders in Australia's biosecurity, and their potential roles and capacities (Kruger, Stenekes, Clarke and Carr 2010b:14-15); namely industry bodies, local growers, workers and pickers, industry development officers, consultants, technical officers/government employees, community champions, government, urban residents, community groups, volunteers, school children and other associated industries. The few studies looking at peri-urban biosecurity in Australia express concern that key stakeholders do not have the capacity to carry out their land management responsibilities (see (Aslin, Kelson, Smith and Lesslie 2004; Aslin and Mazur 2005; Schembri, Hart, Petersen and Whittington 2006; Ceddia, Heikkilä and Peltola 2008; Schembri, Holyoake, Hernández-Jover and Toribio 2010).

Peri-Urban Residents

Low Choy et al (2007) offer the following classification of peri-urban residents:

- *The seekers*: including 'amenity migrants', 'tree/sea change' life-stylers, 'blockies/homesteaders', religious communities and alternative life-stylers
- *The survivors*: including DIY home-builders, the horse community, 'truckies', and 'adaptive' farmers
- *The speculators*: including farm stays and retreats, the pet industry, boutique farmers, recreational providers, landscape suppliers, the equine industry, and developers and real estate agents
- *The strugglers*: characterised by the 'holding-on' farmers (primary producers).

While some research focuses solely on 'amenity migrants' or the dualism between life-stylers and farmers (Maller et al. 2008), Low Choy et al's (2007) classification captures the diverse interests in peri-urban landscapes; ranging from long term to new residents, wealthy to poor, well-educated to culturally and linguistically diverse (CaLD), as well as the service providers associated with these groups. Service providers such as nurseries, equipment suppliers, contractors and livestock agents have received relatively less attention as peri-urban 'residents', however they have a significant influence on landscape management (Gilmour et al. 2011).

A significant proportion of new peri-urban residents are only part-time residents (with a primary residence elsewhere) and do not rely on their property as a primary income source (such as commuters). Luck (2010:108) states that "there may be little economic incentive to control pest species in rural districts when residents' income is not tied to landscape production". For example, there is evidence to suggest that investment (time, finance and resources) in landscape management differs between traditional primary producers and hobby farmers (Ceddia et al. 2008). Such ideological divisions and community diversity typically reduces the capacity for cooperation across a community (Luck 2010:108).

Numerous studies report that new peri-urban residents often have limited capacity (awareness, knowledge, values, time, skills and resources) to carry out landscape management activities (Low Choy et al. 2007; Klepeis et al. 2009; Luck 2010; Low Choy and Harding 2010). These eclectic mixes of residents have diverse land use goals as well as diverse perspectives on how the landscape (and their land parcel in

particular) should be managed. Even where shared conservation ethics exist between residents, some residents have limited practical experience in landscape management (Luck 2010).

The Australian government has facilitated research to determine the level of biosecurity awareness among peri-urban residents in order to more effectively engage them biosecurity initiatives:

> *"awareness of biosecurity, let alone shared responsibility, is frequently lacking in the peri-urban environment. A number of recent biosecurity incidents have occurred in peri-urban areas including the first reported occurrence and subsequent spread of tomato leaf curl virus near Brisbane and periodic outbreaks of Hendra virus in Queensland. Involvement of small business, community groups and individuals in these areas is limited and represents a gap in the biosecurity continuum." (Beale et al. 2008:73-74)*

In summary, the involvement of individual landholders in biosecurity prevention depends on whether they 'know how', 'have resources' and 'want to' (Kruger et al. 2010a). This is also influenced by the social structures, networks and communities within which they are embedded.

Community Organisations

Traditional landscape management bodies, such as local Landcare groups, Greening Australia, The Country Fire Authority (CFA), have played a significant role in educating and motivating communities to work towards biosecurity. The social capital that organisations like Landcare have embodied in the past is critical for addressing trans-boundary natural resource management issues (including biosecurity). However, in the research conducted by Klepeis et al (2009), approx 65% of amenity buyers are absentee landholders and therefore do not get involved in the activities of Landcare. The new peri-urban residents (amenity migrants in particular) are more likely to belong to hobby-based community organisations (such as schools, churches, pony clubs, golf clubs and garden clubs), rather than traditional landscape management bodies.

Beale et al (Beale et al. 2008:84) summarise this trend and recognise the need to engage with peri-urban residents through narrower community interest groups than in the past:

> *"Peri-urban areas represent a biosecurity risk that will remain a challenge to address, but one that justifies greater effort to tackle given the potential risk posed. Individuals and businesses in peri-urban areas may not be members of industry groups nor signatories to cost sharing arrangements and therefore will remain distanced from developments in biosecurity preparedness and response. Existing programs should be expanded to communicate biosecurity responsibilities to hobby farmers and small part-time producers. These programs should utilise community leaders, cultural groups and focal points such as farmers' markets in order to heighten biosecurity awareness in peri-urban areas."*

Industry

National primary industry bodies have tended to focus on industry standards and biosecurity-response mechanisms, and state/territory primary industry agencies have tended to focus on community engagement and media awareness amongst members. These key producer associations are built upon the day-to-day realities of its member's and presenting a collective voice or achieving collective action for the overall benefit of the industry. Industry groups also play a linking role between individual members, producer markets and the latest science (through publicly funded research organisations relevant to the industry). Veterinarians and technical advisors are particularly important professional service groups connecting landholders with up-to-date scientific animal and plant knowledge (and associated land management), as well as collecting an understanding of biosecurity risks across the spatial scale of their services. Their expertise is critical in any outbreak however their hygiene practices can also be a significant vector for the spread of invasive species and disease. A sub-group of non-government veterinarians (Australian Veterinary Reserve) receive special training to oversee the response to national emergency disease outbreaks.

Some primary industries have encouraged members to create farm and business biosecurity plans, however the uptake of this approach depends on the 'regional concentration' of the industry (and therefore concentration of the risks and costs of a biosecurity incursion) a general "lack of meaningful incentives to improve on-farm biosecurity practices' (Queensland Farmers' Federation submission to the independent review by (Beale et al. 2008:74)). Food quality and safety management systems have directly improved biosecurity, through the regulation of labelling and traceability of foods (Beale et al. 2008:74).

It is important to acknowledge that some peri-urban land use activities do not operate as commercial enterprises and therefore, may not belong to industry groups. The economic baseline for industry prevents it from comprehensively responding to biosecurity threats in peri-urban areas (where non-economic drivers also play a significant role).

Government

The Australian Government has facilitated a large volume of peri-urban biosecurity research to better understand who peri-urban residents are in order to establish effective engagement mechanisms and to target communication activities about biosecurity issues (see (Aslin et al. 2004; Aslin and Mazur 2005; Beale et al. 2008; Maller et al. 2008; Kruger, Thompson, Clarke, Stenekes and Carr 2009; Kruger et al. 2010b)). This body of research highlights the need for government leadership to mobilise shared responsibility for biosecurity, link science with on-the-ground preventative and incursion-response activities and coordinate stakeholders right across the "biosecurity continuum" (Beale et al. 2008). Figure 1 outlines Australia's biosecurity continuum of stakeholders, scales of action and responsibilities.

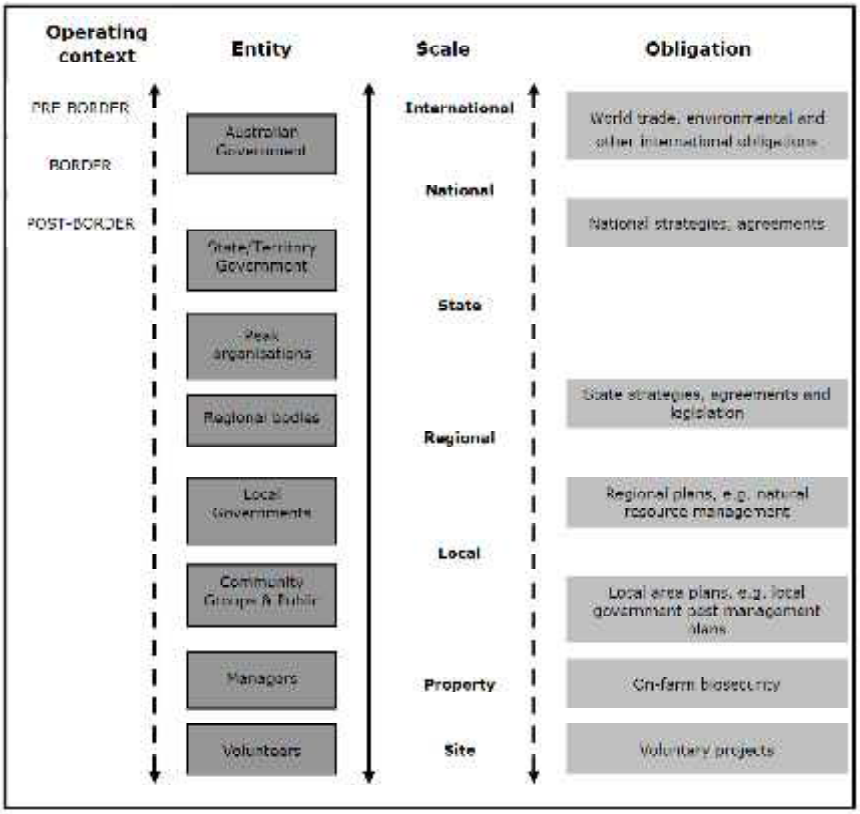

Figure 1: Biosecurity Continuum in Australia (Kruger et al. 2009:3)

The success of this approach is highly dependent on establishing trust, respect, credibility, flexibility, genuineness, reciprocity, responsiveness and transparency (Kruger et al. 2010b:8). Gilmour et al (2011:292-293) comment specifically on the importance of 'trust' due the unbounded-scale of biosecurity risks management. If any stakeholder group does not carry out their landscape management responsibilities, they essentially undermine the efforts of every other stakeholder.

> *"[Biosecurity] information needs to be contextual and sensitive to local experience and conditions. Ideally it should create awareness amongst the target group of what the direct personal impact would be of the biosecurity threat to the things they value, such as the environment or their own backyards. It could also emphasise the notion of being a "good" neighbour or community citizen, or that "doing the right thing" contributes to the greater good" (Kruger et al. 2010a:15).*

An increasingly diverse range of mediums are being used to communicate biosecurity messages and increase biosecurity awareness of both citizens and tourists, including TV programs, hotlines, brochures (Australian Government 2011) and advertising campaigns. "Rural Industries Research and Development Corporation and others who produce multi-lingual newsletters with information on biosecurity for growers in the crucial peri-urban areas" (Beale et al. 2008:67).

National legislation, *Land Protection (Pest and Stock Route Management) Act 2002,* makes it mandatory for state government agencies and local governments to prepare emergency pest management plans. These plans are primarily used to outline stakeholder roles and responsibilities and an appropriate sequence of actions in response to an incursion. In July 2011, Biosecurity Queensland published an exposure draft of the Biosecurity Bill 2011 which is hoped to improve shared responsibility, risk-based assessment, prevention and management of biosecurity issues.

IDENTIFYING THE GAP: LAND USE PLANNING

Regional NRM planning and local pest management plans are clearly represented in Figure 1, however this continuum does not adequately address the specific biosecurity challenges facing peri-urban areas. It ignores the influence of diverse peri-urban residents, land use activities and peri-urban land use patterns on the level of biosecurity risk. There is a clear need to link the biosecurity continuum with land use planning.

This is especially true in SEQ, where the Regional Plan (RP) (and its' associated infrastructure plan) is the overarching statutory instrument from which land use decisions are made and programs and funding are allocated. The SEQ RP aligned its targets with existing SEQ NRM Plan(s) in order to provide continued (and enhanced) support for existing (and new) NRM programs. However, this does not equate to an integration of NRM and pest management planning with land use planning.

There is currently a paucity of data available for planners to identify and monitor the rate of change in peri-urban areas. This is particularly evident with respect to the equine community. The equine industry is not considered an agricultural activity in the Agricultural Census and therefore it is difficult to quantify the level of growth in horse ownership (beyond formal industry members) within a planning region. It is widely acknowledged that horse ownership (for commercial and recreational purposes) is increasingly popular in Australia and peri-urban areas are particularly favourable for the horse community. In the absence of official data, it is possible to use proxy data such as the increasing number of vehicles registered to transport horses in Queensland over the past 10 years, as shown in Figure 2.

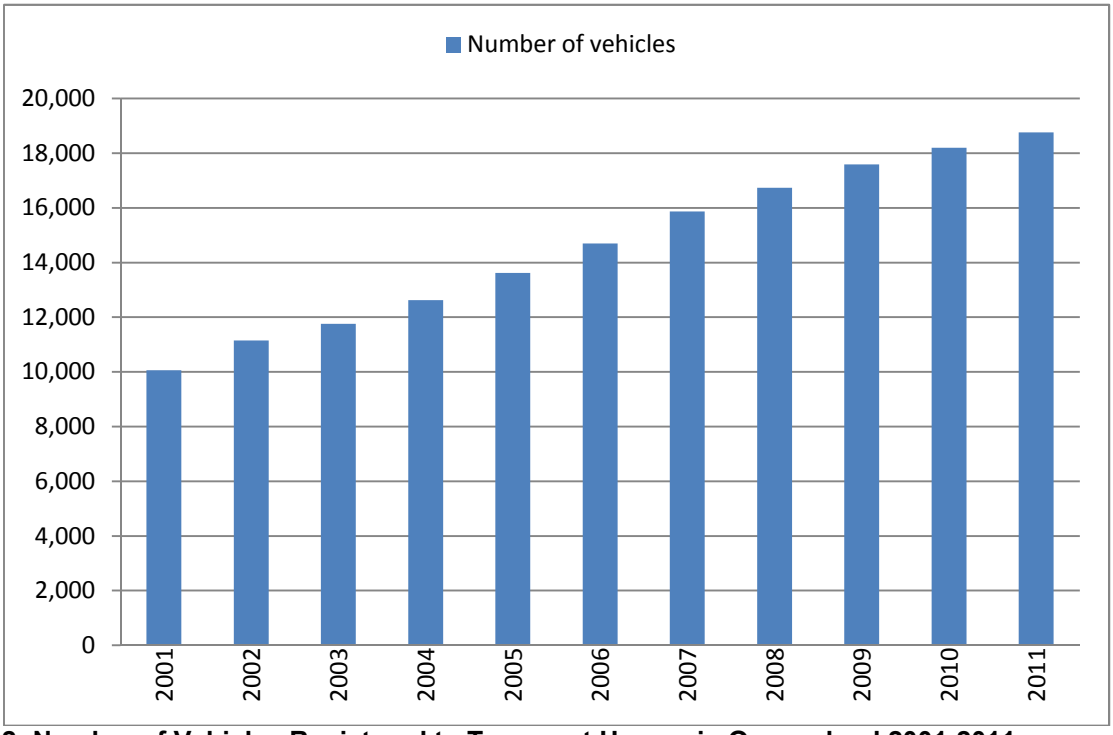

Figure 2: Number of Vehicles Registered to Transport Horses in Queensland 2001-2011 (data courtesy of Queensland's Department of Transport and Main Roads)

It is considerably difficult to analyse the more subtle land use trends that have ramifications for biosecurity. One example of this is the gradual relocation of racetracks (and the cluster of facilities and other equine activities surrounding them) from predominantly urban areas (supported by urban services) to more rural areas. With increasing urban land development pressures and the closer proximity of residential land use, racetracks were considered an incompatible land use and the equine industry has been forced out into the peri-urban. In this instance, it is worth questioning how effectively the equine industry is managing the unique biosecurity risks posed by this new spatial location and the peri-urban biosecurity information that is available to facilitate this.

A FRAMEWORK FOR PLANNERS TO ADDRESS PERI-URBAN BIOSECURITY THREATS

Figure 3 is adapted from the peri-urban cycles created by Low Choy et al (2007). A wide range of drivers (global, national, regional or local), land use changes, land use activities and actors are involved in this cycle and the complexity of the peri-urban biosecurity is evident. Peri-urban residents are embedded within the peri-urbanisation process. Where peri-urban residents lack the knowledge, skills and resources to carry out landscape management activities and limited access to landscape management advice, guidance and regulation, there is a high likelihood of landscape degradation and biosecurity incursions.

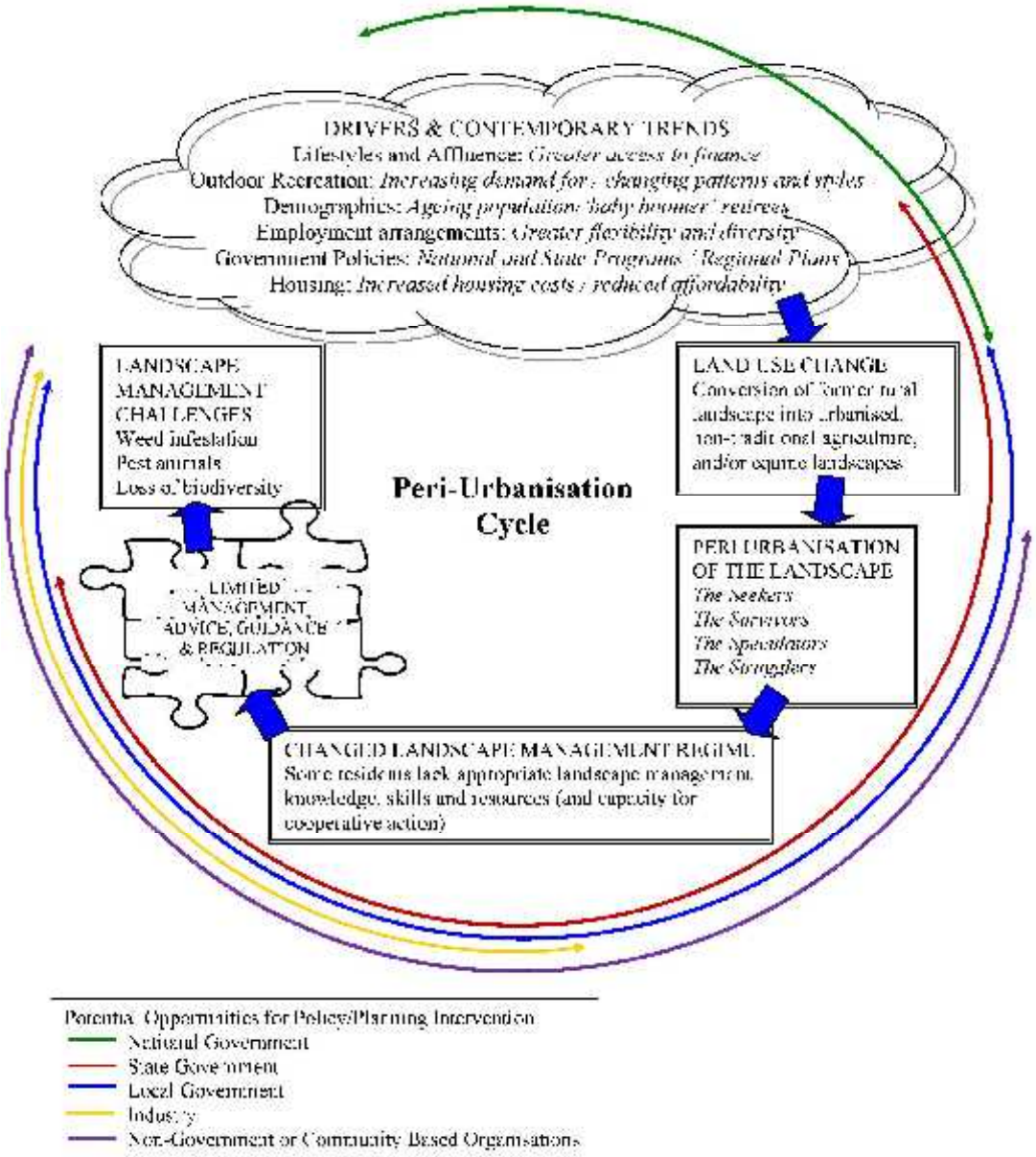

Figure 3: Peri-Urbanisation Cycle (related to biosecurity landscape management challenges)

The coloured arcs in the diagram illustrate the extent of influence and responsibility held by each of the other stakeholder groups. In light of existing research about the new and diverse range of peri-urban residents, it is not guaranteed that landholders will exercise a duty of care and therefore, coordination of action across all levels of government, industry, non-government and community based organisations is critical. It is also evident that there are numerous opportunities for policy and planning activities to influence landscape management challenges throughout this cycle.

A Role for National Government

Notwithstanding the major role of the Australian Government in administering Australia's biosecurity system, the focus on peri-urban biosecurity has primarily been on education campaigns and funding research into understanding peri-urban actors and appropriate ways of communicating with these actors. National government has not however been active in addressing the drivers of peri-urbanisation. It could even be

argued that some national policies are indirectly influencing the peri-urbanisation process, such as the Black Spot Funding to improve road infrastructure across Australia opening up new areas for peri-urbanised development. Without some nationally-consistent mechanism for identifying and monitoring the peri-urbanisation process, it is difficult for national government to take the lead on integrating land use planning into the biosecurity continuum.

A Role for State Government

State government has some influence over the drivers of peri-urbanisation through regional planning activities, as exercised through the urban growth boundary imposed through the South East Queensland regional plan. The effectiveness of these regional planning activities has depended on political will to uphold these decisions in the face of pressure from developers and the associated potential financial and political support gained from developments within local jurisdictions.

State government also has a role to influence the landscape management regime through advice, guidance and regulation. In the past, Queensland's Department of Primary Industries took responsibility for the provision of extension services to farmers. Now however Queensland's regional NRM bodies and service providers are connecting farmers with the latest science. This varies across Australia with some State government departments, some statutory authorities and other bodies sitting completely outside of government. It is worth asking whether the organisations that provide extension services across Australia have the capacity to engage with peri-urban residents?

A Role for Local Government

It is necessary for local governments to take a more proactive role in minimising biosecurity threats in peri-urban areas. Local government has the capacity to not only influence the drivers of peri-urban land use change but also to influence the landscape management regime through advice, guidance and regulation. First and foremost local councils should show leadership in landscape management on council-owned and council-controlled land, such as road reserves. Secondly, with a mechanism for understanding the extent of peri-urbanisation within the local government area, it would be possible for councils to embed temporary spatial zoning systems (that is, recovery planning) into their mandatory emergency pest management plans.

Each local government could also provide advice to peri-urban landholders about local biosecurity and land management issues (in the form of hard copy, online and face-to-face resources). This could be fulfilled through re-instating an NRM point of contact in each local government area. People should know about the existing and emergent biosecurity threats that are relevant to them and their area, how they could be affected and how sound biosecurity practices could minimise these threats. *"for example, gardeners in regional towns could think of their backyards as potential pest and disease reservoirs that could seriously affect trade opportunities for nearby farming operations"* (Kruger et al. 2010a:16) (as well as their own health!)

CONCLUSION

This paper highlights the complexities of peri-urban biosecurity and suggests that land use planning has an important role to play in Australia's Biosecurity Continuum. The key recommendations that emerge are:

Recommendation 1: To build understanding of peri-urban land use activities and patterns and integrate this into risk prevention and incursion-response mechanisms for peri-urban biosecurity.

Recommendation 2: Facilitate landholder awareness and understanding of key landscape management challenges and biosecurity risks in their community (soft mechanisms, e.g. information provision with property title documents or development application decisions, and/or hard mechanisms, e.g. regulation of land use activities)

Recommendation 3: Integrate biosecurity science and landscape management objectives into land use planning.

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