FAILURE TO THRIVE:WATER POLICY AND RURAL DEPOPULATION

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Abstract This article will continue a longstanding narrative on the theme of rural depopulation, but will focus on two Australian policy settings: the user-pays framework which is driving the curtailment of water infrastructure in irrigation areas, and the treatment of positive externalities of agriculture in comparable jurisdictions. It argues that these two policy settings will result in lost opportunities to harness the multifunctional capacities of agricultural land. These policy settings reduce the viability of certain types of land use, thus creating pressure for the agglomeration of farming enterprises into fewer hands and the demise of exposed industries. This is of particular concern in some irrigation districts, in which a reduced consumptive pool in an area is said to have reached a 'tipping point' beyond which the remaining infrastructure cannot be maintained. The social disruption caused by this risks the creation of alternative opportunities for land use, potentially including the maintenance of long term social, amenity and heritage values. The utilisation of a set of mechanisms available in comparable jurisdictions could avert these consequences by creating medium term mitigation opportunities for a rural demographic affected by concentration in markets and protection by competitor nations.

KEY WORDS: Environment, Irrigation, Multifunctional land use.

1. INTRODUCTION

In 1893 the Royal Statistical Society heard that "[t]he alarming depopulation of our rural districts," has of late been the subject of many articles and even more speeches. Able journalists have discoursed on the causes, and ambitious politicians, anxious to catch the votes of an ignorant electorate, have vied with one another in suggesting remedies (Longstaff, 1893, p.380). Rural depopulation has attracted concerned commentary since the industrial revolution in England (Crafts, 1989), and in Australia the tendency of the population to settle along the coast and in urban communities has been a matter of almost continuous commentary. At the time of Longstaff's comments, the depopulation of rural Scotland was particularly marked (Longstaff, 1893, p.389), with the prescient caveat that "[w]here the population is dense it tends to increase, where it is sparse it

tends to decrease" (Longstaff, 1893, p.389). Spain, Holland, Belgium, Austria, Norway, Hungary and Switzerland showed the same trend, with less detailed population information available. Ireland and France had also seen to have been affected by depopulation, although famine and consequent emigration on the one hand and a falling birth rate on the other were large contributors, along with a correction of previous overpopulation. Germany showed growth in urban centres but 'stagnation' in rural districts (Longstaff, 1893, p.404).

In the 'new world' Longstaff noted that

> "*one would not expect to meet with depopulation in any form, least of all rural depopulation. Where land is in superfluous abundance, where rent and landlords are unknown, where every man is his own master, there should be the paradise of the peasant. It might be supposed that in such a place a sturdy yeomanry would go on increasing for many a long year, till the forest and the wilderness should be entirely subjugated – the country fully settled*" (Longstaff, 1893, p.406).

He noted, however, that this was not the case. In Canada there was a tendency in most regions for towns to grow at the expense of rural areas. In the United States "a not dissimilar spectacle meets our view" (Longstaff, 1893, p.406). In Australia, evidence from Victoria showed a massive increase in Melbourne at the expense of rural areas, and that "Sydney… is growing half as rapidly again as the whole colony" (Longstaff, 1893, p.411).

The general decline - or failure to grow - of rural populations could not, he said, be attributable to a system of government, or land tenure, or free trade alone; since the phenomenon is experienced across a range of different systems. He attributes it to 'sentimentality' and improved communications and transport leading to a mobile employment market, centralized manufacturing, and the capacity to trade. In other words, "the dream of the free-trader is being fast realized. That we are more and more learning to do in each place that for which each place is most advantageously circumstanced"(Longstaff, 1893, p.415). He concludes that "those well meaning persons who pin their faith upon these reforms as likely to stop the progress of rural depopulation, are not likely to meet with anything but disappointment"(Longstaff, 1893, p.417).

Rural depopulation has occurred as a theme in all industrialised societies, and net migration is still noted in Australian regions (Walmsley *et al*., 2006). It results from ubiquitous trends and is more recently ascribed to

increasing agricultural efficiency and the diminishing role of agriculture in national economies (Barr, 2008). Crafts notes that English agricultural productivity was high by international standards even at the height of the industrial revolution – attributable to increased farm sizes and improvements in crop rotations (Crafts, 1989, p.423). Whereas some countries have noted 'counter-urbanisation' (Brown and Argent, 2016, p.85), in Australia this has been 'muted and selective over time' (Brown and Argent, 2016, p.85). Research in Australia also indicates a very different pattern of farm exit from that evident in other jurisdictions; Mann *et al*. (2016) report that

> "*[m]uch of the findings of the academic scholarship on structural change in agriculture, elaborated in Europe or America, simply do not apply to Australian circumstances, a context in which a significant fraction of farmers is ready to sell the farm at any stage and where agriculture policy plays only a very minor role*" (Mann *et al*., 2016, p.9).

Thus, research indicates that farm exit in Australia is associated with crisis – either economic pressure or natural disaster – leading to a higher rate of exit in the productive phase of a farmer's life compared with other jurisdictions (Mann *et al*., 2016, p.3). It is contended that the massive reform taking place in the management of irrigation water in the Murray Darling Basin, especially in the context of drought, can act as a critical impetus to farm exit. The strategies deployed by farmers to adjust to water stress, the purchase of water or investment in infrastructure, will not necessarily deliver a profitable outcome. Indeed, research by Mann *et al*. (2016) indicates that there is an 'unexpectedly' negative relationship between profitability (and happiness) and adjustment mechanisms (Mann *et al*., 2016, p.9). This evidence, suggesting that farmers' decision to 'adjust' to drought by purchasing or selling water decreases profitability and may lead to the decision to exit farming, suggests that water sale or purchase occurs in circumstances of financial constraint, either to maintain an existing permanent crop or contract (in the case of water purchase) or to receive a cash injection to remain temporarily afloat (in the case of water sale). It is effectively a 'holding pattern' or interim measure and not consistent with long term enterprise profitability.

This insight becomes particularly important where the permanent transfer of water from some irrigation districts may soon result (or may already have resulted) in a 'tipping point' – a point at which too little water remains in the system to sustainably pay for the water infrastructure in a

user pays system (Kotsios, 2016). This creates potential to trigger a crisis in a water district as a result of increasing infrastructure costs.

2. THE ROLE OF WATER INFRASTRUCTURE

In this section the role of water infrastructure in the sustainability of a productive economy in Australia will be considered. The 'user-pays' policy setting has been adopted in relation to much of Australia's irrigation water infrastructure, but Markey *et al*. (2008) suggest that a change in policy settings could arrest rural decline, and contribute to a more sustainable set of rural communities, by investment in infrastructure and industrial expansion (Markey *et al*., 2008). This argument presents an interesting counterpoint to a policy setting common to most modern market economies – the diminishing proportion of 'social' infrastructure compared with that funded on a user-pays model. This raises the issue of the bifurcation of social and private infrastructure in the context of declining rural communities. It could be argued that much rural infrastructure, including irrigation infrastructure, is partially non-rival – "sometimes nonrivalrously consumed and sometimes rivalrously consumed" (Frischmann, 2005, p. 953) – suggesting the applicability of demand-side analysis. This recognizes that in this case, "markets are not necessarily better than the government or other alternative, nonmarket mechanisms at processing information about or meeting the demands of our complex society for infrastructure" (Frischmann, 2005, p.941). In other words, some public investment in rural water infrastructure is consistent with a market narrative.

Water Infrastructure in Victoria

Water infrastructure is critical to much of the agriculture in Australia, taking the form of irrigation channels, pipes, pumps, regulators, drainage channels, dams and bores allied with on-farm infrastructure. Indeed, water infrastructure in the form of large reservoirs to smooth the episodic flows of Australian rivers is critical to continued settlement. Some level of infrastructure is necessary even to basic amenity in many parts of the Australian continent, and not all water requirements can be met by private infrastructure in the form of tanks, bores and dams. However, in Victoria the basis upon which this infrastructure is funded has changed radically over the past thirty years, and current policy is based on a user-pays framework and a retirement of off-farm irrigation infrastructure which was originally constructed in order to 'drought proof' vulnerable regions. In the

context of extreme vulnerability of water resources to climate change (Jones and Webb, 2008), decisions to close (as in the Campaspe Irrigation District in Victoria (DEPI, 2014, p.49)) or to diminish the extent of this infrastructure (as was proposed in a Victorian White Paper on water resources (DSE, 2004, p.82)) threatens the viability of many enterprises. Farmers are obliged to pay large infrastructure fees, sometimes without the certainty of water delivery, to agree to take over the ownership and maintenance of the infrastructure (as in the case of open channel 'pods' or pipes connecting to 'backbone' infrastructure), to revert to dryland agriculture, or to exit the industry – sometimes with the payment of 'exit' fees. Critically, every exit from irrigation infrastructure lessens the viability of other water users, as does a transfer of permanent water from an irrigation district by transfer to irrigators in other districts or to the Commonwealth or State Environmental Water Holders.

The significance of infrastructure funding to the continued viability of irrigation regions has long been recognized, with the Murray Darling Basin Commission noting that "[m]aintenance of irrigation supply infrastructure costs are largely fixed – the maintenance costs do not change appreciably if there are 10 or 50 irrigators in a particular supply area" (MDBC, 2006). The problem of 'stranded assets' and the capacity of remaining entitlement holders to cover the cost of the infrastructure has been of concern to communities throughout the 'modernisation' and connections programs in Northern Victoria. Particular concerns arise because some of the modernised infrastructure (including lined channels, 'smart' meters, total channel control and proprietary software) will have a shorter lifespan, higher maintenance costs and licensing than the clay channels and robust Dethridge wheels they replaced. Mapped changes in water use between the 2003-04 and 2011-12 irrigation seasons demonstrate a decline in most of the mapped areas, despite many of them still undergoing major infrastructure projects (DPI, 2012), indicating that there is a potential that infrastructure is being 'gold-plated' despite declining use. As infrastructure costs in Victoria are linked to delivery share rather than to water use (or even water share) the pattern of water use does not mean that the properties with diminishing water use are paying less for the infrastructure. In fact, reductions in use may indicate only that irrigators are selling their water to pay for the infrastructure on a year by year basis, rather than using the water and infrastructure for productive purposes. These issues are particularly pronounced in the large irrigation systems in northern Victoria, where the infrastructure covers geographically extensive areas with varied climatic conditions and soil types. Some commodity groups may yield sufficient returns in some areas (the differences in yield between

horticulture, dairy and irrigated cropping is a clear example) but the infrastructure costs may be the same regardless of commodity returns, and of course variation in returns.

Case Study: Goulburn Murray Irrigation District

Table 1, derived from data from Dairy Australia (2017), demonstrates that that the number of high reliability water shares held in the Goulburn Murray Irrigation District (GMID) in Victoria has fallen dramatically over the past fifteen irrigation seasons. The GMID, consisting of the Murray Valley, Shepparton, Central Goulburn, Rochester, Loddon Valley and Torrumbarry Areas, irrigates predominantly for dairy, irrigation and mixed farming production.

Table 1. Total GMID Water Use and Entitlement Change

Year	**01/2**	**02/3**	**03/4**	**04/5**	**05/6**	**06/7**	**07/8**	**08/9**
HRWS (GL)	1597	1598	1567	1543	1517	1480	1585	1490
Year	**09/10**	**10/11**	**11/12**	**12/13**	**13/14**	**14/15**	**15/16**	
HRWS (GL)	1365	1273	1103	1068	1068	1000	1000	

Source: adapted from Dairy Australia (2017).

The same data source indicates that dairy water use over the same period has fallen from 1 884 GL to 1 065 GL. Whilst it could be argued that a reduction in water use is the result of the increased off- and on-farm efficiencies generated by the various infrastructure programs being carried out in the area, Dairy Australia data also indicates that between the 2004/5 and the 2015/16 irrigation seasons GMID milk production has dropped from 2 379 to 1 728 ML and the number of dairy cows has dropped from 431 666 to 320 901. Analysis by RMCG (2016) concludes that there had been a 20 per cent reduction in water use in the GMID, predominantly carried by the dairy sector - equivalent in value to

> "*future lost annual production with a farm-gate value of $200 million/yr….as a consequence dairy processing has seen a fall of $360 million/yr in output value….Mixed farming has lost annual turnover of a further $25 million/yr at the farm gate. …Taken together this has resulted in a reduction in the value of production across the GMID of $580M/yr and the loss of 1 000 jobs across the region (this being*

> *temporarily offset by some 700 jobs associated with capital works for infrastructure upgrades)*" (RMCG, 2016 p.12).

The relationship between reduced water use and social and economic decline was the thrust of submissions to the Senate Committee on the Murray Darling Basin Plan in 2016. One submission noted the relationship between the water remaining in the consumptive pool and increasing social and economic decline:

> "*Shepparton is the regional capital of the GMID. Shepparton suffered the lowest rate of increase of median household income in Australia between 2001 and 2011. The average household income rose only $11 over that 10-year period. This period aligns with the impact of the millennium drought and the commencement of the Basin Plan. This is a stark indicator of the importance of maintaining a quality irrigation system and having enough water to run it. The dairy sector employs about one person per 100 megalitres, the horticultural sector in the GMID about two people for every 100 megalitres. In an area where youth unemployment already peaks seasonally above 20 per cent, the adverse consequences of reducing the available water in the consumptive pool for irrigation in the GMID is really quite frightening. The balance had to be restored, but the tipping point is upon us*" (Senate Committee, 2016, p.14).

The Final Report of the Select Committee on the Murray-Darling Basin Plan (2016) noted that

> "*further work should be done on possible measures to increase market transparency…[including] ensuring market speculators and water users pay the same charge (for instance, storage, infrastructure, delivery and other costs are paid by both irrigators and speculators regardless of whether or how the water is to be used)*" (Senate Select Committee, 2016, p. xviii)

It also recommended that the Productivity Commission be directed to "investigate the value of foregone production and food processing due to reduced irrigation water under the Plan" (Senate Select Committee, 2016, pp. 95-96).

The International Context

A fall in production of this magnitude, allied with the low rate of growth in median income, tracks a stable or falling trajectory in population in rural areas. This can be offset in regional terms by growth in rural centres. RMCG (2016) note that population in the GMID grew in Shepparton and Moira but fell in Gannawarra and Loddon, noting that "the regions experiencing population growth usually relate to increases in regions less dependent on agriculture" (RMCG, 2016, p.12). Similar finely-grained accounts of population decline in rural parts of Shires (compared with the townships or urban centres) occur in the Senate Select Committee report (2016, p. 24). The Australian Bureau of Statistics reported population decline in 45 per cent of SA2s in regional Victoria between 2014 and 2015, whilst population in regional Victoria considered on an area basis generally declined or grew by less than 1 per cent in the same period (ABS, 2016). The apparent inevitability of rural population decline underlines the assertion (Pritchard and Tonts, 2011) that neoliberal policies do not necessarily deliver economic benefits for Australian agriculture or for agricultural communities generally, and that Australia's aggressively free trade stance is a 'two edged sword' for Australian agriculture:

> "*Along one blade sits the often untested but grandiose claims of the national benefits to flow from farmers' access to hitherto protected markets. Along the other lies the frequently traumatic processes (for farmers and the local communities that serve them) of domestic market 'reform' required for the arguments of Australian trade negotiators before the WTO and similar institutions to appear as consistent as possible*" (Argent, 2011, p.18).

Australian irrigators pay for water infrastructure, and this policy setting is unlikely to change. Most irrigators take advantage of the water trading framework, and this policy setting is also likely to remain. Recognition of the third party (environmental) costs of irrigation is appropriate, and there is no argument that the current balance of 19 per cent of entitlements held by the Victorian Environmental Holder should be returned to the consumptive pool. However, the 'mix' of the policy settings balancing the 'private' and the 'commons' aspects of water resource management should recognize that the current trajectory of reform in regional areas will result in depopulation – particularly of productive units. Current policy settings do not take account of a range of demand drivers in the form of public

returns from water infrastructure and from rural lands, and have failed in this because key values are poorly identifiable in market information.

Of course this is only one of the price drivers in relation to affordability of water. The return on commodity prices has always (even historically) been an issue for producers. The Senate Economics References Committee (2017) noted that international commodity prices respond to a variety of events, and that "international market conditions have deteriorated since 2014 following a Russian trade embargo and relaxation of production quotas in Europe. This oversupply drove world dairy commodity prices down and increased competition for the remaining markets in Asia and the Middle East" (Senate Economics References Committee, 2017, p.3). The 'problem of agricultural exceptionalism' in other jurisdictions (Trebilcock and Pue, 2015) is well-known. The most common forms of protectionism, subsidies and price supports, production restrictions and border measures (Trebilcock and Pue, 2015, p.236) are of significant concern to Australian primary producers, who, along with New Zealand, enjoy a low level of producer support compared with competitor nations. The Senate Economics References Committee (2017) also indicated concern with power imbalance between dairy farmers and processes which contributed to downward price pressures. It could be argued that recognition of the 'commons' aspect of water resource management replicates the subsidization strategies of protectionist jurisdictions and a return to 'rent-seeking' behaviour. In participating in new and growing markets for environmental offsets, carbon capture and irrigation futures, however, a modern farming enterprise can engage in positive economic outcomes if the policy settings are appropriate. This is of particular concern where farm abandonment could introduce environmental issues, as well as economic, social and welfare issues in farm communities.

3. WATER POLICY SETTINGS IN AUSTRALIA

In this section Frischmann's infrastructure typology will be applied to the water infrastructure framework in Australia to determine whether, on the basis of "productive activities facilitated by an infrastructure resource and the potential for these activities to generate positive externalities" (Frischmann, 2005, p.917), it is properly characterized as commercial, public or social infrastructure. The article will then consider the outputs from agriculture in more detail, drawing on European literature detailing the consequences of 'farm abandonment'. The article concludes by drawing comparisons between Australian and European concepts of

'stewardship' and conceptualisations of agricultural land as 'multifunctional'.

Frischmann employs a demand side economic analysis of a range of goods, and notes that

> "*Three key insights emerge from this demand-side, value creation-focused analysis. First, infrastructure resources are fundamental resources that generate value when used as inputs into a wide range of productive processes. Second, the outputs from these processes are often public and nonmarket goods that generate positive externalities that benefit society. Third, managing infrastructure resources in an openly accessible manner may be socially desirable when it facilitates these downstream activities*" (Frischmann, 2005, p.919).

He concludes that economic theory, rather than necessitating a market mechanism, supports the protection of 'the commons' for some classes of resource (Frischmann, 2005, p.910). It is argued that irrigation infrastructure is one such resource, and this section of the paper will demonstrate why this is the case.

As noted in the previous section, Australia has followed a number of western jurisdictions by embracing market-based policy settings for water infrastructure. The creation of a market has required the redefinition of, and in some cases creation of, property-like water entitlements. Property rights in law have a series of characteristics. The traditional common law 'bundle' of rights has never been unattenuated, and is subject to extensive modification by statute so that the incidents of property and those of quasi-property interests are almost undistinguishably mixed. Moreover, the concept of property in law is closely associated with the evolving social uses of property, including its economic goal: "one cannot understand private property without understanding its teleology (or aspirations), and these cannot be comprehended without some reference to a moral discourse underlying property" (Lametti, 2003, 327). Increasingly, property rights in law have become subsumed into the economic characterization; however, this has not stripped the entirety of the moral content from traditional *objects* of property right – in particular, property rights involving land. The economic characterization of property rights more and more closely aligns with that existing in property law, consistent with the evolved transactional nature of property law. New moral imperatives, such as social, ecological and environmental values, justify realignment of property objectives. Thus, there are 'overlays' affecting the

use, alienability or destruction of most property rights. This can be easily demonstrated by reference to real property, for which the right to exclusive possession is affected by a range of statutory licences, the right to use is affected by heritage, planning and environmental controls and nuisance provisions in legislation and at common law, and the right to alienate may be constrained by, for instance, subdivision control or foreign investment review.

In keeping with the economic discourse affecting the definition of property, there is a tendency to 'split' or unbundle property rights to enable a range of alienability choices. Just as real property can be split into freehold, leasehold, easement, profit à prendre and similar interests, water entitlements can be split into access, use, temporal and reuse aspects; and, up to a point separately traded. Unlike real property incidents, however, the property-like incidents of irrigation water in Australia are almost entirely the creation of statute. Thus, in the most mature of Australia's water markets, water entitlements have been 'unbundled' to enable billing according to proportion of infrastructure cost. This aligns with an increasing number of neo-property rights have created by the development of market based mechanisms to reach a range of policy objectives. Carbon permits, ecosystem trading, environmental water rights, spectrum rights and related mechanisms create a market in order to forward social or environmental goals. These neo-property rights can cut across and may in fact diminish traditional property rights, whether existing in law or economics. These may be an application of or an exception to the 'beneficiary pays' principle in its application to social objectives.

In Frischmann's terms, many of these neo-property rights are properly to be considered commons, so it is important to transparently assess the policy settings for these rights to ensure that the full social value of the infrastructure is measured, and that market failure is adequately identified and corrected.

4. A TYPOLOGY OF INFRASTRUCTURE RESOURCES APPLIED

Frischmann (2005) defined infrastructure categories based on the nature of downstream activities flowing from that infrastructure. If we adapt this categorization to various types of water resource we see that water resource infrastructure straddles all categories of infrastructure type. As Frischmann notes, "the categories are neither exhaustive nor mutually exclusive" (Frischmann, 2005, p.960). Table 2 sets out a typology of infrastructure categories.

Table 2. Typology of Infrastructure Resources.

Type	Definition	Examples
Commercial Infrastructure	Nonrival or partially (non)rival input into the production of a wide variance of *private* goods	Water bottling plants On-farm irrigation infrastructure Irrigation infrastructure On-farm water re-use systems On-farm drainage systems Bores and wells Drainage systems Water treatment plant
Public Infrastructure	Nonrival or partially (non)rival input into the production of a wide variance of *public* goods	Wetlands River systems Lakes Dams
Social Infrastructure	Nonrival or partially (non)rival input into the production of a wide variance of *nonmarket* goods	Dams River systems Water treatment plant Desalination plant Irrigation infrastructure Bores and wells Drainage systems Water recycling plant

Source: the Author, adapted from Frischmann (2005).

The difficulties in categorization are partly attributable to the privatisation or corporatisation of much of Australia's water infrastructure. For the purposes of this analysis I have considered corporatised public entities paying dividends to government to be engaged in the production of nonmarket goods, despite their market orientation and valuation. Further, the ascription 'market goods' is potentially problematic, since markets have been employed as a vehicle for notional trading in environmental values, thus ascribing commercial valuation. However,

since the importance of the typology is the identification of a range of social and public goods this can be overlooked for the moment.

I am primarily interested in off-farm irrigation infrastructure, which I have categorised as both commercial and social infrastructure. Depending on the infrastructure concerned, it is potentially also public infrastructure. However, this issue is also central to BOOT (build, own, operate and transfer) contracts and public/private partnerships, which are heavily utilized in the construction, operation and maintenance of water treatment and infrastructure projects in urban areas.

The growing trend in Australia and comparable jurisdictions is the utilisation of a blend of corporatised governance structures and market principles to enable full cost recovery on infrastructure, a user pays policy setting, and efficiency measures based on market information. This tends to accelerate the sale of water from a particular demographic, typically irrigated agriculture, to higher value agriculture or urban constituencies. With the sale of water, infrastructure becomes more expensive and thus less viable to remaining landowners, resulting in a cascade effect and exacerbating rural population decline. As irrigated agriculture is more intensive than non-irrigated agriculture, as it increases the productivity of land, the result of water exit may be to replace a more intensive irrigation settlement with a less populous dryland agricultural community. Alternatively, smaller irrigation blocks in high amenity areas may be resettled by lifestyle demographics. In low amenity areas, however, or where planning controls prevent breaking larger blocks into smaller lifestyle units, population will decline. The remaining population will not have the benefit of the existing infrastructure, which will be closed, further reducing the amenity of the area. It could be argued, then, that aspects of Australia's water policy - the particular mix of de jure and de facto management decisions - have withdrawn utilization of the resource as a commons to particular classes of people, by requiring closure of parts of existing irrigation systems, or their piping with diminished capacity, because they do not deliver economic benefits. Other returns from irrigation infrastructure are acknowledged but are not sufficiently cogent in a purely economic argument to override this policy setting.

There are several classes of downstream scale returns - 'public' or non-market goods that derive from irrigation infrastructure and from the settlement that irrigation infrastructure enables. Most of these have been recognized in comparable jurisdictions, and are recognized in policy settings. However, they receive limited recognition in Australia.

- Amenity migration
- Landscape heritage
- Environmental water delivery and ecosystem benefit
- Flood mitigation
- Fire hazard mitigation
- Future benefit (recognizing the cost of recreation of destroyed infrastructure)

Amenity Migration

Agricultural efficiency and the diminishing economic role of agriculture place pressure on agricultural returns, creating, in Barr's narrative, an "interaction between the forces of productivism and migration driven by a search for non-production values from farm land" (Barr, 2008, p.306) rendering non-productive or amenity land uses more attractive. This results in repopulation by non-agricultural users, which has introduced a new pressure on land prices in some regions. This is in contradistinction to other major social displacements; the Highland Clearances typically was intended to replace one form of productive agriculture with another (large scale sheep production) (Devine, 1989, p.35).

The shift in perceived value in agricultural land from a productive landscape to amenity use is a partial driver of environmental regulation in rural landscapes. However, the primary recipients of the benefits of environmental regulation are not necessarily those upon whom the burden falls. Those who live and work in rural landscapes are subject to a higher proportion of people living below poverty lines, and "the great majority – perhaps 75 per cent or more – of the world's poor live in rural areas" (Wiggins and Proctor, 2001, p.428). The legal and policy settings within which environmental values are protected in rural areas is thus a question both of fairness and welfare. There is a degree to which certain environmental mechanisms remove one of the few comparative advantages available to rural communities.

One of the defining characteristics of rural areas is the relative abundance and low cost of land (Wiggins and Proctor, 2001). Along with distance

between settlements and poverty, this is one of the few uncontested features of rurality. It is the counterpoint to the 'superior access of urban inhabitants to financial, physical, human and perhaps also social capital' (Wiggins and Proctor, 2001, p.428) that contribute to lower rates of labour productivity. Farm consolidation is linked to increasing levels of production. The popular rejoinder to the 'nation-building' argument is a generalized opposition to 'subsidisation' of unsustainable regions. However, it can be argued that this is just a correction of the 'resource-bank' attitude by which "hinterland regions [are viewed] as a resource bank from which to 'withdraw' wealth for the benefit of the provincial economy" (Markey *et al.*, 2008, p. 409).

The tendency for amenity migration is not constant across the landscape, as competition from amenity uses is relatively confined. Barr (2008) identifies five social landscapes, revealing "unique characteristics and divergent trajectories of structural change reflecting different balances in production and amenity-based demand for land". These are, firstly, high amenity areas where there is strong competition for land from amenity uses, amenity farming areas, areas in transition, production areas and intensive agriculture areas. The production areas tend to be "flat and lacking in scenic amenity" (Barr, 2008, p.316) and largely encompass the dryland cropping regions in the northwest of the state. The area of greater interest for the purposes of this argument are the 'amenity farming' and transitional areas, many of which in Barr's analysis of social landscapes are served by large irrigation schemes. The characteristics of these landscapes which attract amenity purchase, thus resulting in competition for land from non-residents seeking land for weekenders (Barr, 2008, p.318), include its irrigation capacity – its 'greenness' and access to water. Partly as a result of the high amenity value, the land price is inflated beyond the capacity to deliver a return to agricultural production (Barr, 2008, p.318). The process of migration into high amenity rural areas – the 'commodification' of the rural landscape (Tonts and Grieve, 2002) can destroy the amenity value itself.

However, market conditions are not the only drivers of change. "Regional land use change is the outcome of many small scale drivers and changes, with decisions made at an individual or property scale influenced by regional, national and global norms, environmental change, policy and market forces" (Williams and Schirmer, 2012, p.538). One influence on decision-making is uncertainty in the policy environment. Policy constraints impact on market-based decision making. Planning constraints on subdivision designed to preserve farm size are traditional mechanisms to control the landscape, but new policy constraints have arisen in the form

of a bifurcated water policy environment, resulting on the one hand in the transferability of the water resource, and on the other in the creation of a potentially massive financial impost on land value in the form of water infrastructure costs. In other regions specific controls have been imposed. For instance, the South Australian government has passed legislation identifying 'Strategic Agricultural Land' either having a rare combination of natural resources or having Critical Industry Clusters (Sherval and Graham, 2013, p.176). The *Character Preservation (Barossa Valley) Act* 2012 (SA) and the *Character Preservation (McLaren Vale) Act* 2012 (SA) are intended to prevent activities that would detract from the 'special character' of an identified district. In this cluster of regulatory measures, a period of uncertainty as to the policy instruments to be deployed in these areas has created an unintended constraint on rural transition and adaptation. Uncertainty itself thus has the capacity to neutralize the economic value of the land and water asset, at least in the short to medium term.

The other major policy change is the closure of irrigation networks themselves, diminishing the amenity of some regions and in the transition period disrupting the market price of the land. In some areas the piping of irrigation schemes has resulted in a loss of physical amenity as well as ecosystem and commercial benefits:

> "*Many of these ecological values provide ecosystem services which also aid farm production, such as pollination, flood mitigation, nutrient cycling, soil moisture retention and erosion control. They also contribute to the aesthetic, cultural and heritage, recreational and other social values described by the farmers, such as bird and wildlife watching, clean water for the farm and household, and insect control. Thus, the ecological values of wetlands are intertwined with the social values*" (Graymore and McBride, 2013, p.12)

Many commentators anticipate that the growing wealth of urban areas will lead to economic growth in rural areas: "[r]ural areas will increasingly provide [novel services, such as] leisure, tourism, recreation and amenity, as well as environmental services to the maintenance of the biosphere (climate, biodiversity, waste absorption, etc.). This will allow some additional diversity in rural occupations" (Wiggins and Proctor, 2001, p.434). However, the advantages that will flow from these developments depend on the policy settings. In areas of low amenity, or perceived amenity, current policy settings will privilege infrastructure, including

water infrastructure, whereas in areas of low perceived amenity undergoing a fall in population there is a risk that withdrawal of infrastructure will accelerate decline in amenity, regardless of ecosystem values. This accelerates vulnerability and susceptibility to harm both in the population and in the ecosystem in cases where the two values are symbiotic.

Landscape Heritage

'Landscape heritage' has gained attention in other jurisdictions, but appears to be less regarded in Australia – at least in the context of farmland. The preference for an 'authentic' or traditional landscape which 'meets the requirements of the picturesque' (Janssen and Knippenberg, 2008) can mean that amenity and landscape heritage issues will often be subsumed. However, as Longstreth notes, "[l]andscapes of the recent past are, too often, the last considered and the most threatened" (Longstreth, 2004, p.118). Agricultural landscapes in Australia are marked by settlement policies that marked the road layouts, housing styles, demographics and infrastructure and techniques of irrigation. Policy specified even the ratio of water to acreage, based on soil type and productive capacity. Irrigation channels, prompted by local activism and energized by successive droughts and floods, are models of engineering capacity and yield local innovation. The landscape of irrigation development is a socio-economic history and an important correction to the episodic, crisis orientation of modern infrastructure reform.

Accordingly, policy should recognize the significance of irrigation schemes and their communities as an aspect of landscape heritage. Although some of these landscapes are not of high amenity, modern landscape studies employ subjective assessments of landscapes, and emphasise the relationship between value and processes (Jacques, 1995). This throws into question the differentiation between the cultural and the natural, emphasizing a conception of value that is subjective, dependent on "personal history, cultural inheritance and idealized conceptions of the world" (Jacques, 1995). Reframing these as questions of value emphasises also their transience. The abandonment of irrigation landscapes as a form of cultural heritage diminishes future potential value. Stewardship obligations in these cultural landscapes are not yet recognized because of a preference for landscape types with high current amenity value, and perhaps because productive landscapes in Australia do not enjoy the same subjective associative values as ethnographic or picturesque landscapes,

but it is likely that they will in future be understood as part of Australian cultural heritage.

Environmental Water Delivery and Ecosystem Benefits

The use of off-farm irrigation infrastructure could deliver environmental flows to wetlands, fully enabling the counter-cyclical trade in environmental water. The release of environmental flows will often 'piggy back' on irrigation water pulses, thus reducing water losses (Skinner and Langford, 2013). Currently the degree to which environmental water bears full costs in a user-pays framework is difficult to determine, given the mix of natural and non-natural water carriers, the creation of new wetlands as a result of irrigation schemes, the environmental benefits of low flows, the politically charged question of whether the environment loses water in the same way that irrigators will when a dam spills, and the range of tariffs charged to consumers in different irrigation regions.

Ecosystem benefits of existing irrigation infrastructure may arise as a result of access to water in otherwise dry landscapes or providing connections between wetlands, affording benefits for indigenous fauna and potentially creating localized new wetlands or sustaining existing wetlands which would otherwise be affected by extractions upstream. This phenomenon is intended to be considered in the implementation of infrastructure closure by the completion of environmental impact statements. Graymore and McBride (2013) note, however, that infrastructure modernisation and water allocation arrangements may have an impact on smaller and ephemeral wetlands. In an account of the replacement of an open channel with a pipe in the Wimmera Mallee area of Victoria, the authors note that,

> "*the waterways which receive an [environmental water allowance] are prioritised based on the size and location of waterways, with major rivers receiving an EWA over minor waterways and large public wetlands before small on-farm floodplain wetlands. Further, wetlands listed as significant by Ramsar or similar lists also have priority access to EWAs. Thus, small rivers, floodplains and wetlands are not provided with an allocation. This is likely to reduce biodiversity within natural floodplain areas … once a channel system is decommissioned, with potential consequences for the socio-ecological values of waterways such as on-farm floodplain*" (Graymore and McBride, 2013).

Since many of these smaller wetlands are on freehold, typically agricultural land, Graymore and McBride (2013) also identified significant community health and well-being impacts of diminishing water across the landscape. The Wimmera Mallee project involved the replacement of an open channel with a pipeline. The water identified as 'saved' was then reallocated to other uses, including environmental uses, but the smaller on-farm wetlands would be diminished because they do not qualify as 'wetlands of significance'. Off-stream wetlands are allocated 1 000 ML, and priorities and a plan for allocation of water to off-stream wetlands are determined by a group representing the local water authority, catchment management authorities, the Department of Sustainability and Environment, Landcare and water customer committees. Smaller, 'less important' wetlands will be diminished by the loss of water, with a range of other ecosystem effects. Graymore and McBride (2013) listed these as loss of water for wildlife and vegetation, including loss of refuges and corridors, decline in soil moisture, loss of birds and other wildlife, changes in vegetation structure, dieback of large trees and reduced habitat.

Flood Mitigation

Irrigation infrastructure is of enormous significance in flood mitigation; the large reservoirs which supply irrigation water conserve water for dry periods and also prevent the periodic flooding of townships which was a feature of Australian settlement prior to their construction. The fees paid by irrigators and other consumptive users are intended to pay for these assets on a full cost recovery basis. In addition, agricultural land on floodplains (which represents a high proportion of agricultural land in the Murray-Darling Basin) provides a significant benefit to the community by taking on the water, which would otherwise flood townships built along rivers. The flood cycle is natural, and Australian soils and vegetation are adapted to its occurrence, so agricultural land also receives a benefit from this occurrence. However, there are inevitable costs involved in every flood event on farmland; notably the loss of crops, fencing and animals. It is possible to plan to some extent for flood events, particularly if they are intentional flooding events arising from environmental flows. For instance, flood prone land may be set aside for pasture or to allow regrowth and shelter belts. However, in massive flood events no planning will completely ameliorate the risk of loss. Many of these losses cannot be managed by insurance because of restrictions on flood coverage in these regions. Thus, the benefit to the community and the environment occurs, but the loss lies where it falls.

Fire Hazard Mitigation

Whilst fire is considered to be a necessary part of the Australian ecosystem, the devastating effects of fire on a settled community are evident from recent bushfire events (Cottrell, 2005). Irrigation infrastructure provides access to water, a fire resistant irrigation landscape and a fire buffer for many irrigation communities. It should be noted that the extreme nature of some recent fires has been partially attributed to the absence of people in the landscape to detect and fight fires and more closely settled communities are more capable of providing the volunteers necessary to engage with fires when they do occur (McLennan and Birch, 2005).

Future Benefit (Recognizing the Cost of Reconstruction of Destroyed Infrastructure)

Intergenerational equity has often been recognized in the context of debates about the impact of greenhouse gases, ecosystem damage and other critical environmental questions. Intertemporal equity is part of a suite of tools used to provide a cost-benefit analysis of public infrastructure. Generally, economists argue that in the evaluation of public projects the discount rate should be lower than the marginal rate of return on private investment (Lind, 1997). The Intergovernmental Panel on Climate Change recognizes the relationship between intertemporal equity, discounting and economic efficiency (IPCC, 1996, ch.4). However, it is recognized that "water projects have other objectives, such as regional development, income redistribution… that may not be reflected in the measure of net economic benefits" (Lind, 1997, p.42). The Water Resource Council Principles and Guidelines recognize that non-economic benefits may be specified, by inclusion of a 'multiobjective approach'. The mitigation banking approach in the United States specifically requires consideration of the "ecosystems service impacts on humans of moving wetlands around the environment" (Ruhl, 2015, p.322). The intergenerational equity issues of water projects are not on the same temporal scale as projects with a global warming abatement aspect, which have time horizons of a number of centuries (Lind, 1997) so only give rise to questions of effects, not causes, which simplifies the analysis. However, as the effects of climate change are not yet settled the analysis is complicated: it is possible that infrastructure will have a future reduced benefit because it is poorly situated in a changing climate (for instance, dams built to collect rainfall in a drying catchment, or infrastructure delivering water to increasingly

marginal country). In the case of Australia, climate change is likely to deliver changes highly differentiated by region. Some areas of the country will become much wetter, leading to the potential to capture water in different areas; some will become warmer, bringing less productive land into production. Some urban areas will experience water shortages unrelated to population growth because of drying in the catchment, some dry rural areas will become more water self-reliant. The problem of irreversibility applies to decisions made in this context.

What of the decision to dismantle infrastructure which could be allowed to remain in place at negligible cost, thus allowing it to be recommissioned should the climate shift in an unanticipated way? In this context it is not a trade-off between current potential users, since the infrastructure is not being used to deliver water. Infrastructure could remain fallow, allowing for the opportunity to be re-opened if the market or the environment shifted, and the costs of dismantling the infrastructure is foreborne. There are two obstacles to this approach. Firstly, there is a benefit to the irrigator in putting water easements back into productive use and removing open channels on land which partition properties. However, this is a relatively marginal issue. The second issue, which is likely to be more critical to the policy-maker, is the necessity to make the decision irreversible when compensation is to be paid to the landowner. This enables government to deliver a policy which has demonstrable 'outcomes'. From the perspective of a regional community which loses the future opportunity to grow on the basis of irrigated agriculture, and even from the benefit of the landowner who might reverse an earlier decision if markets changed, or may want to maintain a choice of viable uses of land to create the widest potential market for the property, the benefits of irreversible decommissioning seem illusory.

5. HUMAN AND ECOLOGICAL SYMBIOSIS

Because of the nature of the transformed environment in many regions in Australia, removal of infrastructure will have an effect on both the productive and the ecological values. This trend is noted in the depopulation of many regions. In Australia the tendency for farm consolidation has arisen because of declining terms of trade (Nelson *et al*., 2010), but many farms carry unsustainable debt levels which inhibit adaptation to crises such as drought, or increased water prices (Walker *et al*., 2009). With the withdrawal of infrastructure a decision to walk away from a farm may become the most rational one. This can have negative effects on both the remaining community, as indicated above, but

abandonment of farms generally also has an undesirable effect on the environment (MacDonald *et al*., 2000). In some cases land is not entirely abandoned, but has ceased to operate as an ongoing enterprise. Indeed, "predicting the extent and location of future abandonment is a challenge, as it can be a complex and gradual process that can lead to semi-abandonment (where agricultural production ceases, but the land is maintained as agricultural land), and various forms of permanent or transitional abandonment" (Keenleyside and Tucker, 2010). Current policy in Australia relies on mediated market solutions for this phenomenon. 'Less efficient' farmers are encouraged by market forces to sell and 'more efficient' farmers can afford to buy. There have been exceptions, including tender purchases of water by the Federal Government and buybacks of land subject to inundation, but water purchases are potentially a mechanism to enable an enterprise to cease production and derive income from interest on the water tender payments. Purchase of land by the government is uncommon, and will not typically occur unless the land is of high natural ecosystem value.

For a market framework for farm exit to be effective there needs to be significant finance available. The most common forms of available finance are institutional, usually in the form of large superannuation or financial institutional investment, or overseas investment. Farm abandonment in Australia, particularly where widescale landscape disruption has occurred and has resulted in fragmentation and degradation, is not likely to result in reversion of the landscape to a healthy ecological condition without intervention (Standish *et al*., 2009). This means that there is the potential for negative environmental impacts of farm abandonment in the context of continuing sub-optimal conditions for Australian farmers arising from subsidization of overseas competitors; limited competition in upstream (purchasing) sectors, resulting in price squeezes; increasing regulation and poor terms of trade. Correlative intensification of farming systems due to modernization and rationalization of farming have also led to abandonment of lands (Strijker, 2005).

There is the potential for positive environmental impacts in the event of farm abandonment, particularly in "highly fragmented landscapes and where it could provide the opportunity for significant large-scale restoration of non-agricultural habitats" (Keenleyside and Tucker, 2010). Latocha *et al*. (2016) assessed the effects of abandonment of land due to depopulation in the Sudetes Mountains in Poland and found that changes in land use, result in "spontaneous secondary succession of vegetation", particularly on steep and higher slopes, diminishing soil erosion in those areas (Latocha *et al*., 2016, p.128). There are also potential negative

effects. In Europe large-scale 'rewilding' is reported to have had negative amenity values, as a result of loss of cultural landscape characteristics, loss of species richness, inhospitable landscapes and fire risk (Höchtl, 2005). MacDonald *et al*. (2000) note that the environmental effects of abandonment relate to biodiversity, landscape and soils, and wildfire.

Partly in recognition of the negative impacts of farm abandonment comparable jurisdictions have developed ameliorative policies, including that of 'multifunctional land use'. This concept, which allies non-commodity and commodity outputs "has become a key concept of the Common Agricultural Policy … and is seen as a way to address social and ecological concerns such as farm abandonment and biodiversity loss through agricultural subsidy policies" (Otte *et al*., 2007, p.1). The large subsidies available to the agricultural sector in many developed countries often utilise the 'environmental' or 'amenity' uses of agricultural land to justify continued payment of subsidies, against the overall trend to diminish subsidisation of industries (Trebilcock and Pue, 2015).

However, Australia has resisted the adoption of similar policies, relying heavily on market paradigms supplemented by provision of funding conditional on the 'set aside' of land or water only in very limited circumstances. The disparity in policy approaches marks a fundamental difference in attitude to the property basis of farmers' rights to use their land. European payments are based on the proposition that, since "farmers hold the property rights to alter the environment [they] should be given incentives to chance practices" (Hodge 2001, p.101). By comparison, in Australia the assumption is that "environmental degradation occurs because of the failure of markets to recognise the fundamental dependence of agriculture on environmental protection" (Lockie, 2006) and participation in environmental programs is marked by volunteerism. Policy supports the internalisation of the environmental and social costs of agriculture (Lockie, 2006, p.24). This apparent network approach to governance of the interaction between agricultural and environmental values has been buttressed by top-down environmental regulation such as land-clearing restrictions (Reeve, 2001). The amenity, ecological, fire mitigation, resource bank and other benefits of inland settlements and infrastructure supported by agriculture are entirely missing from this policy setting.

Questions arise as to the adaptability of the multifunctionality concept in Australian agriculture. It has been considered to be a Eurocentric view, with little application elsewhere (Cocklin *et al*., 2006, p.198). In fact, the neoliberal roots of multifunctionality are precisely within the hegemony of policy settings in Australia. As McCarthy notes, "[m]ultifunctionality's

insistence that the non-commodity goods jointly produced by natural resource industries ought to be disaggregated, priced and paid for" is consistent with the identification, unbundling and marketization of other natural commodities (McCarthy, 2005, p.779).

Identifying the public good and negative externalities of agriculture should be an explicit policy setting. Abler (2004, p.9) notes a comparison of positive and negative externalities, adapted in Table 3 below:

Table 3. Public Goods and Negative Externalities.

Public goods	**Negative externalities**
Landscape and open-space amenities	Nutrient runoff
Cultural heritage	Sedimentation and turbidity
Rural economic viability	Drinking water contamination
Domestic food security	Odours from livestock operations
Prevention of natural hazards	Animal welfare
Groundwater resource recharge	Irrigation – overuse, salinization
Preservation of biodiversity	Loss of biodiversity
Greenhouse gas sinks	Greenhouse gas emissions
Flood mitigation buffers	Land degradation
Feral animal and weed control	Spray drift
Fire mitigation	Reduction in natural fire patterns

Source: the Author, adapted from Abler (2004).

It is notable that, at least in Australia, most of the negative externalities are heavily regulated, whereas none of the public goods are directly rewarded (with the possible exception of greenhouse emission sinks – although the Federal Government has cut funding to the Carbon Farming Futures program (Vidot, 2013)). On a comparative basis it is possible that the balance of positive and negative externalities weighs differently in Australia than in other countries due to land use, runoff and clearing controls, animal welfare and planning regulation and a lower takeup of intensive farming techniques. In fact, it would be expected that the Australian experience of lower intensity agriculture, minimum or no-till cultivation, regulations on clearing, animal welfare and nutrient run-off would mean that negative externalities are comparatively limited. From a political perspective, it is also possible that the more rancorous opposition to Common Agricultural Policy (CAP) payments in Europe is due to the perception or actuality that landowners, particularly in Britain, represent a monied class and that payments are predominantly made to already

wealthy farmers. Although the design of agricultural payments may be flawed in this respect, this does not constitute an argument against the adoption of stewardship policies.

The 2013 budget for direct farm payments in the form of subsidies and rural developments was 57.5 billion euro, or 43 per cent of the European Union budget (BBC, 2013), and although this had fallen from the 87 per cent of the EU budget in 1970 (BBC, 2013) it is still a significant distortion for markets, within the constraints of which Australian farmers are expected to provide unfunded environmental benefits. Whilst the 'Brexit' of Britain from the European Union is mooted to result in a reduction or removal of subsidies to farmers (Daneshkhu, 2016), advocates for a free market have still supported replacement of the CAP with schemes setting objectives such as "food security; investment in science and technology to improve productivity and agri-environment schemes to enhance the environment" (Daneshkhu, 2016). The National Trust has urged the end of subsidies in their current form, but advocates the provision of payments to farmers for environmental services (Vidal, 2016).

Direct payments under Pillar 1 occur in the form of income support in return for keeping land in good condition and meeting compliance obligations. Pillar 2 payments under the rural development program include capital investments, agri-environment schemes and woodland creation. The 'greening the CAP' program, designed to improve the environmental performance of the CAP, reframes direct payments as methods of maintaining environmental values in member countries. Unlike techniques in Australia, many of the payments are designed to implement production, rather than set-aside activities. Thus, maintaining permanent pasture and crop rotation are considered to be 'greening' activities.

There is little likelihood that the Australian political landscape would adopt such policies. However, payments for multi-functional services are entirely consistent with Australia's neo-liberal policy trends. The adoption of elements of the concept of mediated 'multifunctional land use' could provide an optimal solution to the dual problems of social and ecological decline as a result of farm abandonment. The provision of direct payments for 'stewardship services', for instance, has been proposed as an alternative policy (Hamblin, 2009; Wu and Babcock, 1996). The public benefits of private property husbanded by farmers, which have been recognised in other jurisdictions, should be recognised more appropriately in policy settings in Australia. Alternatively, the recognised positive externalities in agriculture could be identified in the user-pays policy settings in the creation and maintenance of infrastructure. The potential for continued land degradation as a result of farm abandonment, absentee landowners or

inexperience should be mediated to mitigate the risk of feral animals, biosecurity risk and weed infestation.

Several examples of stewardship enterprises already exist. However, these are frequently voluntary, self-funded or funded by non-profit organisations. Table 4 indicates the structure of Federal and Victorian programs; similar programs exist in other states.

Typically, land set aside is not compensated. The ubiquitous grass roots Landcare project is primarily voluntary. Government funding is available for projects, not for labour on-farm which could conceivably replace farm income. A range of other funding sources are listed in the table above. The primary Federal funding available is through the 'National Reserve System'. Unlike most Commonwealth funding, this is available to private landowners on private land to place conservation covenants on parts of their working properties. However, funding does not amount to a payment for the land, or for the price of the farmer's labour: support "can include relief from rates and taxes, equipment and expert advice. Local partners help draw up management plans which take into account both the need to manage for conservation with the fundamental requirement to maintain a viable working property" (DSEWPC, 2013). In return, farmers "provide a legally binding commitment tied to the title of the land in perpetuity… [and] agree to meet international standards in conservation management" (DSEWPC, 2013). The Victorian Trust for Nature has similar characteristics, although it is largely funded through donation; it provides funding for fencing land of high conservation value, which is then set aside. Once again, farmer contribution is not recompensed.

The closest analogy to the environmental components of the European CAP payments is the Victorian BushTender program which aims to protect remnant vegetation of high conservation value. Under this program landowners tender for contracts to improve native vegetation on-farm. They are eligible for periodic payments under agreements with the Department of Sustainability and Environment for carrying out specific actions such as fencing or pest control. The nascent EcoTender follows the same principles, except for a wider range of eco-system services. BushBroker provides market-based programs for the matching of native vegetation off-sets with third parties or in the form of first-party offsets. None of these programs provide market payment for the land set aside.

Table 4. Comparison of 'Stewardship' Programs Nationally and in Victoria, Australia**.**

	Agency	**Program**	**Payments and terms**
'Caring for our Country'			
	Commonwealth	Landcare	Project-based payments to regional groups selected on the basis of 'community engagement, demonstrated capacity, feasibility and value for money'
	Commonwealth	Regional Delivery Projects	Payments to 'eligible regional natural resource management organisations'
	Commonwealth	Environment Grants and Funding	Water purchase or infrastructure grant in return for water
	Commonwealth	World Heritage Grants	Funding to World Heritage property state management agencies
	Commonwealth	Innovation Grants	Funding for groups or individuals to 'drive the development and adoption of innovative practices and technology'
	Commonwealth	Community Environment Grants	Community groups and organisations
	Commonwealth	National Reserve System	Acquisition of property to protect terrestrial biodiversity, then run by non-profit conservation organisations or 'ecosystems protected by farmers on their private working properties'
Trust for Nature	State of Victoria *Conservation Trust Act* 1972 (Vic) Federal government funding and private donation	Conservation Covenants	Private landowners place covenants on title to protect remnant native vegetation. The landowner is not paid, but the Trust will bear the cost of covenanting where the landowner is doing it voluntarily. If the covenant decreases the value of the land the owner might be eligible for an income tax deduction.
BushTender	State of Victoria	Remnant vegetation protection	Tender based, then periodic payments for contracts for management of remnant vegetation
BushBroker	State of Victoria	Native Vegetation offsets	Matches third party or first party vegetation offsets with permit market
EcoTender (pilot)	State of Victoria	Environmental management and revegetation	Tender based, ecosystem services performed by landowner who is paid the bid price to perform services such as weed and pest control, fencing and replanting and stock control

Source: the Author.

The distinguishing characteristic in these programs is that despite the evolving 'market' for a range of eco-system services, such as carbon credits, native vegetation offsets and labour for conservation outcomes, the default position is that the existing 'resource' has no value. Landowners are rarely compensated for the existence of vegetation alone, despite the contribution of vegetation to carbon offsets and to compliance with international covenants.

6. CONCLUSION

Australian irrigators are in competition with a number of comparable jurisdictions, most of which employ caveats to redress an absolute economic analysis of water and water use. A range of programs acknowledge the cultural, amenity, social and environmental aspects of agriculture, including irrigated agriculture, and conceive of landowners as stewards from these multiple perspectives. In Australia there has been a willingness in policy to regulate externalities from agriculture without acknowledging all public goods. The costs of this policy setting have been felt in agricultural communities, and will be felt into the future with various iterations of farm abandonment, with consequent environmental and social costs. This almost isolated policy setting could employ a wider range of tools to reward public goods derived from agriculture.

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