Recent ‘bush blitzes’ have unearthed a number of species of spider, moths and other insects previously unknown or unrecorded but this does not mean our biodiversity balance is better – it is just different, again.\textsuperscript{23}

1.1 A variety of interventions

The Victorian context

Demonstrating our commitment to innovation various methodologies for change are being studied and adopted to augment and institute change.\textsuperscript{17}

Benign neglect, ‘informed inaction’,\textsuperscript{18} or ‘passive regeneration’, all associated with the changing demographic in farming landscapes and the transition to ‘amenity landscapes’,\textsuperscript{19} are producing biodiversity outcomes across the landscape – for free, as Lunt and others tell us.\textsuperscript{20} However, the simple failure to deplete our environmental estate will never be enough to arrest biodiversity decline. As we have known for generations, action, not just omission, is required.

Our potential to compound our record of extinctions is confronting.\textsuperscript{21} When the \textit{State of the Victorian Environment Report 2008} was compiled the Department of Sustainability and Environment provided data which suggested that 157 animal species were threatened and 24 had become extinct. Threatened plant species totalled 778 and 51 had been recorded as extinct.\textsuperscript{22}

Our baseline data is incomplete and this makes us less, not more, confident about what we know. Recent ‘bush blitzes’ have unearthed a number of species of spider, moths and other insects previously unknown or unrecorded but this does not mean our biodiversity balance is better – it is just different, again.\textsuperscript{23}

All the studies, reports, research and field work tell us our biodiversity future looks a lot like our past – bleak – without serious intervention.
The international context

In international settings *The Economics of Ecosystems and Biodiversity* (TEEB) is exploring investment in natural capital through:

- offsets
- the principled application of ‘no net loss’
- payments for ecosystem services (PES)
- tax and fiscal incentives
- subsidy reform.24

Projects attach to fisheries and dairying, timber procurement and carbon credit schemes. This commitment to options across a range of sites and sectors is being reflected in many jurisdictions.

Accepting the need for hierarchical environmental management the USA EPA and the US Army Corp of Engineers have used ‘no net loss’ to address wetlands issues, requiring adherence to a mitigation sequence which:

- *begins* with the avoidance of loss
- *progresses* to minimisation of harm
- only remits ‘offsets’ as *last resort*.

There have been criticisms of such responses. These stem from the delays between the land alteration and restoration projects when offsetting does occur, as permits are issued with the view that wetland destruction and compensatory mitigation are concurrent and instantaneous.25 The inherent delays associated with initiating and completing restoration activities results in temporary wetland losses that can compound in a consistent, temporary net loss of wetland area and function over time. As with any offsetting program, there are also significant concerns regarding homogeneity of conserved wetland systems.26

The Australian response

*Avoidance and mitigation measures are the primary strategies for managing the potential significant impact of a proposed action. They directly reduce the scale and intensity of the potential impacts of a proposed action. Offsets do not reduce the likely impacts of a proposed action, but instead compensate for any residual significant impact.*27

While ‘no net loss’ is the objective of Victoria’s permitted clearing regulations as well, the overarching policy of *Victoria’s Native Vegetation Management – A Framework for Action* is “a reversal, across the entire landscape, of the long term decline in the extent and quality of native vegetation, leading to a net gain.”28

‘Net gain’ of biodiversity is the subject of heightened interest. Whilst attracting the same hierarchical mitigation requirements, some would argue a commitment to ‘net gain’ strives to do more than simply maintain the biodiversity status quo, which is depleted and depleting.
So, if stewardship is important how will we attain it?

These initiatives can be driven by policy instruments and by regulatory mechanisms, but even together these may not affect the arrest of biodiversity decline.

Legal sanctions have, some argue, limited impact in improving environmental condition:

‘Although central (command and control) regulation and taxes can eliminate externalities and hence, the ’Tragedy of the Commons,’ the empirical history in many cases has not been particularly satisfying’.29

Economists have recently suggested that ‘public trust litigation’ is simply costly and actually ‘hinder[s] timely and economical dispute resolution’.30

Examining the regulatory environment, some argue that ‘while regulatory approaches can require a cessation of clearing of key targeted vegetation types they will not enhance condition’.31 One of the key findings of Marsden Jacob Review of the Environmental Stewardship Program in 2010 makes the point:

‘existing regulatory approaches [across all jurisdictions] are an insufficient policy intervention in their own right to achieve the policy objectives of environmental stewardship’.32

In considering stewardship, and appropriate policy interventions, the interrelatedness of the social, economic and environmental aspects should be acknowledged.

While the primary consideration in determining suitable offsets is delivering a conservation gain for the impacted protected matter, the delivery of offsets that establish positive social or economic co-benefits is encouraged. Social and economic or environmental co-benefits may be delivered where an offset aligns with broader strategic environmental objectives such as those outlined in the National Wildlife Corridors Plan, the Indigenous health strategy Closing the gap, or policies that enhance the environment of regional Australia.

For example:

- an offset contributing to an area recognised as important to increasing landscape connectivity, above and beyond what is required by the impacted protected matter
- an offset that employs local Indigenous rangers to undertake management actions
- an offset delivered by paying rural landholders to protect and manage land for conservation purposes.33

So, if stewardship is important how will we attain it?
1.2 Incentives

Incentive proposals, such as incentives and payments for ecosystem services (PES) appear to be presenting real potential for change and validation of efforts already underway.

Internationally, government programs employ various mechanisms to encourage changes in land management on privately owned lands, in order to enhance biodiversity outcomes or natural resource management.

These mechanisms are diverse and include education, awareness raising, technology transfer, research and development, regulation, subsidies and other economic instruments. However, programs often rely on one or only a few mechanisms.

Based on new ways of thinking about our intense reliance upon nature and the value of ecosystem services and about ‘human dominated landscapes’, incentive schemes are making places for people in biodiversity solutions. As ‘innovative finance mechanisms’ such schemes are increasingly promoted, both here and internationally in spite of old worries about the problems of social cost and the issues which underpin ‘externalities’.

Incentives arguably allow for local flexibilities. Their deployment may promote cost savings and higher-valued uses and will almost certainly result in the generation of valuable information. Alignment of ambitions and outcomes may follow. When provided to people with connections to places they care about this type of initiative picks up on the patterns that connect people to sites, geographies, vistas, and flora and fauna populations which they know and value.

It is true that successes and failures will need to be evaluated carefully – we almost require a new form of environmental impact study as distinct from a simple mechanism for determining whether monies have been spent efficiently.

In some instances it would appear that incentives, deployed as one of many processes, will work with other initiatives for greatest effect. This makes sense and is supported by the considerable research which talks about blending programs and aligning and integrating policy options with the concerns of people on the ground. In Costa Rica, where a lot of early work on payments for ecosystem services was instituted, reduction in deforestation is arguably the product of a number of things. There change was effected by the marriage of a number of innovations and this specifically included incentives and legal restrictions, as changes to the law and payments for ecosystem services both commenced at the same time. Their impacts cannot be separated.
We will all benefit from landowners protecting their wetlands by locking them into their farm planning regimes if payments for protection of these ecosystems are available.

The attraction of finding diverse market mechanisms has grown out of frustrations with the failures of established practice to conserve and protect biodiversity. Incentive payments may well, as a component of a systematic approach, fund improvements in land management practices and biodiversity outcomes.

As a means to working through this complexity, David Pannell recommends a framework based on identifying the private and public net benefits from the land-use changes being proposed. The framework recognises that environmental managers can invest in a range of projects involving changes to land use on private land, and that the available options vary widely in the levels of public and private net benefits they generate – potentially including negative net benefits.

We will all benefit from landowners protecting their wetlands by locking them into their farm planning regimes if payments for protection of these ecosystems are available.
1.3 Biolinks and corridors: the ‘pattern that connects’

Beyond examining incentives in respect of individual landscape revegetation and conservation projects in this paper we also examine their potential in promoting the landscape linkages – biolinks and biodiversity corridors – which are essential for better environmental outcomes.40

Corridors and linkages, for which there is real community support,41 are pivotal for biodiversity protection across fragmented and privately owned landscapes.

The scope for corridor connectivity and biolinks on many scales is quite marked as some aspirational planning demonstrates.

The maintenance of appropriate connectivity is an important component of any effective conservation strategy in production landscapes. However, the task of maintaining or enhancing connectivity is not necessarily a straightforward one because the concept of connectivity is complex and multi-faceted. In an attempt to tackle this complexity, Lindenmayer and Fischer (2007) recognised three kinds of connectivity.

**Habitat connectivity** can be broadly defined as an emergent property of ecosystem mosaics that reflects the influence of landscape structure on a species’ mobility and its probability of survival within and among resource patches.

**Landscape connectivity** is based on a human perspective of landscape pattern and typically relates to the connectedness of native vegetation patches. In some circumstances, and for some species, habitat connectivity and landscape connectivity will be closely correlated. In others, habitat connectivity for a given species will be quite different from a human perspective of landscape connectivity.

**Ecological connectivity** is the connectedness of key ecosystem processes (Lindenmayer and Fischer 2007). Understanding these relationships is crucial because we generally manage on the basis of habitat connectivity, with the goal of achieving landscape connectivity.42
In its *Biodiversity Strategy for the Goulburn Broken Catchment 2010-2015* the GBCMA provides a map which illustrates biolink possibilities across the region from Glenrowan to north of Seymour, west beyond Nagambie and north along the rivers and creeks to the Murray.

Townsfolk in Picola, Nathalia, Euroa, Violet Town, Avenal, Benalla and Ruffy all have an interest in this project and many may find they have highly gratifying roles to play. The GBCMA works at several scales. Its finalised Regional Catchment Management Strategy, which defines areas of socio-ecological systems, talks of resilience theory, and is another valuable way at looking at prioritising catchment assets.

**Figure 2: Biodiversity Assets for Goulburn Broken Catchment, Victoria, 2010-2015.**
http://www.gbcma.vic.gov.au
The Victorian Environmental Assessment Council also provides an illustration of the way we can plan for this sort of change across landscapes which juggle productivity and fragmentation.

Such representations form a part of a larger tapestry. Farm planning is being promoted to give effect to the commitment to integrate aspirations and commercial realities as population demographics and climate change impact and heighten concerns about viability. The fencing of creeks, of steep hillsides, or of wetlands, is all conducive to change and, if supported by payments for ecosystem service provision – which is what these initiatives do – have the potential to align with other, landscape change.

Biolinks do not have to be broad scale. They can be confined, intimate, carefully even micro-engineered and they can arise from the most unlikely circumstances. The depiction of the sort of efforts which may be drawn together to develop these possibilities illustrates our point.
The importance of linkages is also evident at the smaller scale and in metropolitan settings. Members of the public, in the public domain and in their private gardens have the potential to play a part in closed settled places like Blackburn, the Merri Creek and along the Maribyrnong River as biolinks can work across smaller scales too.
A VicRoads study of fauna crossings along the Calder Freeway has revealed many iconic Australian animals using the underpasses as alternative routes.

The Eastern Grey Kangaroo, the Black Wallaby, Short-Beaked Echidna and even koalas have been photographed taking advantage of the Slaty Creek underpass.

In all, 36 species of wildlife were monitored making 4861 trips under the Calder using a number of different crossings between spring 2011 and autumn 2012.

In summary this paper starts with a discussion of the importance of biodiversity and ecosystem services, then moves to consider ongoing and arising challenges before returning to examine payments for ecosystem services and the role they may play in generating connectivity across our fragmented landscapes.