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Title:

"Educating Urban and Regional Planners - how notions of sustainability can be enhanced through the inclusion of Permaculture in planning curricula"

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Acknowledgments

Table of Contents

Table of Figures

Abstract

Sustainability is a somewhat vexed term that is open to interpretation and can embody many definitions depending on one's ideological, political and economic perspective. Urban and regional planners need to understand this as it impacts on their education, theory and practice. It also impacts on the policy, program and plan frameworks that they engage with.

What this study examines is the use of Permaculture as an integrated design system to codify not only what sustainability is, but also how it can be applied in the education and practice of urban and regional planning.

The methodology that follows is a literature review that unpacks the relationship of sustainability to Permaculture, the interface with planning education and the (potential) application in practice of this design system. This is further expanded in a conceptual mapping exercise, to examine the relationships between planning education, planning practice and Permaculture. What are identified are linkages within this potential system thinking ('organising framework') and avenues for further inquiry, research and integration.

The conclusion examines these future pathways and seeks to offer Permaculture as a viable design system, based on ethical and practical principles, focused on understanding and expanding sustainability in theory, practice and decision-making.

Introduction

This study is an examination of the concepts that surround, inform and govern an understanding of what 'sustainability' is within the context of urban planning and planning education. This examination does not attempt an exhaustive, or comparative analysis of all the paradigms, economic arguments, or deep and sometimes vexed issues that accompany the term sustainability. That analysis is beyond the scope of this paper. In methodology, what is attempted is a literature review of ideas and paradigms related to sustainability and a proposal that a theoretical framework, namely Permaculture, is a valid tool that can be applied to sustainability theory. This discussion is expanded further to examine the way planning practitioners are educated, and engaged with notions of sustainability in theory and practice.

This paper is therefore interested in how *'top down'* action is generated from government policy, programs, and plans to drive sustainable decision-making agendas. It concerns how the ethical and philosophical elements of Permaculture theory can influence this framework. It is also interested in a *'bottom-up'* approach, the training and development of planning practitioners. It asks the question - is the underpinning ontological perspective of planning education sufficient to turn out graduates with the skills necessary to tackle issues that they will face as lifetime practitioners? And, is Permaculture (an integrated design framework centred on an ontological perspective of resilience and capacity building) a better, or valid complimentary perspective, and how would this be taught, mainstreamed and formalised within a university teaching environment?

However, before we progress any further with this discussion, it is valid to pause and briefly consider what Permaculture is (and what it is not), and the context in which Permaculture sits.

As an observer, looking in, Permaculture is often seen as being a form of organic gardening, or an agricultural and land use practice. While quite a valid observation on one level, (many of the core tenants of Permaculture are indeed food production,

primarily a production that is localised around centres of consumption), it needs to be noted that Permaculture theory runs much deeper than this.

Concepts of sustainability proliferate throughout Permaculture, addressing ontological perspectives and ideological positions, ethical concerns and practical programs. The security of resources at an urban, regional and national scale, localisation, design and analysis, land use patterns, human settlements and development of appropriate technology are all common themes.

Permaculture could be thought of as a 'worldview', and hence a vision of how a sustainable society could function. As a sustainability movement, it challenges and questions the status quo and asks what is it that we are trying to 'sustain'. Permaculture could be described as an 'organising framework' to think about, and act on issues that confront human settlements around the world. This is particularly relevant when addressing the multiplicity of concerns related to the twin, yet explicably intertwined issues of Climate Change and Peak Oil. While not the topic of this paper per se, it needs to be acknowledged that it is the creative response to change, and the engagement with issues of energy decline in an unstable climate, that make Permaculture a compelling and arguably valid model to render a discourse on sustainability theory and practice.

This paper is comprised of four main sections. Following this introduction is a literature review focused on planning and sustainability. The method of this review explores a 'political economy' and ontological perspectives that can be used to analyse different approaches to sustainability and in doing so, unpack notions of sustainability in higher education and planning practice.

Chapter two explores some of these ideas further, but does so by attempting to 'map' major themes in planning to 12 core design principles that exist in Permaculture. In doing so there is an attempt to highlight the relevance of Permaculture as a paradigm that could inform and challenge notions of 'sustainability' within urban planning.

The third chapter brings together the two previous discussions to look at what would be required to teach this perspective to planners at a University level. It is suggested that graduate planners, especially those entering a profession that has such relevance to the shape, form and design of human settlements, should be schooled deep in scenario planning, and be educated to have a holistic and ethical system based framework to support decisions and design evaluation.

The study concludes these discussions by examining future pathways in planning for sustainability. Questions are still to be asked as to the application of sustainability, ideological and ethical imperatives in tackling large-scale social change. Planning for change and possible future scenarios are again highlighted, with consideration given to assumptions of continued growth and the role of the planner in this discourse.

Chapter 1 – **Literature review**

There is much written on sustainability, as a movement, a concept and a 'direction' in which to head. Sustainability thinking has come to characterise much of our society's judgment on policy guidelines, decisions, design and implementation of programs and plans. It also forms a core basis for teaching at a tertiary level in various disciplines, planning included, perhaps because of the understanding that (simply defined) sustainability is "regarded as a space in which social, environmental and economic objectives overlap" (Smith 2007, p.4). In this context sustainability necessarily touches on many different facets and approaches to action and problem solving.

Sustainability has also been deconstructed and 'packaged', to dictate a direction and influence outcomes. It is also a term that is used to market goods and services, generate emotive responses and act as an anchor for various marketing concepts. While this analysis of advertising and branding of 'green products' is not the topic of this paper, it is important to acknowledge the influences it has, and the enormous pressure that is brought to bear on thinking about sustainable outcomes and, by inference, formulating thinking about evidence based values and the policy used in decision-making. Thus, when considering 'sustainability' it is very important to consider the 'lens', the *focus* if you like, that is brought to bear on the subject matter. Just what is it that is being *'sustained'*, and for what reason? What vested interests (if any), overt or otherwise, are implicated? What influences will this have on outcomes, and more importantly, the critical evaluation of these outcomes? At this point it is important to consider the 'political economy typology' that Davidson (2009) has fashioned, which attempts to define a nomenclature of the sustainability debate.

Davidson (2009) analysed the main political and economic approaches within the sustainability debate using four key signifiers [1] to describe and categorise the political paradigms in question. This lens becomes extremely useful when seeking to

[1] The 4 signifiers are – Recognises Limits to Growth, Technology as a Solution, Substitutability of human made capital for natural capital and Considers Power Relationships.

unpack these positions and critically evaluate the background data that purports to support any given position. This is primarily because 'sustainability', as a terminology, suffers from "vague and inadequate theorising" (Davidson 2009, p. 2), making it difficult to understand a position that might lie anywhere within a spectrum that includes everything from a Neo-Liberalism approaches to 'deep green' radical social theories that seek to re-write society as we know it to be.

When considering Permaculture as an *ideological signifier* of sustainability, it becomes important to consider the social and economic position that Permaculture represents. The subject of this review focuses on this critically, in an evaluation of sustainability in relation to planning and how this can interface with the theoretical framework that is Permaculture. In terms of a political economy it is then important to consider how Permaculture would strategically align with the analysis and evaluation of ideas, scenario planning and government policy, and what outcomes this would have for the training of planners at a university level.

Planning education is governed by many concerns such as those articulated at the University of SA Planning Symposium in 2009 – in seeking to create graduates with certain qualities and qualifications, and also to contribute to solutions and understand challenges that society will face, often in the face of uncertainty and external change. It is a discipline that needs to produce graduates capable of interpreting trends and understanding scenarios and transitions in society and being able to set clear policy agendas as a result.

Frantzeskaki and de Haan (2009) pose the understanding of transitions in society as "an interesting challenge for policy makers" as they involve large uncertainties (2009, p. 593). This notion is further explored by Geels (2010) in an examination of environmental issues and the ontological perspective of "socio-technical" transition when applied to responses to environmental issues. For the planner, understanding transitions combines multi-dimensional problems and underpinning ontologies – as defined by Geels (2010, p. 496) - "foundational assumptions about the nature of the (social) world and its causal relationships".

Geels (2010) sees a response as being problematic because:

> "Socio-technical transitions to sustainability do not come about easily, because existing energy, transport, housing and agri-food systems are stabilized by lock-in mechanisms that relate to sunk investments, behavioural patterns, vested interests, infrastructure, favourable subsidies and regulations" (Geels, 2010, p. 495)

Similarly, Meng (2009) outlines the importance of scenario planning and the planner understanding 'mega-trends' and how these will impact on the manner in which planners are taught. This understanding of trends, and 'transition points' in society, leads to theoretical perspectives that use sustainability to unpack actors, technology, ontological and cultural meanings and movement within society.

It is also alludes to an 'integrated' approach as defined by Jepson (2001) that is critically important to an analysis of trends and tipping points. Integration is viewed as the key to a more "coherent and complete" public policy, indeed as the "central conceptual challenge" – across disciplines, diverse actors, and across values (Jepson 2001, p. 506). Sustainability and planning, as viewed by Jepson (2001), explores scientific and cultural interpretations clearly recognising that the two are interrelated. He unpacks the focus on urbanity within the sustainability debate as being intrinsic to the impacts on agricultural capacity. [2] He postulates that there is a need to understand the ecology of cities and integrate this with a "human ecology" (Jepson 2001, p. 499) – that focuses on balance and equilibrium. Planners become the conduits and interpreters of this information, understanding the carrying capacity of urban centres and ecological footprint analysis (Jepson 2001). Again, this 'conceptual context' parallels an analysis of a political economy, as Jepson questions the definitions of growth (2001, p. 504) - "growth in money or growth in well-being"- as being vital to an understanding of sustainability.

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[2] Cities being founded close to agriculturally productive land, and as they grow and expand outward, take more of that land for non-food production activities.

In this 'conceptual context' as defined by Jepson (2001), and popularised by the likes of Holmgren (2002) and Heinberg (2006), there is much debate about climate change and peak oil and the impacts that these twin concerns will have on capacity, security and economic growth paradigms. It could be argued that it is the responsibility of education to prepare graduates for these scenarios (even as a precautionary principle). There is a necessity for education to engage students with sustainability, in that "education can prepare students to face the challenges of declining fossil fuel supplies, climate change and social instability that are the likely (outcomes) of these events in a positive and life affirming way" (Gundersen & O'Day 2009 p. 167).

Lane (2010) argues that there is a need to develop new "land-use strategies" to cope with the "challenges ahead" – that these strategic models need to take account of studies which examine a range of carrying capacity analysis and methodologies that examine the relevance to future spatial planning models. Lane argues that there is a need for carrying capacity assessment to be brought into planning concerns. The analysis of different carrying capacity models all suggest that our societies need to pay closer attention to population limits within environmental constraints, both from planning growth in infrastructure, to consideration of environmental impacts of consumption. This analysis is then extended to examining production rates of various agricultural systems and capacity to feed a given population without impacting adversely on the natural world to provide ecological services. He addresses the role of diet in this discussion, especially a finer grained understanding of the inputs and outputs from various systems and how these interact with each other. From this there is a recommended response to look at the integration of systems, cultural habits, dynamic timeframes, impacts and risk, constraints, suggested alternatives, credible data, usability, future planning, fine-grain scale, and natural habitats. Further to this it is observed that the "fossil fuel based gloablised system of trade has made the study of population carrying capacity seem largely irrelevant because humanity's wants and needs have not been tied to any single local" (Lane, 2010 p. 1044). The scenario of peak oil and climate change impacting on the current use of fossil based fuels may mean, "lifestyles will inevitably need to align more closely with local environmental conditions" (Lane 2010, p. 1044).

The analysis of sustainable boundaries as a tool for assessment of impacts and spatial planning becomes important, as there is a need for the creation of equity in modern lifestyles, to "hold populations accountable to their immediate environment" and steer infrastructure and land use planning (Lane 2010, p. 1045). In engaging with this perspective it is also important to accept that "true sustainability may never be achievable" (Beatley 1995, p. 392) but that the "difficulty or improbability of reaching sustainability should not paralyze us into complacency or non-action. Some movement in the direction of greater sustainability is better than none" (Beatley 1995, p. 392). Meng (2009) states that it is therefore important to use methods such as scenario planning "as (a) creative tool which helps to create visions, build consensus and make us future-ready by changing perceptions about the future as being predetermined." (2009, p. 5) He questions the future of planning education – how do planners respond to these changes and challenges – how do we set agendas in planning – how do we educate planning students to be aware? Or, as Meng (2009) asks, in a rapidly changing world, how do we define and explore emerging mega-trends in society and how do we 'future-proof' planners?

Perhaps for planners who engage with Permaculture to analyse trends and developments to 'future-proof' human settlements, it will be food systems theory that plays a significant part in efforts to construct and design future scenarios and mitigation strategies. There is a notion that ascribes a "political awakening" that comes from an understanding of food security (Welsh & MacRae, cited Campbell 2004, p. 347) and that community planning for local food security and creating the idea of "food citizens" (Campbell 2004, p. 342), will see food security become firmly meshed with all other planning goals.

When looking at food systems and integrating food back into the urban framework there is a need to move away from a "dependency culture to one of self-reliance" (Lang cited in Campbell 2004, p. 347). Partly in response to globalisation and looking at local and seasonal eating, it is also part of 'localisation' (Keady et al, 2008) and minimising transport and material inputs into the food system and creating

spaces for agriculture close to and within cities – "activities that can increase a community's supply of fresh, healthy food at lower prices by reducing transport costs" (Beatley, 1995, p. 388) The role of planning in this discourse is not just then one of land use, transport and distribution but is also an ethical consideration that "views food as a right not an entitlement" (Campbell 2004, p. 346). While few would take issue with this statement, it is important to understand the embedded costs and externalities associated with food 'rights', and in an understanding of food ethics, it is important to consider food at what cost? Perhaps as planners there is a need to understand the value of integrating food back into the urban framework, not just from a practical standpoint, but from an ethical one as well.

According to Hammer (2004) there is an "emerging pedagogy of food systems planning" (2004, p. 425) and a need for the teaching of community food systems planning in education curricula. She quite rightly states that "planners are involved in siting or permitting retail stores, farmers markets, processing facilities, composting facilities, community gardens, and farm related businesses – as well as transportation to said sites" (Hammer 2004 p. 425). Whether they realise it or not planners "engage, explicitly or implicitly, in a range of food systems work" and that "planners possess analytical and facilitative skills requisite for a range of community food systems activities" (Hammer 2004 p. 425). This discussion echoes Campbell (2004) who sees the role of planners as being essential to the facilitation of community food systems planning, that "planners will become direct stakeholders in the alternative food system" (Campbell 2004, p. 346).

Born & Purcell (2006) also acknowledge that there is an increasing awareness of food systems and the relationship to planning in that "it has become clear that planners must begin to confront questions of food safety, ecology, security, access and distribution both inside and outside the city" (Born & Purcell, 2006 p. 195). They are critical, however, of the assumption that can occur in that the "local is inherently good" (Born & Purcell, 2006 p. 195). They caution that planners can be seduced with "incorrect assumptions" and argue that there is a need to better understand theories of scale - and that scale is socially constructed. Scale is seen as a

strategy, an agenda of those empowered by scalar strategies. Again this idea recalls the "political economy" put forward by Davidson (2009). Their argument is concerned with the social dimension – that scale is contingent on time, place and actors and that it cannot be assumed that that any given scale is inherently better than another. Born & Purcell (2006) argue that "just because the current global food system is capitalist, industrial, and unsustainable does not mean that all global food systems exhibit these failings or that current food systems always will be so" (2006, p. 197). While a valid point, this argument seems to gloss over the fact that inputs to a functional system are not isolated wholly within the scale of that system. Input function (for example fossil fuel based energy into modern industrial agriculture) can be externalised, isolated from the end consumer of the production. Should there be a decline in such available resources, the system scale (with externalities) could be called into question. As such, Permaculture seeks to address issues of scale at a localised level, aiming to create closed loop systems and resource efficiency. These dimensions have been identified (Hammer, 2004) as interesting avenues to explore further, especially by planning researchers focused on the energy use of different systems of food production, the ideological notions applied to these, and how these would integrate with development opportunities.

Hammer (2004) discusses this, and explores some of the opportunities for embedding food systems into planning courses and the academic justification to integrate food research that uses Permaculture as a sustainability signifier. These include university planning courses in economic and community development, research and planning workshops (Hammer 2004 pp. 426 – 427).

While the case can be made that food systems should be an area of study in urban planning, the associated parallel topic of land use planning needs to be highlighted, especially in terms of the shape, form and function (and ultimately the sustainability) of cities. This discussion is complex and again somewhat beyond the scope of this paper, but the consideration of land use and the relationship this has to transport is crucial to an understanding of policy, capacity and the direction ascribed to future development.

Kenworthy (2006) examines ten critical responses to the design and development of 'eco-cities', and states that it is the core "issues of urban transport systems and their relationship to urban form" which "focus primarily on the problems of reducing automobile dependence in cities, building more sustainable urban form and creating more liveable places" (Kenworthy 2006, p. 68). Kenworthy's paper analyses the development of eco-cities from a systems perspective, and though not directly a Permaculture text, embodies many of the ideas of Permaculture design principles.

Kenworthy (2006) states that the scale and form of the city needs to allow for and protect the natural, while allowing for food producing areas, especially in the city hinterlands. Automobile use is minimised, with road construction curtailed in favour of investment in transit systems. There is a widespread use of environmental technologies that aim to create closed loop systems in the city minimising waste and maximising the capture and storage of energy. There is a high quality public realm, that extends through-out the physical structure of the city – creating an economic sense of place, and importantly planning for the future based on visionary processes, with sustainability integrated in all "social, economic and cultural considerations." (Kenworthy 2006, p. 69).

For this to be realised and a new urban form envisaged, planned from a perspective of future scenarios and resiliency, Kenworthy (2006) describes the policy directions necessary. This concerns moving transport planning (and it could be argued ALL planning) from a model of "predict and provide" to "debate and decide". In this model planners (as the conduits of information) ask questions about the kind of city that is desired into the future and then work out how to achieve it. This model, though centred on transport planning, is equally relevant to many other land use questions, for it is the way that cities are planned around transport that affects so much of the shape, form and function of the urban environment.

Beatley (1995) describes the sustainable communities that could grow out of this change as ones that exhibit a compact urban form, and the movement towards this

will be one that changes the thinking about "every aspect of community development and every aspect of community design" (Beatley 1995, p. 384). He states that "planning for sustainability seeks to reorganise the social, physical and political-economic landscape in very fundamental ways" (1995, p. 384) and in doing so, create communities that seek to operate within natural limits. Certainly when considering urban form, land-use cannot be viewed in isolation; there is a need to look at "ways of combining policies, programs and design solutions to bring about multiple objectives" (Beatley 1995, p. 388). This necessarily involves reducing the demand for automobile transportation instead of building more roads to alleviate traffic congestion.

Reducing automobile dependence is addressed at a government policy level, for example in the South Australian *30 Year Plan for Greater Adelaide* and the *Housing and Employment Land Supply Program Report 2010, Greater Adelaide* (both Government of South Australia reports). These documents look at densification around activity centres that are based around public transport, effectively Transit Oriented Developments. One of the first reports that was produced to complement the 30 Year Plan (*Housing and Employment Land Supply*) examines this densification based around transport corridors and under-utilised land, and is in part due to a policy of guaranteeing a supply of land for future development. There is, however, still caution needed to ensure that expanding the urban growth boundary is kept in check. Beatley (1995) is particularly critical of cities that cannot be contained within growth boundaries, that "urban-growth boundaries become an indispensable management feature" and that they should be "tightly drawn and enforced" and be "much less permeable than they often have been in the past." (Beatley 1995, p. 384) He advocates curtailing growth in undeveloped lands and ensuring that development occurs within existing urban structures. Adaptive reuse and reconfiguration of existing urban landscape rather than building new suburbs on the fringe is required (Beatley, 1995).

Perhaps there is a need for planners to reconsider the relatively short time frames that formal plans consider, and look to a much longer scale, one that embodies visioning

mixed with scenario planning to understand the ecological services, functions and value and the irreversible damage (e.g. species extinction) that can occur, as a result of human influence on the natural environment. For this to work, planners would need to inspire people to envisage the future and offer a "viable alternative paradigm" (Beatley 1995, p. 393), one that is appealing and inclusive. Planners have a role in helping elected officials and the community *understand* sustainability and why moving toward this is desirable. Overcoming negative perceptions as to what a sustainable society might look like and a shift from "materialistic measures towards more abstract measures of quality (of life)" (Beatley 1995, p. 393) will be important.

Inclusively and integration will be important in this understanding. Community planning models that take a precautionary principle to community design *also* need to be cautious that sustainable communities do not come to mean exclusive communities. If a sustainability ethic is all about creating "a more equitable and just society" (Beatley 1995, p. 392) then we need to ask the question, what are we seeking to sustain and for whom? Who benefits from sustainability, and why? Beatley (1995, p. 392) observes, "Planners must become better at pointing out un-sustainability of conventional planning and development policy and putting forth (or helping to put forth) an alternative vision more in line with (the) ethical imperatives".

In addressing these questions further, and exploring the relationship of Permaculture to sustainability, it is important to build a scaffold around which an understanding of Permaculture can be built. In the following chapter there is an attempt made to map the 12 key Permaculture design principles to planning concerns and highlight where interfaces can intuitively be made.

Chapter 2 - **Mapping Permaculture and Planning**

Without going into a deep historical summary of urban and regional planning it is perhaps important to initially pause and consider some planning history and the major themes currently being grappled with within planning practice.

While it can be seen that some regions and cities have grown organically, towns and cities have also been designed (historically) and planned for certain outcomes and purposes. Defence and social structure, management of resources and waste disposal, access to agriculture centres, trade and economic links are just some of the reasons to site and design centres for human habitation.

Within a modern world context, it is perhaps the advent of industrialisation that laid the foundation for town planning, as it is known today. These roots can be traced back to the need to separate undesirable industrial processes from population centres, and are the beginning of an understanding of land use zoning. The Garden Cities movement, seeking to design towns that would provide healthy environments for factory workers was a somewhat utopian vision from this time.

Post World War One, as a modernist perspective was embodied in art, culture and philosophy, planning became characterised by a notion of machine age certainty and a rebuilding of the old. The tensions evident in modernist thought sought to understand the urban environment as a technical mechanism, capable of being driven and influenced with the right inputs and guidance.

Post World War Two saw social and physical reconstruction efforts the focus of Europe and significant urban expansion occur particularly in the United States and Australia, with the corresponding growth in suburbia and the use of the private automobile. Moving into the later half of the 20th century, with a growing awareness of environmental issues, the relationship of the automobile to the function of cities is

questioned more so than before. Transport and land use issues, suburbia, urban sprawl and the car age, and a growing awareness of climate change and peak oil fuel a tension in modern consumerism and environmental issues. Movements such as New Urbanism look to a reorientation of urban form around transport systems, creating more 'traditional' and walkable neighbourhoods tapping into this greater awareness of sprawl as an issue in sustainability of cities.

From this a 'smart growth' movement evolves and the notion of a 'creative class' (Florida, 2004), i.e. that attracting the right people and fuelling inner city redevelopment will regenerate cities and regions. There is also a concatenation of sustainability with sustainable development and sustainable growth in this discourse, making it difficult to separate the terms out from one the other. Economic growth arguments abound. There is an implication in this discourse that prescribes the idea that society and development can modify a 'business as usual' approach and that growth will be able to continue with no decrease in a current 'standard of living' and continuing growth economy. Permaculture can be used as a tool to examine this, and use a lens of sustainability to unpack this relationship to urban and regional planning.

David Holmgren, one of the co-originators of the Permaculture concept, defines Permaculture thus:

> *'Consciously designed landscapes which mimic the patterns and relationships found in nature, while yielding an abundance of food, fibre and energy for provision of local needs'*
>
> *http://www.holmgren.com.au/*

Essentially Permaculture is an integrated design system concerned with the creation and maintenance of sustainable human settlements. It is also worthwhile noting at this point that Permaculture design is a movement that grew out of Australia and has been taught and disseminated around the world for over 30 years.

Permaculture theory is based on three core ethical principles that are concerned with care of the earth, care for people and distribution of surplus. Accompanying these are 12 design principles. There has been much written on these principles, both in terms

of practical and theoretical analysis. Important amongst this analysis is David Holmgren's 2002 book *Permaculture: Principles and Pathways Beyond Sustainability*.

In his book, Holmgren presents chapter by chapter each of the principles in detail. While not the task of this paper to reproduce that analysis, it is important to recognise the contribution, and reading of this book, in the context of this section. Outlined in this section is an overview of how these 12 design principles 'fit' with urban and regional planning objectives. This section of this paper is examining the 12 Permaculture principles through a lens of planning policy and practice, and looking at how the principles can inform sustainable policy objectives.

The 12 Design Principles are:

1. Observe and Interact
2. Catch and Store Energy
3. Obtain a Yield
4. Apply Self Regulation and Accept Feedback
5. Use and Value Renewable Resources and Services
6. Produce No Waste
7. Design From Patterns To Details
8. Integrate Rather Than Segregate
9. Use Small and Slow Solutions
10. Use and Value Diversity
11. Use Edges and Value The Marginal
12. Creatively Use and Respond To Change

A summary of these connections is diagrammed in Figure 1 below and explained in more detail immediately following.

FIGURE 1: Mapping Major Planning Themes to Permaculture Design Principles
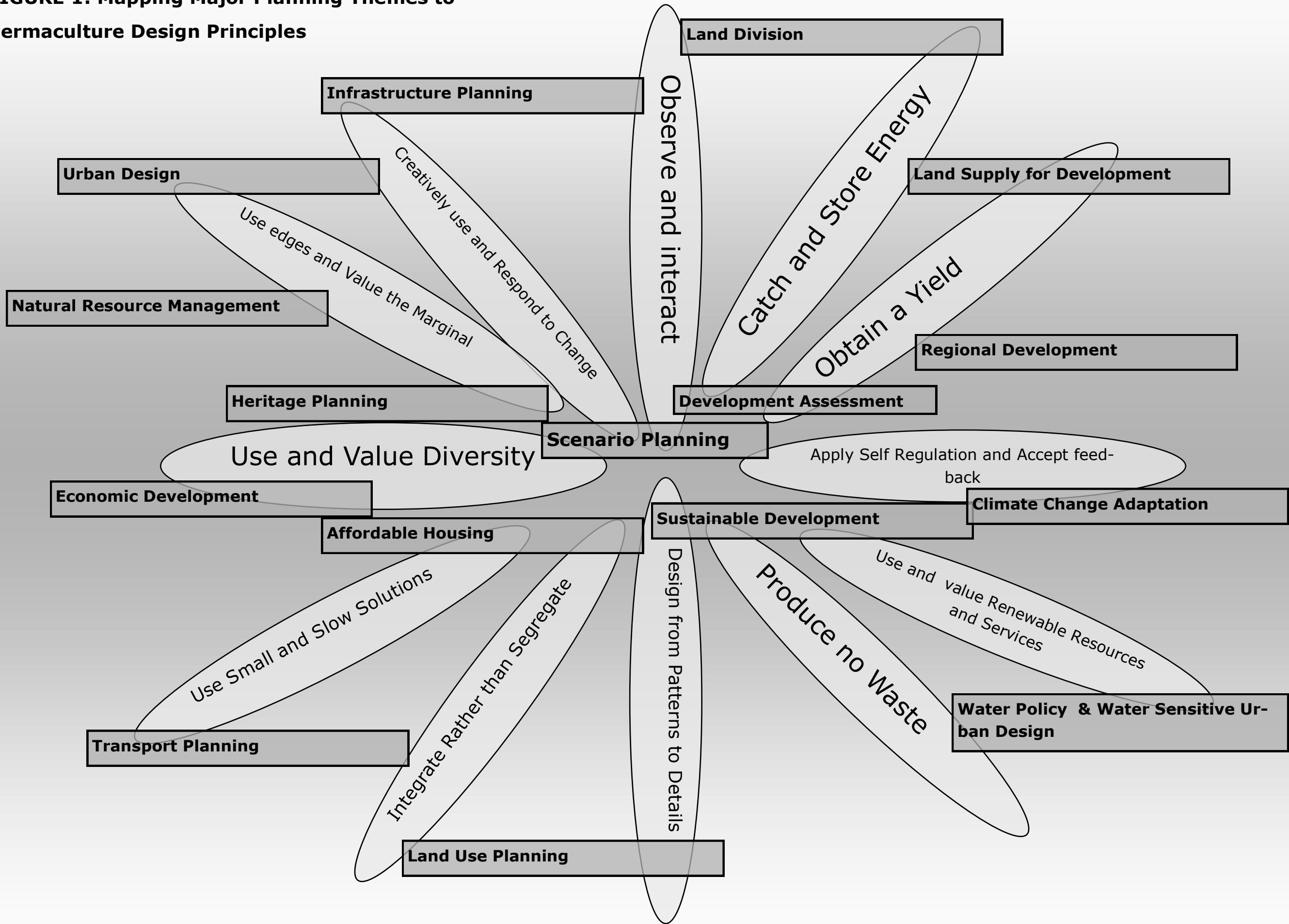
2.1 Observe and Interact

The first principle is foundational; it creates a base from which further iterative design modelling can occur. 'Observe and Interact' is concerned with developing a nuance understanding of landscape patterns. Being able to observe a landscape, the various facets that affect and determine functional characteristics, the elements that interact within that landscape, and the relationship between patterns and systems, is a key Permaculture skill when deciding how a landscape should be modified.

This perspective intersects with planners having a capacity to read and understand both the physical and social landscape in question, review and contrast decisions and have the ability to quickly develop familiarity with the tasks at hand, the landscape form, and the impact that planned or designed development will have on that landscape.

The importance of 'Observe and Interact' is in understanding system elements and the relationship and connectivity these elements have from a very early stage. All other design work is based on this understanding.

2.2 Catch and Store Energy

This principle deals with the optimisation of systems to capture energy, informing an understanding of entropy, efficiency, energy returned on energy invested, and building energy systems *designed* for long term investment in natural and human capital. It concerns not only the built form, but also capturing water, nutrients, and carbon in the landscape and in the process re-building degraded natural capital.

Application of this principle to the Australian built environment offers great potential. Simply put, Australia has a lot of energy available from solar gain. From a domestic perspective, the rooftops of suburbia represent ideal 'real estate' to retrofit

to catch energy (using photovoltaic or solar hot water systems) and lower reliance on external energy inputs that come from non-renewable sources.

Expanding this out from the household to the neighbourhood scale requires consideration of passive solar design where appropriately laid out land developments, building lots and building envelope encumbrances are designed to catch optimal winter solar energy, while blocking summer heat gain. Energy can be captured in the mass of a building to mediate peaks and troughs in temperature and seek to maintain as constant a temperature (thermal comfort) as possible.

The example of the siting and orientation of building lots can also negatively impact on the profitability of a land development. Often a large parcel of land is subdivided to maximise the number of lots. The land developer does of course want to maximise project profitability by having the maximum number of lots available to market. However, an increase in energy efficiency regulation *that places much higher importance on lot orientation*, and therefore a higher material build cost to meet compliance for sub-optimal sites, may mean that some lots, if not entire streetscapes, will come to attract a sub-optimal return. Planning regulation can ensure that a street layout is optimised not only to maximise the return on land investment for the developer, but also an overall efficient lot orientation, therefore increasing profitability for the builder who is seeking to decrease the material compliance (building cost) to meet increasing energy efficiency standards.

Planning will need to engage a range of stakeholders in this process. This would include research and policy initiatives to design energy efficiency into the development of land releases and retrofit existing housing stock, industry bodies and design professionals, trades people (builders, plumbers, electricians), manufacturers (building products, glazing, etc), home building and marketing companies (project home builders), and industry bodies such as the Housing Industry Association and Master Builders Association, all to better understand, disseminate and encourage the adoption of energy efficiency.

2.3 Obtain a Yield

'Obtain a Yield' follows from the 'Catch and Store Energy', in that it concerns being able to efficiently and creatively find new ways to capture and store energy. But rather than dealing with long-term issues of energy security, it deals with the 'here and now' and embodies the colloquial phrase *'You can't work on an empty stomach'.* More so than the first two principles, 'Obtain a Yield' deals with some of the core Permaculture food production issues of not only maintaining a supply of food and plant based energy within close proximity to the home environment, but of how to actively seek to increase and diversify this supply.

One of the early Permaculture visions made popular by Bill Mollison was of "urban landscapes full of food and other useful plants rather than useless ornamentals" (Holmgren 2002, p. 55). Some may take issue with this, in that Mollison's so-called "useless ornamentals" often have an intrinsic amenity and aesthetic value. The point Mollison bluntly makes primarily refers to the amount of energy and time that is put into maintaining an environment that does not directly provide food or other resources. Plant species selection can provide more than one return, in that a fruit tree can provide shade, cooling, and aesthetic aspect as well as food.

Policy issues related to 'Obtain a Yield' would concern the value of plant selection and species diversity within public open space, more specifically, a debate that concerns and challenges the notions of food producing plants existing on public land. The application of urban food ecology could also be seen to be in tension with current South Australian planning policy, which is focused on creating locationally efficient urban landscapes and a supply of land releases directly related to transport (*Housing and Employment Land Supply Program / 30 Year Plan for Greater Adelaide*). The promotion of Transit Oriented Developments as a panacea for car based urban sprawl, is one example of such thinking, currently popular as a way to *functionally reconfigure* and re-design urban environments, increasing densities around transport hubs.

While highly desirable to create a less car dependant population, planning regulations will need to be changed in order to make this a reality. In doing so, there is a need to be careful not to lose touch with a sense of place, and the valuable contribution that open and green spaces play in this conglomeration. One of the challenges for planning policy will be to create environments that are efficient and of higher density, whilst *not creating* social and cultural alienation, the loss of private and public open space, and the ability to use this space to make a functional contribution to sustainable outcomes such as food production and distribution of surplus.

2.4 Apply Self Regulation and Accept Feedback

'Apply Self Regulation and Accept Feedback' applies to the design of systems that are more self reliant and resilient to external pressures. The aim is to design system components that accept feedback and interaction with other parts of the system as a whole, but that are self-reliant from that system should the inputs and outputs cease to function.

'Apply Self Regulation and Accept Feedback' is critical of modern society's over reliance on external inputs in order to function. Holmgren states (2007) that there is an "enormous degree of dependence on large-scale, often remote, systems for the provision of our needs, while expecting a huge degree of freedom in what we do without external control" (Holmgren 2007, p. 13). From a planning perspective this critique is in part about reducing externalities to a system. It is also about reducing consumption and minimising waste within a system.

This commentary is central to some of the current crises that are observed in water resource management, conflicts over access rights to arable land, housing development and future energy supply in a carbon-constrained future. Planning policy may need to align with the 'limits to growth' paradigm and it may indeed need regulatory responses to impose limits on consumption. This can be seen in what has occurred with urban and regional water resource management and the generation of policy that attends to this. However, what is important is that the community does

not feel alienated from a decision making process, as it is the cooperation, the 'buy-in' if you like, that will be vitally important to ensure that equitable outcomes are achieved.

2.5 Use and Value Renewable Resources and Services

'Use and Value Renewable Resources and Services' is centred on the dichotomous relationship between natural systems that embody renewable processes, and the consumption of non-renewable resources that results in the output of unrecoverable (and externalised) wastes. It seeks to underscore the *intrinsic value* that is often provided for by natural systems and services that does not result in that system's consumption or exploitation (Holmgren, 2002 p. 93) for direct monetary profit.

A good example of this *intrinsic value* includes urban street trees. Street trees provide shade, water retention, bio-remediation and habitat, while adding to an aesthetic and quality of life within urban centres (Proceedings of the 11th National Street Tree Symposium 2010). Providing these services, trees and urban vegetation in a more general context, can ameliorate the heat island effect by cooling the surrounding environment, and thus having the capacity to lower the use of mechanical air conditioning in the built form (Hall, 2010 p. 57).

Another example of natural services beneficial in an urban context includes water reuse systems that take grey and black water and utilise this water as 'fit for purpose', lessening the reliance of potable water for all our consumption needs (a common theme developed in several papers and notable in 2010 publication, *Adelaide: Water of a City*). The use of stormwater, that is captured, detained and retained on site, slowed in flow or used to recharge ASR (Aquifer Stormwater and Recovery) systems for later environmental or industrial re-use, is another example.

'Use and Value Renewable Resources and Services' can slot into a spectrum of sustainability agendas. Within Planning, it is probably best summarised in the management and facilitation of land use practices that allow for natural systems to be

incorporated that provide services to human settlements and that are valued, enhanced and proliferated even if there is no primary economic gain to be made.

2.6 Produce No Waste

'Produce No Waste' is centred on the management and maintenance of waste streams – essentially embodying the idea that pollution is "an output of a system component that is not being used productively by any other component of the system" (Mollison, cited in Holmgren, 2002 p. 110). Essentially it can be seen to be a concern with the siting and proximity of systems elements to insure increased efficiency.

At a larger scale, this might mean that industrial zoning practice is predicated upon the siting of industry close together where one process's waste might be input into another, a form of industrial ecology (McDonough & Braungart, 2002) (Newman and Jennings, 2008 p. 203). These industrial parks, designed from the ground up, as integrated systems, would have mandated energy efficiency legislated and assessed through the Building Code of Australia. On-site water capture would be prioritised along with electricity production from mandated solar PV panels calculated on the available roof area. Thus, the path to compliance with the building code would embody a legislated system based on sustainable practice, rather than applying a voluntary best practice compliance regime.

At a neighbourhood level it could mean something as straight forward as ensuring that no green waste or waste food is allowed into the landfill stream. Behavioural change programs that build on and promote local green waste collection systems, encouraging local and coordinated composting activities and engaging a policy of waste minimisation and recycling of organic matter back into local gardens, would be an appropriate program to emphasise resource recovery.

2.7 Design From Patterns To Details

This Permaculture principle deals with top-down design analysis seeking to recognise patterns in a landscape before design and development begins. 'Design

From Patterns To Details' seeks to understand patterns and relationships that exist in self-organising systems, and enhance those through the design process, using theories of zones and sectors to analyse and understand areas of intensity of use. These theories recognise that design and development should be based on a detailed understanding of the local environment and social and economic conditions. 'Design From Patterns To Details' is critical of unstructured, non-integrated design that does not account for the uniqueness of place or locality.

An example of this applied to urban planning is the evolving thermal performance standards for the built environment. Australia is a large country with many different environmental conditions, climates and bioregional characteristics around which towns and cities have been built. However, until relatively recently (*Building Code of Australia 2003, Volume 2*), building codes did not directly account for different climatic conditions in terms of environmental efficiency provisions in the way in which energy use was calculated.[3] Even today, the Building Code of Australia *(Building Code of Australia 2010, Volume 2)* energy efficiency sections *assumes* that people will heat and cool a building to achieve a comfortable temperature. This energy use is associated with the amount of energy required (commonly by means of mechanical heating and cooling) to maintain the building within a comfortable temperature range all year round. While this has meant that the building fabric has become better insulated, very little else is considered unless it *has to be* in order to meet building rules consent. Most project homebuilders, supported by industry bodies such as the HIA and MBA see energy efficiency as a compliance hurdle, one that will impact on building costs and housing affordability, and have actively lobbied against increasing energy efficiency standards. [4]

This lack of focus on bioregional difference has seen the majority of Australian cities embrace a high degree of *sameness of design*, from patterns of the landscape to the detail of the housing. This is where 'Design From Patterns To Details' can highlight and complement the design process, seeking to create a framework within planning

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[3] Until 2003 there was no energy efficiency regulation in the Building Code of Australia – see 2003 Vol 2 BCA – 8 BCA climate zones
[4] http://www.bpn.com.au/article/Six-star-requirement-ineffective-HIA/509868.aspx

that looks at the patterns in the landform and local bio-geography, and seeking to create and analyse (using the design technique of Permaculture zone and sector analysis) how the different aspects of the land form interact, so as to best design to a detailed level.

2.8 Integrate Rather Than Segregate

'Integrate Rather Than Segregate' is an analysis of the diverse types of *relationships and tensions* between elements that form a system, rather than a segregated analysis of elements in isolation. This design principle focuses on integration and seeks to recognise complex relationships, and explore benefits and deficits. Permaculture emphasises the symbiotic and mutually beneficial relationships, and co-operation to achieve desired outcomes. It can be argued that integration enhances system understanding and functionality, especially when considering design with system redundancy checks in mind (Holmgren, 2002 p. 10)

Two statements in Permaculture teaching emphasise this:
- Each element performs many functions
- Each important function is supported by many elements

(Holmgren, 2002 p 10)

From an urban planning perspective this could be used to both critique and design alternatives to the way form and functionality is prescribed onto characteristics of Australian cities.

The segregation and compartmentalisation of different aspects of city function, and the relationships that this produces, is a strong feature of modern Australian cites. While undoubtedly necessary to separate, for example (and indeed one of the primary reasons why cities are planned), undesirable industrial processes from residential neighbourhoods, one could also argue that this segregation has resulted in a form and function of our cities *biased* towards isolating discrete functions from each other. Opportunities for efficiency gains in placing system elements in close

proximity to each other can be impeded by this design and land use ethos. Examples common to planning include housing to better integrate work, transport and home life with options to extend real-estate functionality and demographic shifts (single individuals, couples, families, aged care, children), at a denser urban framework.

The advance of Transit Oriented Development as an urban consolidation design paradigm could go beyond the idea of mixed commercial / retail environments with apartment living, and be examined in terms of long-term capacity building and interdependence. Being able to offer a range of housing options, affordable tenancies, innovative marketing and financing, community facilities, open space, cooperative spaces, social engagement strategies, and importantly areas for urban food production, could see these mixed-use developments embody integration of many community elements.

2.9 Use Small and Slow Solutions

'Use Small and Slow Solutions' again draws attention to issues of scale and the application of solutions to problems that are appropriate to fit, are workable and efficient. It also questions the speed of modern society while seeking to redress what is seen as an imbalance in power relationships.

'Use Small and Slow Solutions' concerns the *scale* around which integration occurs, and the use of energy to maximise functionality on a scale that is as energy efficient as possible. There is a strong ethical basis seeking to promote consumption that is local, self-regulated and transparent. In doing so there is a desire to create an alternative aesthetic, one that based around the psychological implications of living close to and being reliant on locally produced good and services. The Slow Food movement and Slow Cities are two well know examples of this ideal (Newman and Jennings, 2008 p. 195).

By employing appropriate social and physical planning strategies, urban designers and cultural planners should be able to afford more opportunity for people to experience the interaction and vibrancy that is found when slower forms of transport

(walking and cycling, rather than driving) are undertaken. By planning for a future where it may not be as easy, or as possible, as it is today, to drive one's personal car from one part of the city to the other, planners can seek to work on strategies of re-localisation, and neighbourhood designs based around an experiential sense of place, and the unique identity, of any given area.

2.10 Use and Value Diversity

As is suggested by the name of this principle, a focus on diversity, enhancing and understanding the complexity of "forms, functions and interactions" (Holmgren, 2002 p. 204) diversity can bring, is vital to ensure stability and to re-build natural capital.

'Use and Value Diversity' is also about security and self-reliance within a system that seeks self-regulation, stability and resilience to external forces. It is a design principle that questions the nature of bio-diversity and what functional role this has within ecological systems (whether natural or designed) and how this is balanced against productivity to meet anthropogenic needs.

From an urban and regional planning perspective (and urban habitat management) this could lead to an understanding that biodiversity is not a static "snap-shot" that should be aspired to based on past or lost structures. Rather, it may indeed be that biodiversity in urban areas comes to be viewed as a dynamic and evolving project capable of delivering many functions and amenity to human and non-human populations.

This focus integrates adaptability and the notion that biodiversity can include a landscape designed for a self-perpetuating human centred functional imperative, and not necessarily a recreation of a lost landscape. This view harks back to the notion of maximising productivity with given resources and creating productivity to meet challenges of resilience within human populations.

2.11 Use Edges and Value The Marginal

This principle recognises that the world, both natural and human influenced, is comprised of edges and zones of activity. These are areas that are often more intense and "dynamic and productive parts…where exchange of materials and energy take place. They are places where both co-operative and competitive relationships between system elements and whole systems are played out" (Holmgren, 2002 p. 226)

Urban design can recognise the edge zone by enhancing streetscape permeability and legibility, creating environments that combine both interest and intrigue. This feature could also see natural edges being brought into suburbia through the integration of green corridors and habitat corridors. These edges could be further enhanced by the integration with transport, as in the Green Travel Corridors (*Safety in Numbers*, 2006) concept where the corridor becomes a cycling boulevard designed to decrease the reliance on car based transport systems.

From the home zone to the neighbourhood, to the suburb, to the citywide level, and ultimately a regional scale, there are zones that have active interfaces with other zones. Interaction between home and street, how the street fits into overall 'pattern language' of the suburb (Alexander, 1977), and how this is placed within a city are all considerations for planning policy and urban design– looking at the boundaries and interaction between these different zones as being important to create greater diversity and productive spaces.

2.12 Creatively Use and Respond To Change

The design principle of 'Creatively Use and Respond To Change' deals with change that is recognised and inevitable and change that is rapid, unforseen and potentially damaging. It is about being able to positively respond to external pressures by

embedding resilience, change and risk management practices into the design and development of habitation systems.

It is a design principle that acknowledges that some change is beyond our control, and accepts that there will be a need to creatively respond to challenges, while at the same time designing systems that can respond to change and "make use of change in a deliberate and co-operative way" (Holmgren, 2002 p. 239).

By understanding this design principle, planning can take both top down and bottom up change management perspective to encourage innovation and adaptive change not just in physical infrastructure, but also in social policy and development of communities.

For example, (re) developing urban environments that can be retrofitted, and aiming to reduce the use of motor vehicles and increase mass transit, would entail a policy, program and plan that could have far reaching implications for land use planning. A policy to further reduce road funding and redirect capital expenditure to other transport options (mass transit, cycling and walking) would recognise the significant redundancy of such infrastructure should the scenario of diminished world oil supplies play out.

Change management policy could aim to examine likely scenarios and channel funding to areas to mitigate social unrest and dislocation should there be a capacity shift to maintain the current growth centred economic paradigm. This would have consequences for the shape, form and function of the urban environment moving forward, but it can also be argued that these strategies should be designed into planning now to take account of retrofitting environments into the future so that significant expenditure and embodied energy is not lost should these environment no longer be able to function as they currently do.

These 12 Permaculture principles establish a basis to conceptualise and understand exactly what 'sustainability' is and a theoretical and practical framework to focus action and attention. From a planning perspective, the support of diverse land use

strategies, enhancing industrial ecology, sustainable housing, inclusion of ecological and diverse environments, sustainable street design, climate change mitigation, integration with policy and funding objectives, and making sure that long term scenarios and risk management strategies are understood, are all elements of how Permaculture can integrate with planning and contribute further to this discussion.

Chapter 3 – **Permaculture and Planning in University curricula**

Identified clearly in much of the above literature review and mapping exercise is the importance of planning as a practice and planning education in generating professionals who have a depth of understanding and a wide perspective in order to tackle future scenarios and associated issues related to urban and regional human settlements.

Also identified is the relationship that Permaculture has with scenario planning and integrating a design system of practical steps to creatively engage with change. As a system-based approach (Smith 2007, Holmgren 2002), Permaculture examines change through the lens of resilience planning, efficient resource use and social and economic stability.

Permaculture in education should be attempting to integrate into the curricula to create ecologically literature students (Gundersen & O'Day 2009). Permaculture would then be used as an applied model for teaching sustainable design and further curriculum development – tackling issues of climate change and peak oil, looking at planning paradigms designed to lower carbon emissions and fostering ecological literacy and understanding applied systems thinking (Smith 2007).

As a social movement Permaculture has roots in issues concerned with food security and food production activities, land use, capturing energy and addressing carrying capacities within environmental limits. In higher education, Permaculture may interface with a wide range of topics and agendas, complementing existing planning programs and offering new, specific courses, aiming for mainstream acceptance and assimilation of this design system.

The alignment with scenario planning can be seen as a nexus point and interface between planning as a profession and Permaculture as a theory and design practice. Much of the commentary in the literature review concerns planners and planning
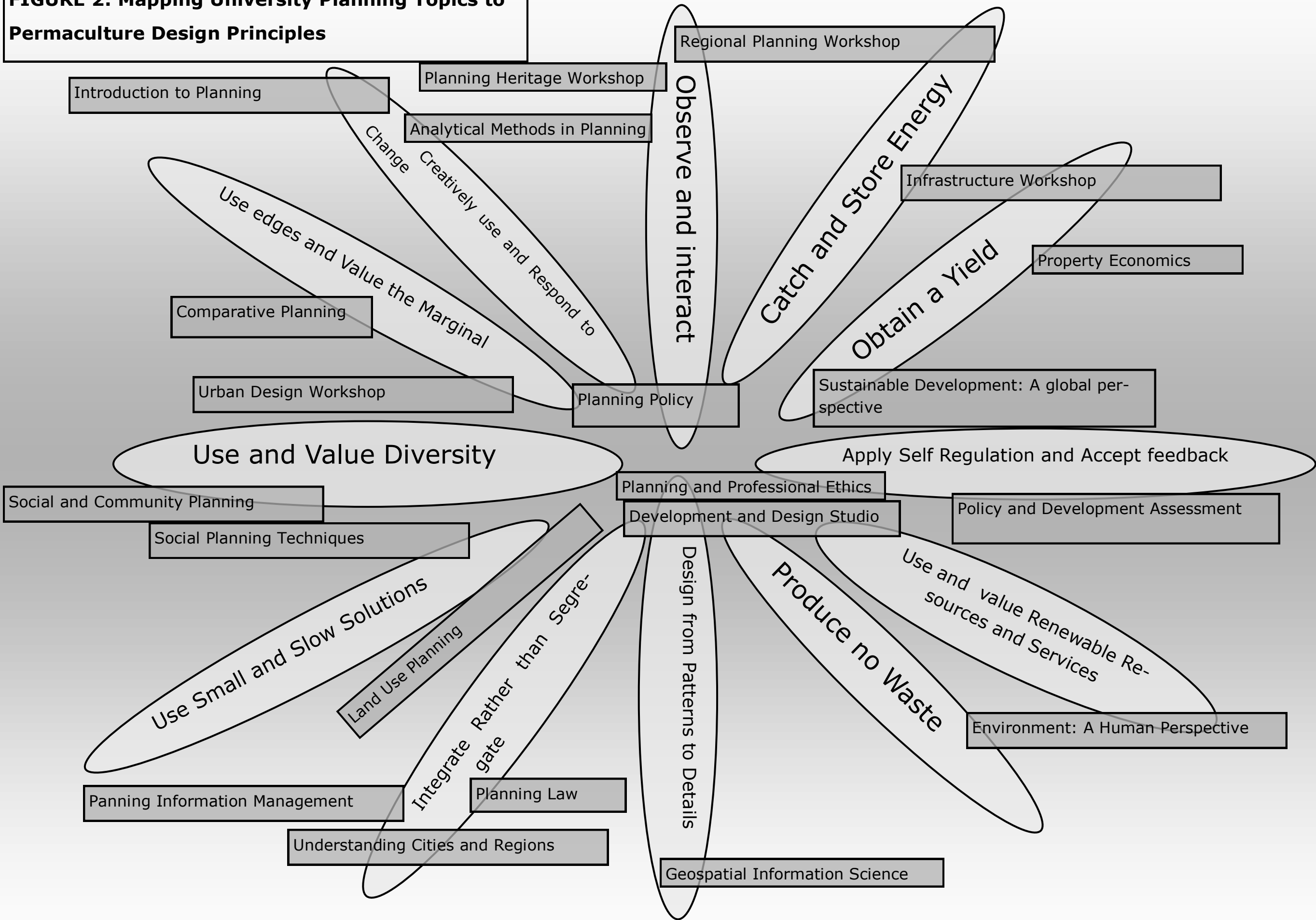
education being more observant at anticipating future trends and transition points. This is about having the capacity to envision and create policy that examines where society is now and where it needs to be, and to embody resilience and capacity to absorb change without causing widespread social disruption and disorder.

Two main future scenarios play out - that of designing environments for climate change - and the prospect of peak oil impacting on the shape, form and function of modern cities. Permaculture gives planners a conceptual road map to understand these scenarios from a systems base and to appreciate sustainability and the consequences of social and economic impacts should these scenarios be realised on a broad scale. Permaculture is a system for describing sustainability – it gives a depth and a perspective to discussions about sustainability both in terms of theoretical and practical responses.

The problem when integrating with mainstream education, and indeed one of the core challenges for Permaculture educators, "is to find better ways to communicate abstract principles in ways that empowers people to both understand the context of their actions and actively seek out and create technical solutions appropriate to that context" (Holmgren 2003, p. 3).

In the diagram below, a visual mapping has been attempted between planning undergraduate topics at the University of South Australia and the 12 principles of Permaculture. What this reveals is the connectivity and relevance that many of these principles have with these topics. A broad based understanding of the principles can inform the pedagogy and epistemology of the material. It also allows for an examination of what might be lacking in the current course work, and opportunities to integrate Permaculture as a theory and practical design system into the degree structure.

FIGURE 2: Mapping University Planning Topics to Permaculture Design Principles

Regional Planning Workshop

Planning Heritage Workshop

Introduction to Planning

Analytical Methods in Planning

Change

Creatively use and Respond to

Observe and interact

Catch and Store Energy

Infrastructure Workshop

Use edges and Value the Marginal

Obtain a Yield

Property Economics

Comparative Planning

Urban Design Workshop

Planning Policy

Sustainable Development: A global per-spective

Use and Value Diversity

Apply Self Regulation and Accept feedback

Planning and Professional Ethics

Social and Community Planning

Development and Design Studio

Policy and Development Assessment

Social Planning Techniques

Use Small and Slow Solutions

Land Use Planning

Integrate Rather than Segre-gate

Design from Patterns to Details

Produce no Waste

Use and value Renewable Re-sources and Services

Environment: A Human Perspective

Panning Information Management

Planning Law

Understanding Cities and Regions

Geospatial Information Science

3.1 Food Systems Planning

A possible topic that is revealed in this exercise, one that is certainly discussed in the literature review above, is food systems planning. Food systems are concerned not just with integrating production with localisation and consumption, but the whole issue of supply chains, redundancy and resource efficiency. It could be argued that this could segue quite succinctly with water resource management and water sensitive urban design strategies as the two are so interrelated.

Hammer (2004) believes that food systems planning should be given relevance as a key area in planning, and in doing so, make visible community food systems and linkages with other planning topics as it is "…anchored in (a) critical analysis of existing food and community issues and development of the skills requisite for effective participation in community food systems planning" (Hammer 2004, p. 432).

Some of the topics that she identifies include examining capacity building and practical applications including the further analysis and integration within urban research, problem definition, data collection of trends and expanding this field to include:

> "…food access and health, social capital and sustainable food systems, consumer and producer beliefs and behaviours regarding food systems, food systems contributions to local and regional economies, and community and agroecological impacts of alternative food system models"
>
> (Hammer 2004, p. 426)

Certainly, understanding food systems from a theoretical and ethical view through to a practical, infrastructure and distributional model is important. Likewise, understanding the scenarios of energy descent and climate adaptability touches on many topics in planning course work. It could be argued that it is important for graduates to be exposed to consequences of decision-making, especially decisions that are framed within certain ideologies, and ontological perspectives that inform

the policy, plan and program guidelines that they will be expected to operate in as planning professionals.

3.2 Ethics

By further embodying an ethical basis for decision-making, it allows the planner to question assumptions that are driving policy. In this context, however, it would be important not to become too caught up in dogma and idealism. The cultural and location contexts, especially when dealing with an international perspectives, or unfamiliar territory, are vitally important. In addition, education allows the practitioner to filter different approaches and ideas, coming up with a solution for a given context. Ethics certainly have ability to:

> "…steer us in the right direction but design principles are our primary tool for assessing and filtering the diversity of possible relevant information and models for the inevitably unique context in which we design and act. Thus the efforts to both refine the tools, explain and make better use of them are central issues for Permaculture education." (Holmgren 2003, p. 3)

3.3 A multidiscipline approach to education

As planning is a profession that touches on many aspects of the social, economic and environment it is arguably important that planners are schooled in an interdisciplinary background, including those who have backgrounds in geography and the study of physical landform patterns, ecology, climatic science, hydrological modelling, microclimate and heat island effect mitigation, solar gain and land use orientation and historical and social studies. Permaculture emphasises integration of thinking and of response. Warburton (2003) sees this as a 'deep learning' approach to the education of sustainability, creating strategies designed to maximise and "foster creative interdisciplinary approaches to sustainability beyond the institution" by breaking down the barriers that "existing interests or backgrounds of students (who) have a strong disciplinary focus" (Warburton 2003, p. 44).

3.4 International perspective and International students

In addition to the education outcomes described above there are opportunities for a university to embrace Permaculture and in doing so attract students from around the globe. Permaculture has been described as one of Australia most significant "intellectual exports" (Holmgren, 2002). For over 30 years Permaculture practitioners and in particular Australians, have been involved in projects around the world, often in small scale, local initiatives, in countries with environmental, social and economic development issues. Permaculture brings with it "working models and refinement to suit local conditions" (Holmgren 2003, p. 3) - an important consideration when addressing regional, international and culturally appropriate models of development. By incorporating themes of environmental security and problem solving, an interdisciplinary course is particularly relevant to this international perspective, especially where multiple concerns and interests are competing for resource allocation, or there are conflicts over access giving rise to social and economic security concerns – access to food and clean water being an obvious example.

Permaculture is a model for sustainability and a design practice that can be applied from the home front to the neighbourhood, city, regional, and countrywide scale. By employing an applied ethical basis, system model and adaptable and practical design principles, Permaculture presents a holistic vision of how a sustainable society could function.

Understanding this in the context of why planners are educated, and the opportunities to deepen connectivity with other disciplines, engages with scenario based policy outcomes and objectives to contextulise a sustainability discourse within risk assessment, integrated design and an approach to applied systems thinking. This approach could therefore inform existing course work and seek to introduce new topics of discussion and paradigms into the education of planners at a university level.

Chapter 4 – **Conclusions.**

At the beginning of this project two questions were posed to frame the investigation and pathways for future discussion. To re-cap, the first of these was whether the underpinning ontological perspective of planning education was sufficient to turn out graduates with the skills necessary to tackle issues faced as lifetime practitioners. The second is whether Permaculture is a valid perspective, and how would this be mainstreamed and formalised within a university teaching environment.

Both these questions are not necessarily easy to answer, as they deal with interrelated and multi-layered perspectives – often generating a network of ideas. Some of these go beyond the scope of this paper to address. It is also the case that in unpacking these issues, an awareness of ideological positions, a 'political economy' and interpretations of 'sustainability', are brought to bear. This can introduce a degree of complexity into the analysis, as it is the individual's lifetime experience, political understanding, education background and openness to new ideas that affects their interpretation.

This tension needs to define where on the spectrum of a sustainability nomenclature Permaculture *commonly* sits. By this definition, it also needs to be understood how, and at what level, Permaculture could engage with current policy objectives, and in essence, become more 'mainstream'. In doing so, further questions are asked about what Permaculture can bring to a discussion within planning as to what constitutes 'sustainability'. This is concerned with (and by no means is this an exhaustive list), the high-level urban and regional concerns surrounding transport and land use planning, energy and water use, food systems and open space functionality, food security, eco-city development, urban regeneration and housing provisioning. At the lower level a theoretical engagement with globalisation is sought, including strategic environmental security, ecosystems and spatial policy objectives, and more fundamentally ideological paradigms that define how as a society we *think and feel* about the world around us, and our relationship to it.

In the Permaculture lens of analysis, the concept of 'sustaining' an existing model of the western industrial growth paradigm - centred on current models of human habitation and embodying the notion that we can adapt current practices so that 'business as normal' can continue into an indefinite future - is seen as an unsound assumption.

In the Permaculture design model there is a need to think of 'sustainability' as a dynamic system capable of adapting to continuous and often dramatic change in the way that society, at all levels, is able to do things. Energy descent, adapting to a world with diminishing supplies of cheap and abundant fossil fuel based energy, climate change and the affects of pollution brought about by human activities, are scenarios that are addressed. Permaculture thinking acknowledges that we need to understand the context in which that design is implemented, and that the practice of development and innovation is also an ongoing process. In a continuing and developing society there is a need to "continue our culture of innovation in a radically different context without being too set on a particular set of design solutions or even strategies as the final word in sustainability" (Holmgren 2003, p. 2)

Permaculture focuses on actively reducing consumption and becoming less reliant on external inputs. Planners, especially those involved in urban design and evaluation of long-term development, would understand capacity based on future scenarios, ecological constraints, and resilience, when assessing developments. What the planner will need, though, is sympathetic regulations and policy frameworks that clearly articulate desired outcomes; otherwise these outcomes may become mired in derision and lack goals that can be implemented.

By integrating Permaculture into higher education, especially course work like urban and regional planning, graduates can be exposed to a design system that assists in explaining and organising a framework to question and interrogate ideas associated with 'sustainability'. The purpose of this education would be to challenge and pose questions from both a theoretical and practical context, while offering integrated, 'fit-for-purpose' and contextually, culturally and spatially appropriate design solutions.

This conclusion perhaps does not neatly wrap up this paper. Rather it seeks to challenge assumptions and to further understand that scenario planning and risk assessment are two important considerations in urban and regional planning. By having a framework in which sustainability can be applied as a system model and design practice to both scenario planning and risk mitigation, planners who use a Permaculture system have a conceptual tool kit to discuss not only policy, programs and associated government plans, but have a model to describe their own integrated responses to these decision points, transition change management and design strategies.

Because of this, the nexus of Permaculture and planning represents an exciting and engaging avenue that is worthy of further investigation, interrogation and integration. This would be apparent not only in a formal and mainstreamed planning curricula, but also in the more broad scale sustainability debate that concerns the shape, form and functional imperative of human settlement patterns in a changing and evolving world.

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