

PERMACULTURE

Australia's new agriculture?

By Jonathan Earley

Introduction

Permaculture, or 'Permanent Agriculture', is an interdisciplinary earth science focused on the 'conscious design and maintenance of agriculturally productive ecosystems which have the diversity, stability, and resilience of natural ecosystems' (Mollison 1988, pg ix). It has become a worldwide movement since the 1970s in response to the proliferation of short-sighted, destructive agricultural practices across the globe. As scientific advances interplay with ever expanding demands of industrial societies, the impacts of mismanaged agriculture have risen exponentially in recent centuries. In Australia we are no exception and since European settlement land clearing, overgrazing, and various other unsustainable agricultural practices meant that in 1975 over 10% of the landmass was found to be subject to land degradation due to wind and water erosion and soil salinization (Woods 1983). In addition to this are the impacts on native flora and fauna with Australia having 'the worst mammal extinction rate in the world' (AWC 2018) as well as standing 'to lose a large proportion of its remaining endemic biodiversity' due to 'degraded forests' and 'rapidly expanding invasive weed species and altered fire regimes' (Bradshaw 2012). This report will give a background on the agricultural causes of land degradation in Australia today, before discussing the permaculture movement and its practical applications toward solving these problems. It will end looking at the limitations of permaculture both conceptually and socially and how practically it's solutions may be adopted by Australian society.

Agriculture and land degradation in Australia

Land clearing

Since European settlement in Sydney Cove in 1788, Australia has had a devastating record of vegetation clearing for agriculture. In this time 'Australia has lost nearly 40% of its forests' with much of the remaining forest 'highly fragmented' and 'severely degraded' (Bradshaw 2012). This is substantial considering around 75% of Australia is 'covered in inhospitable deserts or arid lands generally unsuitable to forest growth' (Bradshaw 2012). Land clearing was carried out largely in the name of wheat and sheep industries in NSW (Norton 1996), wheat farming in WA (Bradshaw 2012), and more recently due to the rapid expansion of the cattle industry in QLD (Bradshaw 2012). Australian agricultural practices began immediately following colonization and were spurred on by profit driven legislation, such as the 1861 Crown Lands Alienation Act that 'penalised entitled landholders, via a forfeit to the Crown, for failing to 'develop' their lands' (Braithwaite 1996).

In 2011 the Australian government's Bureau of Agricultural and Resource Economics and Sciences (ABARES) found almost 10% of Australian land area (716,313km²) was modified grazing pasture whilst 2.73% was employed for cereal cropping (ABARES 2011). Furthermore, it found 44.87% of Australia (3,448,896km²) saw stock grazing on native landscapes. To give these numbers context, the same report found all other production including mining, manufacturing, perennial and seasonal horticulture, water reservoirs, plantation forestry and more to account for a mere 1.5% of land use, less the 1.35% of forestry from native forests (ABARES 2011). The Australian government's State of the Environment Report 2011 found land clearing 'averaged

around 1 million hectares annually over the decade to 2010' (DSEWPaC 2011 pg262). Land clearing for agriculture contributes directly to habitat destruction and decline in native fauna and soil biota. '30 native mammals have become extinct since European settlement' (AWC 2018) and whilst the impacts on native soil biota are harder to measure studies agree 'conservation of regional biota depends almost entirely on the retention and management of the remnants of native vegetation' (Hobbs, Saunders, De Bruyn, Main 1993). Land clearing also contributes to a host of secondary degradation effects including wind and water erosion of soils, loss of soil carbon stores, dryland salinization, proliferation of invasive weed species, and altered fire regimes. 'Current rates of soil erosion by water across much of Australia now exceed soil formation rates by a factor of at least several hundred and, in some areas, several thousand' (DSEWPaC 2011). Forest clearing over large areas also affects local climate conditions such as temperature variation and precipitation patterns (Deo 2011; Deo et al. 2009; Junkermann et al. 2009; Narisma and Pitman 2003, 2006; Pitman et al. 2004). Poor agricultural practises are also responsible for soil acidification, irrigation salinization, soil compaction and loss of structure, overgrazing, as well as eutrophication of coastal waters due to phosphate and nitrate rich fertiliser run-off.

Loss of soil carbon stores

Globally, terrestrial vegetation contains approximately 550 petagrams (550 billion tonnes) of carbon whilst the atmosphere is of a similar order with approximately 800Pg. Organic matter in soil however contains two to three times as much carbon (Le Quéré et al.: Global Carbon Budget 2016). Approximately 1500 – 2000Pg of carbon is in the top metre, and as much as 2300Pg in the top three metres (Houghton 2007). Soil carbon is low in many agricultural ecosystems in Australia and the conversion of native vegetation to agricultural land reduces the soil carbon by 20-70% (Luo, Wang, Sun 2010; Sanderman, Farquharson, Baldock 2010). This is a major concern as soil carbon is key in energy supply for soil biota, nutrient supply to plants, soil's ability to retain and exchange nutrients, soil structure stability and particle aggregation, water storage, thermal mediation and pH buffering (DSEWPaC 2011).

Soil acidification

Acidification affects about half of Australia's agriculturally productive soils. Agricultural practices such as cattle farming, high rates of cropping and application of nitrogen fertilizers lead to soil acidification (DSEWPaC 2011). The result is acid-sensitive plants cannot be grown in the region whilst acid-sensitive biota above and below ground die away. Lime is applied to lessen the problem but is ineffective once acidification advances deeper into the soil profile (DSEWPaC 2011).

Dryland and irrigation salinization

Much of Australia's agriculture occurs in areas of 450-800mm rainfall which naturally experience minimal deep drainage (under 20mm/year) and thus accumulate salts in the soil profile. When vegetation is removed from such areas more water infiltrates or runs off surface. If shallow rooted crops are planted (such as in the wheat belt in WA) even more water passes into the soil. This can lead to rising water table which mobilizes stored salts. Dryland salinization results. (DSEWPaC 2011).

Irrigation salination is a similar agricultural by-product where poor quality irrigation water is used and salts contained in it accumulate in the soil.

Permaculture – the new agriculture?

Arguably permaculture has been around since the dawn of cognitive thought in the form of societies and individuals who acknowledge their dependence on natural cycles and try to minimise their adverse impacts on them. The term 'Permaculture' however was coined by Tasmanian born Bill Mollison who spent 1972 – 1981 developing the concept of Permaculture into an applied design system he would go on to teach to thousands of students at The Permaculture Institute in Sisters Creek, Tasmania (Mollison 1988). Whilst the name and symbol (Figure 1) were coined by Mollison they were based on old ideas and the permaculture

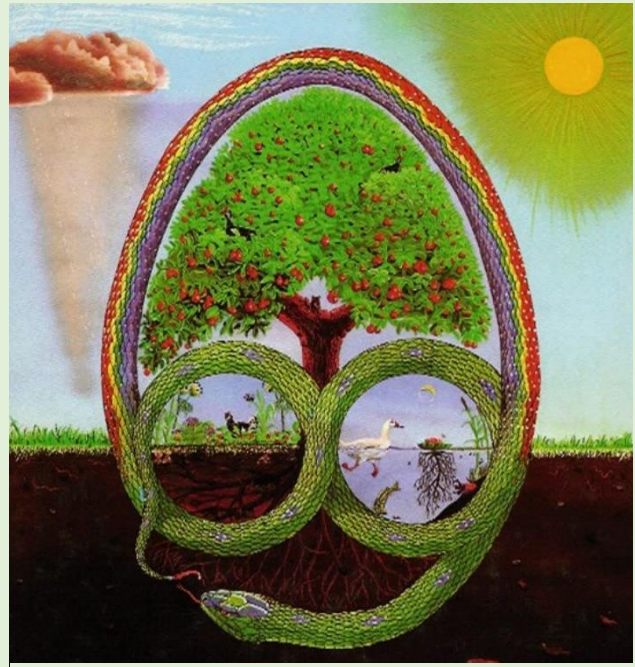


Figure 1: The image of the rainbow snake: the unofficial symbol of the permaculture movement. © The Permaculture Institute

movement today is a decentralised one as it concerns the management of everyday resources putting the advancement of permaculture practises in the hands of farmers and those on the land without the necessity of formal education. Permaculture has gained definition in recent times as the logical other to short-sighted agriculture; Bill Mollison's famous book 'Permaculture: A designer's manual' describes it thusly:

'It is the harmonious integration of landscape and people providing their food, energy, shelter, and other material and non-material needs in a sustainable way. Without permanent agriculture there is no possibility of a stable social order.' (Mollison 1988, pg ix).

Thus, permaculture is an ideology that informs the design process of a system where one utilizes current scientific understanding, as well as protracted and thoughtful observation, to work with, rather than against, the established cycles of nature. It is then, by definition, the answer to agricultural causes of land degradation in Australia as it seeks to replace demonstrably destructive practices with sustainable ones.

Table 1: Attitudinal principles of permaculture. Source: Morrow, R. (2006) *Earth user's guide to permaculture*.

ATTITUDINAL PRINCIPLES	
BASIC POSITION	OUTCOMES
<ul style="list-style-type: none"> • Work with nature not against it 	<ul style="list-style-type: none"> • Results in minimum negative impact and long-term sustainability
<ul style="list-style-type: none"> • Value edges and marginal and small • See solutions inherent in problems 	<ul style="list-style-type: none"> • Small and different can be vital • Overcomes blockages to design and implementation
<ul style="list-style-type: none"> • Produce no waste • Value people and their skills and work 	<ul style="list-style-type: none"> • Move towards a closed ecosystem • Draws people in, enables, appreciates and supports them
<ul style="list-style-type: none"> • Respect for all life 	<ul style="list-style-type: none"> • The delights of all natural and cultural diversity are valued
<ul style="list-style-type: none"> • Use public transport and renewable fuels • Calculate 'food miles' 	<ul style="list-style-type: none"> • Move towards people - scaled, sustainable urban planning, friendlier places and less pollution • Support local farmers, bioregional produce, lower food costs, truck-free roads
<ul style="list-style-type: none"> • Reduce your ecological footprint 	<ul style="list-style-type: none"> • Accept responsibility, simplify your life, become more self-reliant • Remember the future and save resources

Examples of permaculture designs and understandings

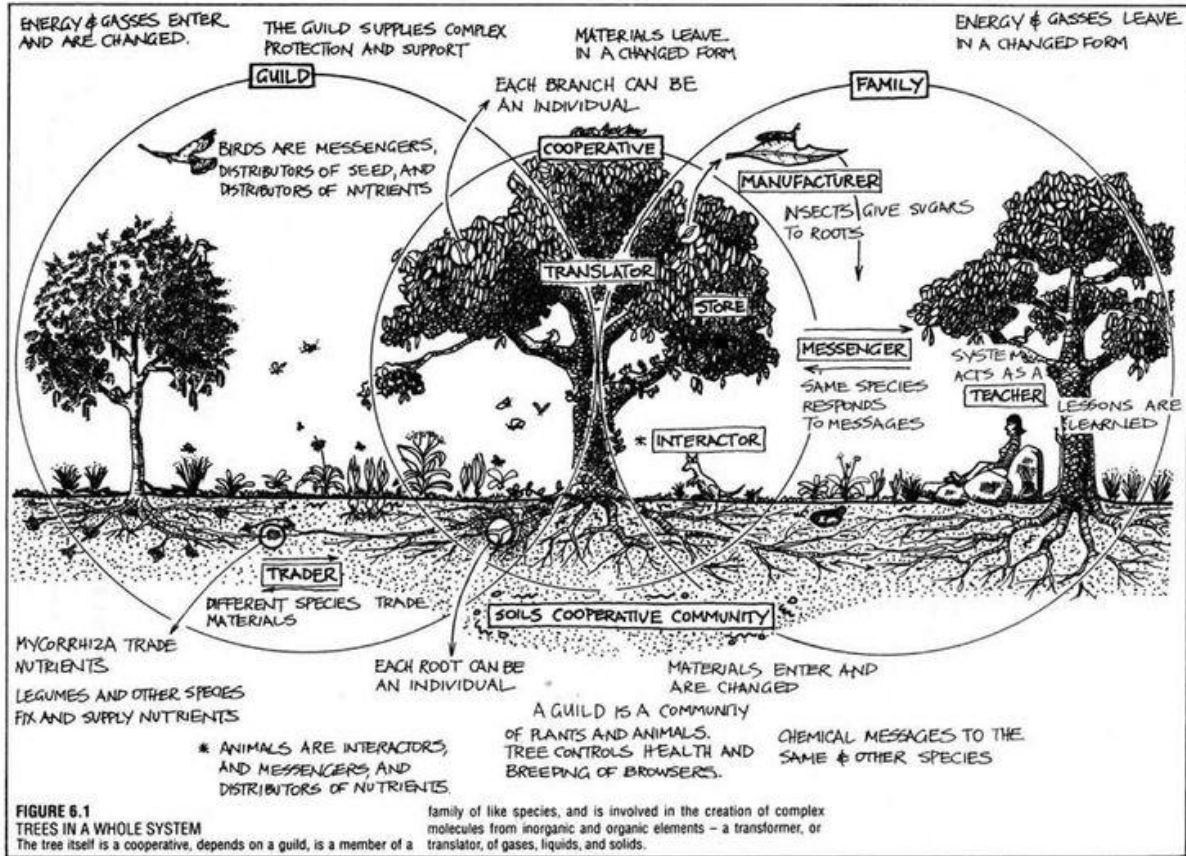


Figure 2: A Tree as part of a greater system. Mollison, B. (1988) *Permaculture: A designers' manual*

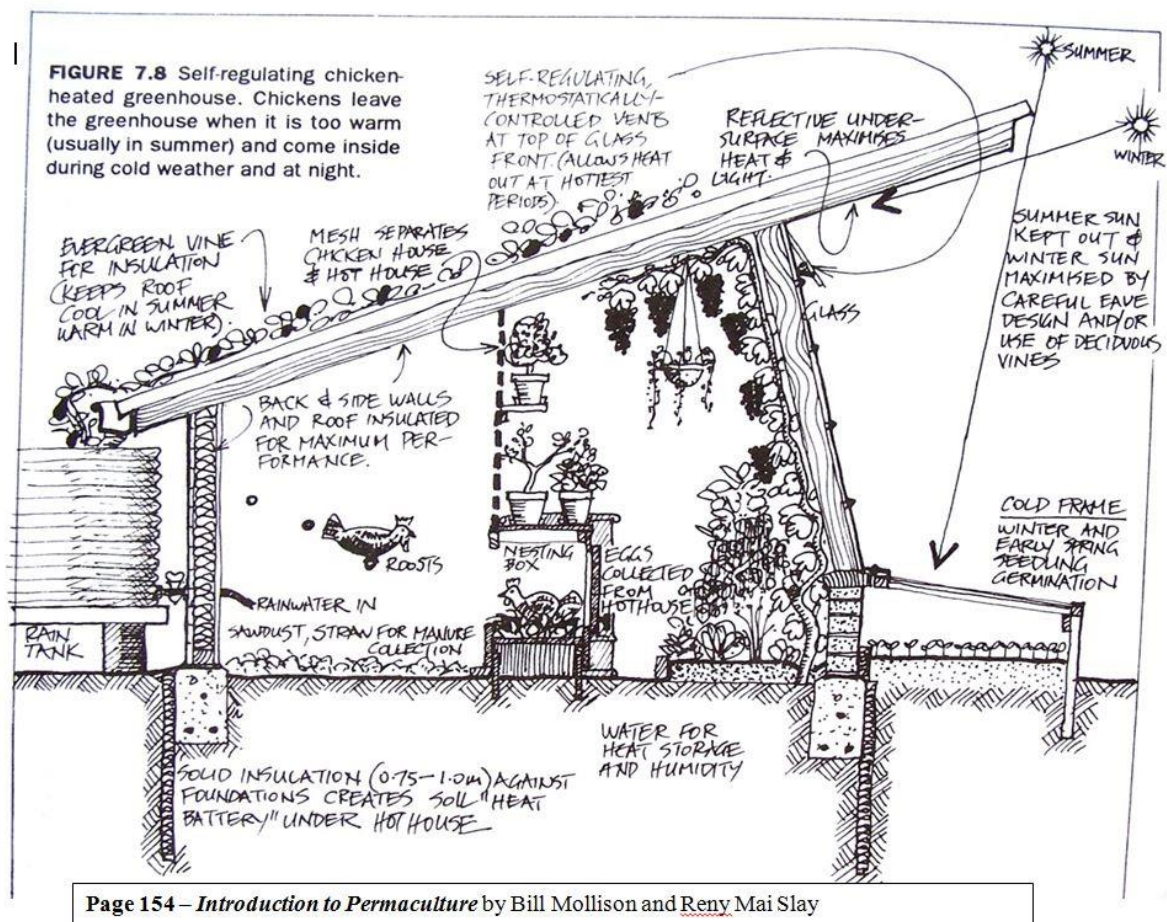


Figure 3: A greenhouse design employing permaculture techniques. Mollison, B. (1991) *Introduction to Permaculture*, pg154

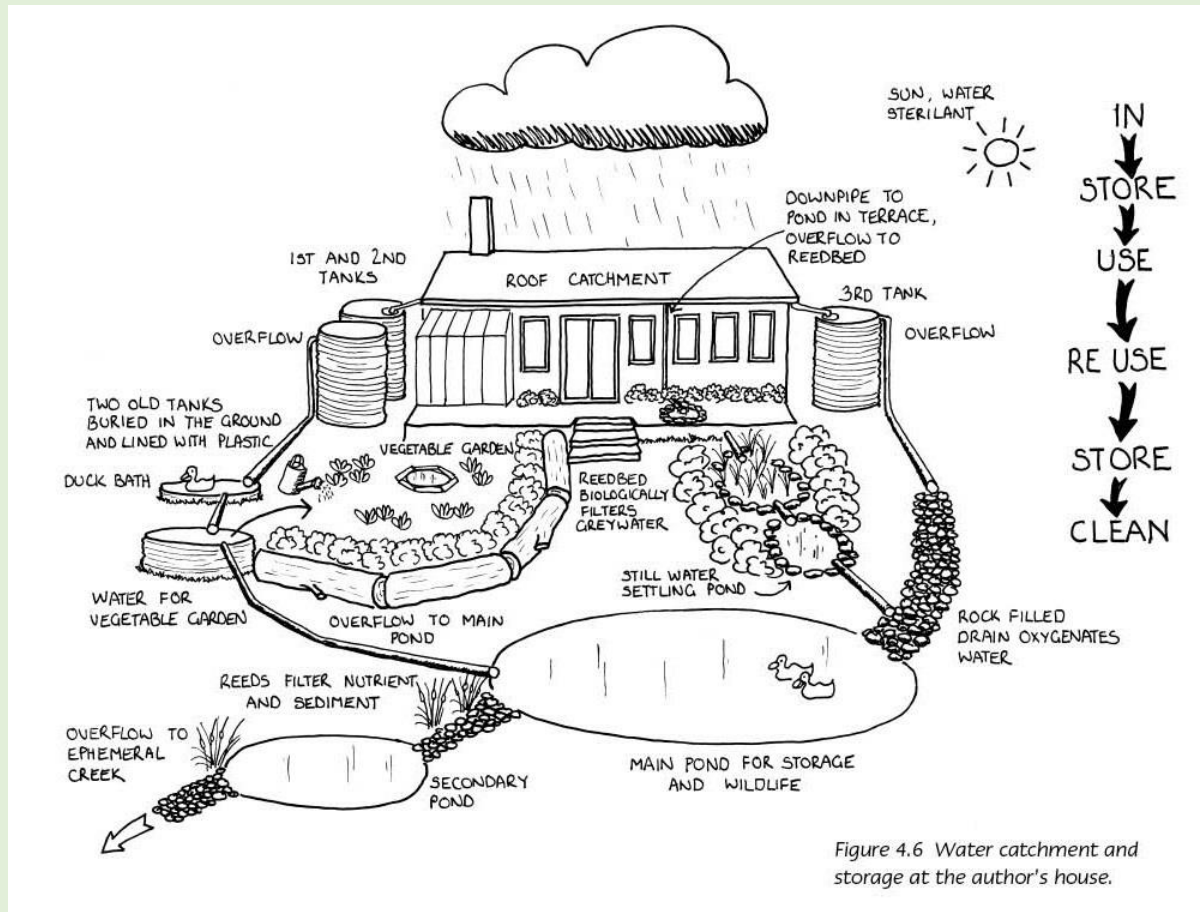


Figure 4.6 Water catchment and storage at the author's house.

Figure 4: Water cycling ideas in the home. Morrow, R. (2006) *Earth user's guide to permaculture*.

Permaculture may have long been a staple of subsistence farming communities and may be gaining wider popularity in recent times as a social movement in home and domestic garden designs however it is noticeably lacking from current industry models. If the ideology of the movement is sound, how practical is its application on a large scale?

Limits of permaculture - Ideology to reality

Economic inequality

The practical application of permaculture is one of local-scale farming and resource management and whilst various communities around the world such as landholders like Bill Mollison's Permaculture Institute, or indigenous and 'off-grid' subsistence farmers, may employ permaculture principles, most do not. This is due to pressures of large modern societies and their inherent structures of economic and social inequality. The shift from agriculture to permaculture is a move away from the short-term profit of those with power toward the long-term interests of the wider society. This means the adoption of genuine socialist, egalitarian, values by Australia and nations worldwide rather than current regimes of privatisation and mass waged employment and exploitation; people need the freedom to trade-in economic profit for an ecological one.

Egalitarian hunter-gatherer societies were widespread for tens of thousands of years (Marlowe 2005) and 'long before we organised ourselves into hierarchies of wealth, social status and power, these groups rigorously enforced norms that prevented any individual or group from acquiring more status, authority or resources than others'

(New Scientist 2012; Woodburn 1982). However, as populations have grown new social structures have emerged.

Capitalism and employment

Karl Marx and Friedrich Engels elucidated the inequality inherent in the capitalist class-struggle; a division borne of the modern employment model (Marx 1867). Employment sees people receive a deficit anywhere from 1-99% on their fair exchange of goods and labour, in the name of profits to those upstream in the economy. Such social paradigms lead to the overexploitation of both land and human resources as profits are collected by the rich. Furthermore, employment establishes an authoritarian economic system, as the one in Australia today, where lack of job autonomy sees employees actively harming their environment against their own values. One solution to waged employment, and a potential harbinger of widespread permaculture, is the worker cooperative model where workers own the business and have democratic-autonomy over their work practices (Wolff 2012; Pencavel 2012). The Australian government could transition the people to such a model by its Australian Competition & Consumer Commission (ACCC) adding the employment model to its existing laws against pyramid schemes (Competition and Consumer Act 2010). In addition to this its Fair Work Ombudsman could mediate cooperative structures instead of employment ones. Such a shift would make businesses a local phenomenon, run for and by a community, instead of making them a resource for big business to use and abuse. This is a major policy and ideology shift that would have global implications and there are many economists who doubt the viability of a cooperative model (Kremer 1997). Nonetheless, a shift towards local markets is key to the widespread success of sustainable permanent agriculture.

Private property

Some thinkers, such as philosopher Jean-Jacques Rousseau, go further to say modern inequality is borne of private property (Rousseau 1754) as economic equality cannot exist on a finite Earth when one can own mountains and rivers. Furthermore, compartmentalising the land also tends to preclude holistic management practises, such as widespread permaculture. Whilst eradicating private property is a challenging concept with no clear resolution, land use laws could be adapted in favour of permaculture practices. Council restrictions on subdivision as well as zoning restricting farming and residential practices could, and ought to be, radically reworked to allow communities to develop local economies and for grassroots permaculture practises to be realised. In 2014 the UN's Department of Economic and Social Affairs reported that '54 per cent of the world's population lives in urban areas, a proportion that is expected to increase to 66 per cent by 2050' (UN 2014). This means increasingly permaculture is going to need to be integrated into our town planning and more nuanced regulations will be needed to allow permaculture's solutions such as passive-cooling earthships and compost water heaters to become common sights in our towns and communities.

Social identity and anthropocentrism

For the dissemination of large scale permaculture, beyond the barriers of social structures exist mental ones. Where the day-to-day application of destructive agriculture is not motivated by social inequality or ignorance, it is motivated by

anthropocentrism. 'One of the main issues addressed by environmental ethics is the dilemma of anthropocentrism versus ecocentrism and of intrinsic value of Nature vs utilitarian (i.e. just for human use) or instrumental value (value as a means to acquiring something else)' (Washington 2013, pg 68). Anthropocentrism has dominated modern societies since at least the sixteenth century (Smith 1998). 'A central assumption of Western moral thought is that value can be ascribed to the non-human world only in so far as it is good 'for the sake of humans' (Washington 2013, pg 68).

Such paradigms are surmountable however, they have even been dubbed the 'anthropocentric fallacy'. It has been argued that whilst the non-human world is only available to us through human senses this does not stop us attributing intrinsic value to it (Fox 1990; Eckersley 1992). This is analogous to how a white male does not have to be racist or sexist as he can attribute intrinsic value to women and dark-skinned people though both are outside his life experience (Fox 1990).

The momentum gained by the permaculture movement in recent decades, as well as countless other environmental movements, is a testament to people surmounting anthropocentrism. The extent of our liberation from these notions is hard to gauge however as social structures force many to act in opposition to their values.

A final mental hurdle worth considering is that of postmodernism; the theoretical-scientific view that we 'co-create reality', that there is no real 'objective truth' (Cohen 2001). 'In scholarly circles it is difficult to suggest that the world exists outside our construction of it' (Reason and Torbet 2001), this 'postmodernist questioning of reality (or its definition only in relation to humanity) thus continues the anthropocentric view of the world developed by modernism' (Washington 2013, pg75).

Conclusion

Permaculture is a sane, logical solution to land degradation in Australia and globally; possibly the only long-term solution. It aims to integrate our lives and communities with the cycles of the natural world. If it is to replace destructive agricultural practices in this country however, a political shift must occur away from sanctification of profits and globalization toward a socialist confederation of small, sustainable communities more akin to the indigenous map of Australia. What this will look like is up for debate but as humans become better connected and informed, and their awareness of ecological issues grows, permaculture will inevitably deliver us from the destructive ways of our present age.

References

Mollison, B. (1988) *Permaculture: A designers' manual*. Sisters Creek TAS: Tagari Publications.

Woods, L. E. (1983) *Land Degradation in Australia*, Department of Home Affairs and Environment, AGPS, Canberra.

Bradshaw, C. J. (2012) *Little left to lose: deforestation and forest degradation in Australia since European colonization*.

Norton TW (1996) *Conserving biological diversity in Australia's temperate eucalypt forests*. For Ecol Manage 85:21–33.

Braithwaite LW (1996) *Conservation of arboreal herbivores: the Australian scene*. Aust J Ecol 21:21–30.

ABARES. Australian Bureau of Agricultural and Resource Economics and Sciences. *Land use and land management information for Australia: Land Use of Australia 2010-11 dataset*. Canberra: ABARES, 2016.

DSEWPaC. State of the Environment 2011 Committee. *Australia state of the environment 2011. Independent report to the Australian Government Minister for Sustainability, Environment, Water, Population, and Communities*. Canberra: DSEWPaC, 2011.

AWC website. Australian Wildlife Conservancy (2018) *Wildlife*. Viewed 3rd August 2018. <http://www.australianwildlife.org/wildlife.aspx>

Hobbs R.J., Saunders D.A., De Bruyn L.A.L., Main A.R. (1993) *Changes in Biota*. In: Hobbs R.J., Saunders D.A. (eds) *Reintegrating Fragmented Landscapes*. Springer, New York, NY.

Deo RC (2011) *Links between native forest and climate in Australia*. Weather 66:64–9.

Deo RC, Syktus JI, McAlpine CA, et al. (2009) *Impact of historical land cover change on daily indices of climate extremes including droughts in eastern Australia*. Geophys Res Lett 36:L08705.

Junkermann W, Hacker J, Lyons T, et al. (2009) *Land use change suppresses precipitation*. Atmos Chem Phys 9:6531–9.

Narisma GT, Pitman AJ (2006) *Exploring the sensitivity of the Australian climate to regional land-cover-change scenarios under increasing CO2 concentrations and warmer temperatures*. Earth Interact 10:1–27.

Pitman AJ, Narisma GT, Pielke RA, et al. (2004) *Impact of land cover change on the climate of southwest Western Australia*. J Geophys Res-Atmos 109:D18.

Le Quéré et al. (2016) *Global Carbon Budget 2016*. Earth Syst. Sci. Data, 8, 1–45, 2016.

Houghton R. *Balancing the global carbon budget*. Annual Review of Earth and Planetary Science 2007;35:313-47.

Luo Z, Wang E, Sun O. *Soil carbon change and its responses to agricultural practices in Australian agro-ecosystems: a review and synthesis*. Geoderma 2010;155:211-23.

Sanderman J, Farquharson R, Baldock J. *Soil carbon sequestration potential: a review for Australian agriculture*. Report prepared for the Australian Government Department of Climate Change and Energy Efficiency. Canberra: Commonwealth Scientific and Industrial Research Organisation, 2010, viewed 1 September 2011, www.csiro.au/files/files/pwiv.pdf

Marlowe, F. W. (2005) “*Hunter-gatherers and human evolution*”, Evolutionary Anthropology, vol 14, p 54, 2005.

New Scientist website. (25th July 2012) *Inequality: Why egalitarian societies died out*. Viewed 2nd August 2018. <https://www.newscientist.com/article/dn22071-inequality-why-egalitarian-societies-died-out/>

Woodburn, J. (1982) “*Egalitarian societies*”, Man, vol 17, p 431, 1982.

Marx, K. (1867) *Capital: Volume One and Two*. Wordsworth Editions Ltd: Herts, United Kingdom.

Wolff, R. (2012) *Democracy at work: A cure for capitalism*. Haymarket books, Chicago.

Pencavel, J. (2012) *Worker cooperatives and democratic governance*. Department of Economics, Stanford University, Stanford, California 94305-6072.

Competition and Consumer Act 2010. Chapter 3 Part 3-1 Division 3 – Pyramid Schemes. Viewed 2nd August 2018. Available at:

https://www.legislation.gov.au/Details/C2013C00620/Html/Volume_3#_Toc36865758

Kremer, M. (1997) *Why are worker cooperatives so rare?* July 1997. National Bureau of economic research. Cambridge, MA 02138.

Rousseau, J. J. (1754) *What is the origin of inequality among men, and is it authorised by natural law?*

UN website. (10 July 2014) *World's population increasingly urban with more than half living in urban areas.* Viewed 2nd August 2018.

<https://www.un.org/development/desa/en/news/population/world-urbanization-prospects.html>

Washington, H. (2013) *Human Dependence on Nature: How to help solve the environmental crisis.* Abingdon, Oxon: Routledge.

Smith, M. J. (1998) *Ecologism: Towards Ecological Citizenship,* Buckingham: Open University Press.

Fox, W. (1990) *Toward a Transpersonal Ecology: Developing New Foundations for Environmentalism,* Boston, MA: Shambala.

Eckersley, R. (1992) *Environmentalism and Political Theory: Toward an Ecocentric Approach,* London: UCL Press.

Cohen, S. (2001) *States of Denial: Knowing about Atrocities and Suffering,* New York: Polity Press.

Reason, P. and Torbet, W. (2001) 'Toward a transformational social science: A further look at the scientific merits of action research', *Concepts and Transformations*, vol. 6, no. 1, pp. 1-37.