



# FEEDING RETROSUBURBIA



FROM THE BACKYARD TO THE BIOREGION



DAVID HOLMGREN



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### **Dedication**

To the memory of Rod May,  
visionary catchment revegetator,  
tree crop pioneer and organic farmer  
nourishing retrosuburbia<sup>1</sup>.

*Rod May 1954-2017*

*Photo by Josie Alexandra*

1 See obituary by David Holmgren and Jason Alexandra in The Age - <http://www.theage.com.au/comment/obituaries/early-organic-farming-enthusiast-made-things-happen-20170606-gwlfe2.html>

My book, **RetroSuburbia: the downshifter's guide to a resilient future** (Melliodora Publishing, in press) supports householders to become more self reliant and resilient in the face of multiple challenges from what I call “energy descent futures”. The focus on the household spills over into community level action that has been the emphasis of the Transition movement, but the book does not include grand plans for policy driven top down change.

The retrofitting in *RetroSuburbia* is focused on three fields of action: the built, biological and behavioural. Many people understand the idea of retrofitting buildings to make them fit for purpose in a changing world of economic contraction, climate change and peak oil. A permablitz garden makeover to create a garden farm that feeds the family is an example of retrofitting the biological field, while working from home, taking in a boarder and getting out of debt are all examples of retrofitting our behaviour.

Many people pursuing these bottom-up creative responses are inspired by seeing how their efforts could fit into a larger societal shift. Extended application of these changes already underway across suburbia, regional centres and small towns could create the foundations for revitalised local economies at the same time as the old economies are frozen or decaying due to a myriad of factors that are now underway.

While personal behaviour change might be the key to the household retrofitting revolution, the reruralising of suburbia through garden and urban agriculture will be the most dramatic change to the residential landscapes where most Australians live. What happens in suburbia will spill over into reshaping our rural hinterlands and our higher density urban core areas.

This essay outlines other parts of the puzzle that could complement the suburban retrofitting revolution to grow relocalised bioregional economies and bioregional cultures based on farming and food.<sup>2</sup>

Understanding the complementarities in land, water and resource use between urban cores, suburban residential landscapes and rural hinterlands

2 Effective and ethical means of monetary exchange are another essential part of the puzzle that is beyond the scope of this essay.

can help us articulate how our household activities fit into a larger vision that we can all contribute to.

## TOP DOWN OVERVIEWS OF CURRENT FOOD SYSTEM

In the 1970s, environmentalism included a strong focus on agriculture and the food supply system. In the second environmental wave in the late 80s and early 90s, agriculture and food were sidelined by the focus on buildings, transport and technology. Since the turn of the millennium, agriculture and food are back on the agenda, partly in response to grass roots enthusiasm: more people get excited about food growing than solar panels!

This grass roots interest in food and agriculture has forced sustainability researchers and policy analysts to reconsider assumptions about which human needs currently generate the largest environmental impact. When the activities in each sector of the economy (eg agriculture, power generation, transport, commerce etc) that are part of the food production, supply and use chain, food stands out as the greatest contributor to greenhouse gas emissions, water use and ecological footprint<sup>3</sup> (compared with provision of water, shelter, clothing, services, governance etc).<sup>4</sup>

This evidence contradicted the mainstream sustainability wisdom. Although the methane emissions from ruminant livestock is the most well known aspect of this reassessment, it is the logistics of processing, packaging, storing, wholesaling, retailing, regulating, shopping, preparing and disposing of waste that highlight the central role of the entire food system in environmental impact, resource depletion and systemic vulnerabilities.

This new evidence put wind in the sails of the burgeoning local food and household self reliance movements that were being driven by lifestyle, health, equity, autonomy and resilience issues as much as climate change or sustainability.

- 3 Dey, Christopher et al (2007) 'Household environmental pressure from consumption: an Australian environmental atlas' in Wind, Water, Art and Debate: how environmental concerns impact on disciplinary research, ed Birch, Sydney University Press; available at <https://ses.library.usyd.edu.au/bitstream/2123/2104/1/WaterWindCh9Dey.pdf>
- 4 Similarly the claim that the 3% of the population employed in agriculture supply all the food for the rest is a misleading interpretation of the food supply system.

Serious public policy discussion about redesigning the food supply system for climate change, or sustainability more generally, rarely includes consideration of energy descent futures. However documentation of the current food system is still helpful in any effort to imagine an alternative, parallel or complementary food system building up from the household and community non-monetary economies.<sup>5</sup> To understand the whole food supply system from a mainstream sustainability perspective, the following three reports provide good starting points.

A research report from the Victoria Eco-Innovation Lab<sup>6</sup> in 2008 provided a good overview of the Victorian food system and potential threats and stresses, especially from climate change and oil dependence. It identified new modes of production including organics and distribution through farmers' markets, CSAs<sup>7</sup> and urban agriculture. For those focused on garden farming in the household economy and the potential of the burgeoning local food movement, this report is a reality check about the complexity and scale of the current food supply system.

While this report discusses peak oil (and even mentions permaculture) it does not address bubble economics and the potential for rapid deflationary contraction. Nor does it consider the creative potential of the household economy to again play a substantial role in bypassing<sup>8</sup> the long and complex supply chains of the current food system.

The Beyond Zero Emissions land use report<sup>9</sup> suggests ways that agriculture

5 Household and community food production may be termed 'complementary' in the same way various therapies have a niche as 'complementary medicine'. It might be called 'parallel' if it operates on its own terms with less interdependence on the centralised system. It could be termed 'alternative' if in more radical scenarios it parasitises the central systems to grow to a point that the central system loses viability due to loss of market share.

6 Larsen, Kirsten, Chris Ryan & Asha Bee Abraham (2008) *Sustainable & Secure Food System for Victoria*

7 Community Supported Agriculture

8 When economies grow, more middlemen emerge to take a cut and provide additional services. When economics contract, the economic distance between production and consumption shrinks or disappears. The term for this contraction or bypassing of long economic supply chains is 'disintermediation'.

9 Beyond Zero Emissions (2014) Land Use: Agriculture and Forestry - <http://bze.org.au/land-use-agriculture-and-forestry/>

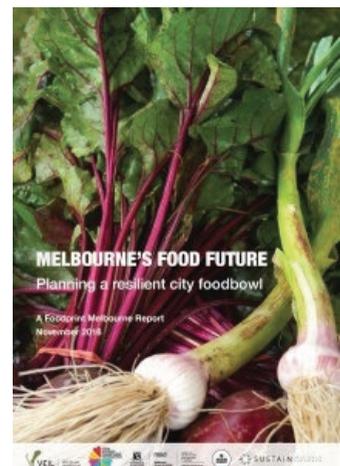


*Rod May delivering veggie boxes in Hepburn as part of local Community Supported Agriculture 2006*

and other aspects of land use can most easily contribute to a zero net emissions target for Australia. Reducing grazing livestock (reducing methane output) and reforestation, along with improved soil sequestration of carbon are the main recommendations to make agriculture carbon neutral. These proposed changes are broadly reasonable and have many benefits beyond reducing GHG emissions, but this plan ignores the threat of energy descent futures and would still leave Australians dependent on a corporate duopoly of “Just In Time” logistics. Further, it assumes no significant role for the household and community non-monetary economies in producing food with far less emissions than those generated in the agriculture, transport, power generation, manufacturing and construction sectors that sustain the current food supply system.

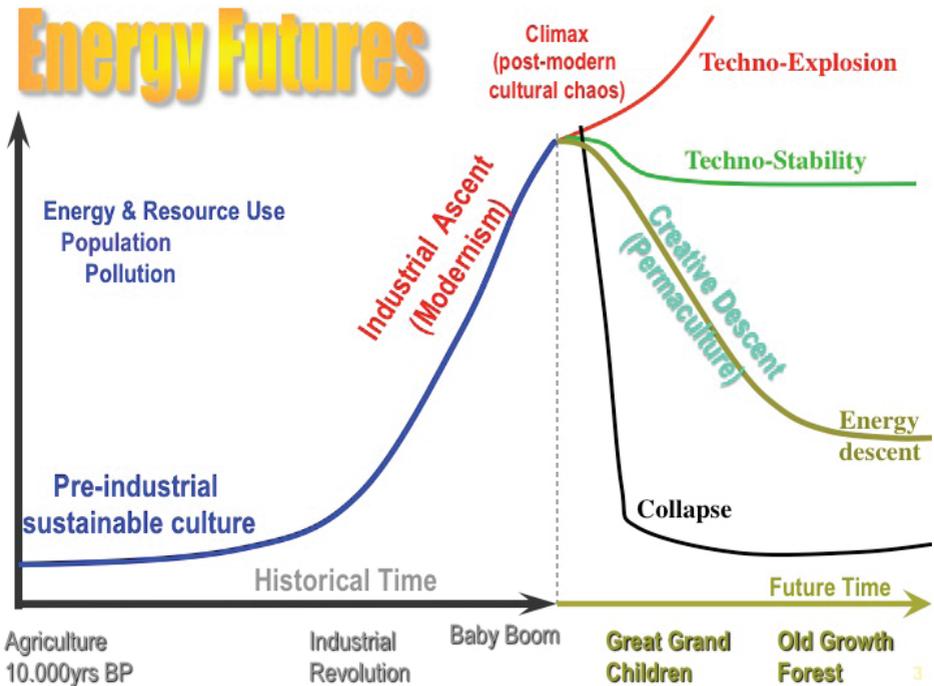
*Melbourne’s Foodprint: what does it take to feed a city*,<sup>10</sup> adds substantially to the picture of the current globalised system with projections out to 2050 factoring in expected climate change but without considering much change from business-as-usual growth assumptions.

10 Sheridan et al (2016) Victorian Eco-Innovation Lab, The University of Melbourne; available from [http://www.ecoinnovationlab.com/project\\_content/resources-to-feed-melbourne](http://www.ecoinnovationlab.com/project_content/resources-to-feed-melbourne)



# ENERGY TRANSITION CONTEXT FOR FOOD FUTURES

The nature of the current energy transition driven by climate change, peak oil and other limits to growth is uncertain. All possible futures for global industrial civilisation over the next few hundred years, fall into one of four long term scenarios according to the direction and rate of change in energy available to support society. I name those futures: **Techno explosion**, **Techno stability**, **Energy Descent and Collapse**.



**Techno explosion** depends on new, large and concentrated energy sources that will allow the continual growth in material wealth and human power over environmental constraints while allowing for population growth (generally associated with space travel to colonise other habitats but more certainly

involving further growth of population in mega cities). This has been the default view of the future for at least a century, but has roots going back to the beginnings of the scientific revolution 500 years ago. Almost all official modelling by governments and global organisations take continuous growth as necessary and inevitable.

**Techno stability** depends on a seamless conversion from material growth based on depleting energy to a steady state in consumption of resources and population (if not economic activity) based on the novel use of renewable energies and technologies that can maintain, if not improve, the quality of services available from current systems. It implies the continued dominance of urban living, albeit in smaller but higher density cities and more compact urban villages. This version of the future emerged in response to The Club of Rome's 1972 *Limits To Growth*<sup>11</sup> and underpins mainstream sustainability. The reports discussed above all assume some version of this future.

Energy Descent is the erratic but on-going decline in the material and energy base to support humanity. In this scenario, as fossil fuels are depleted and the impacts of their past use continue (such as climate change), the nature of society will change to reflect many of the basic design principles if not details of pre-industrial societies. This will require a relocalisation of the economy, a re-ruralisation of settlements and reduction in the population that can be sustained in many countries. Novel technologies and cultural patterns may ease the transition but will not prevent the process of energy descent to less complex but more resilient ways to provide for human needs and values. As happened with many past civilisations (including the well documented decline of the Roman Empire), energy descent could occur through a series of precipitous crises that punctuate longer periods of stability.<sup>12</sup>

**Collapse** suggests a failure of the whole range of interlocked systems that maintain and support industrial society as high quality fossil fuels are depleted and/or climate change radically damages the ecological support systems. This collapse could involve a major die-off of human population

11 Club of Rome & Meadows, Donella H (1972) Earth Island, London; or access here: <http://www.donellameadows.org/wp-content/userfiles/Limits-to-Growth-digital-scan-version.pdf> - <http://www.dartmouth.edu/~library/digital/publishing/meadows/ltg/>

12 John Michael Greer, author of *The Long Descent* (2008) has been the most prolific and influential writer about energy descent futures. <http://www.ecosophia.net/>

and a loss of the knowledge and infrastructure necessary for industrial civilisation, if not more severe scenarios. Current settlements would become quarries mined for valuable metals by new hunter gatherer/trader cultures. Mainstream climate science is now articulating this as the default future for humanity if greenhouse gas emissions do not fall rapidly to a fraction of the current level over the next few decades. In a larger historical sense the idea of total collapse or Armageddon has been an alternative story about the future built into Christian civilisation.

## ENERGY DESCENT SCENARIOS

*My Future Scenarios* work<sup>13</sup> used the uncertainties of climate change and the rate of decline in oil production following global peak to outline four energy descent scenarios: Green Tech, Brown Tech, Earth Steward and Lifeboat.<sup>14</sup>

I suggest the current global crisis is likely to tip the whole world, or different parts of it, into either the Green Tech or Brown Tech scenarios that could be stable for some decades before a further crisis precipitates a collapse down to the Lifeboat world or a more gentle segue to the Earth Steward scenario.

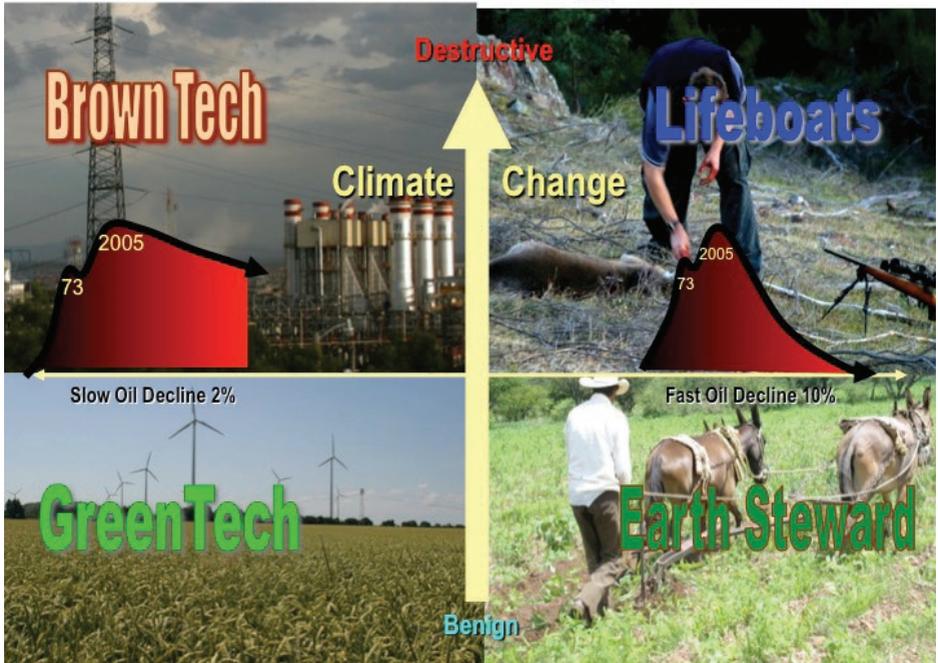
In my essay *Crash On Demand: Welcome to the Brown Tech Future* (2013), I “picked a winner” but suggested hope for avoiding climate catastrophe if the global financial system bubble were to deflate rapidly. I suggested that burnt out climate activists could restore their mental and physical wellbeing by joining the permaculture and related activists who are building local resilience. I postulated that 10% of the global middle class doing so, could help bring the “planet killing Ponzi scheme” (the global economy) to its knees.<sup>15</sup>

13 see <http://www.futurescenarios.org/>

14 A direct transition to my Earth Steward or Lifeboat scenarios would be classified by most futurists as forms of Collapse, while some futurists describe any decline as Collapse.

15 This now seems quite academic since the global financial system is already on its knees and there are signs that aggregated GDP for the world is falling. If this accelerates, precipitous falls in greenhouse gas emissions along with many other environmental impacts are likely.

## Climate Change & Peak Oil drive Energy Descent Scenarios



Those attempting to build support for serious top down responses to climate change are also proposing radical plans that would impose a command economy similar to the mobilisation for World War Two.<sup>16</sup>

The strategies in *RetroSuburbia* are crafted to be useful in all energy descent scenarios. While I still think Brown Tech is where we are heading, financial deflation could save us from the climate cooker and tip us into the Green Tech scenario. The days of “Business as Usual” are coming to an end, by design and/or accident. This is not the place to restate, refine or extend my Future Scenarios work, but it is useful to understand that Green Tech scenarios are characterised by growth and diversification of agriculture in all its forms, biological technologies and renewable energy. This growth provides a partial buffer to the radical contraction in the consumption economy of goods and services. The household and community non-monetary economies also boom as they have done whenever the monetary economies are no longer lubricated by credit.

16 See Silk (2016) *The Climate Mobilization Victory Plan* available through <http://www.resilience.org/stories/2016-09-16/the-climate-mobilization-victory-plan-foreword>

# MODELS AND VISIONS OF GREEN TECH ENERGY DESCENT

Once you see the world through the lens of energy descent it is very difficult, if not impossible, to engage in serious discussion about top down policy change to bring about a most prosperous way down, if only because all such discussions reflexively assume a “Techno Stability” if not “Techno Explosive” future. However, the complexities of how energy descent unfolds are sure to confound the most well thought out plans.

One of the best-studied models for energy descent was the energy, economic and food crisis faced by Cuba when the Soviet Union collapsed in the 1990s. The reformation of the Cuban food supply involved a combination of bottom up action by households and top down resourcing by governments. Garden and urban agriculture using organic and permaculture principles were major elements in a very positive story.<sup>17</sup> That story has strongly influenced the fair food movement in affluent countries including Australia. Using the Future Scenarios lens, the Cuban crisis fits mostly into my Green Tech scenario, although the dynamics of an isolated country is very different from the looming global energy descent.

In *A History from the Future: a prosperous way down*<sup>18</sup> I let my imagination run free to tell a story from 2086 of how the central Victorian region leads the way through a combination of prior visionary models, responses to crises and opportunities from global markets, to a benign transition to a more enduring bioregional economy and culture. It is an edgy rather than rosy story that incorporates a version of the Green Tech scenario called ‘Global Green Divide’ that remains stable for decades before a second crisis causes a shift to a benign Earth Steward scenario called ‘Bioregional Renewal’.

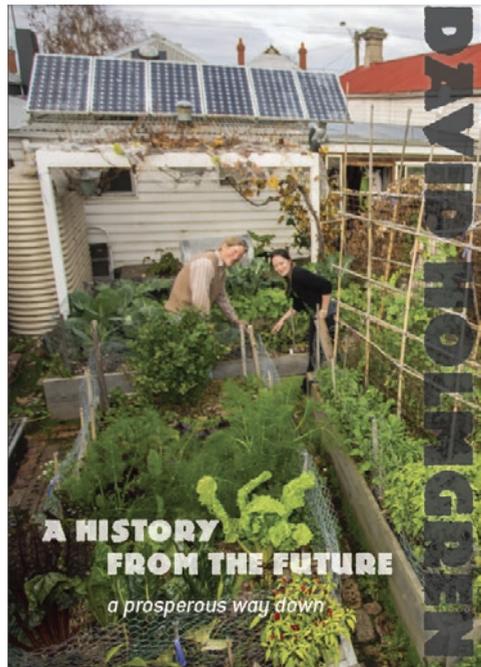
I think story telling may be a more potent pathway for muddling through to a prosperous way down than grand plans for the future. In any case, dirt

17 See the documentary *The Power of Community: How Cuba Survived Peak Oil* (2006, dir. Faith Morgan) and recent overview by Miguel A. Altieri of the achievements of the Cuban agricultural revolution and threats posed by the end of the US embargo: ‘Cuba’s sustainable agriculture at risk in us thaw’ *The Conversation* 2006 available at <http://theconversation.com/cubas-sustainable-agriculture-at-risk-in-u-s-thaw-56773>

18 Holmgren (2016) available from [retrosuburbia.com](http://retrosuburbia.com)

under the fingernails creating the working models is the essential precursor to both galvanising vision and workable plans.

As we approach the bursting of the Australian property bubble I see the retrosuburbia agenda and process as the most critical path toward any planned or emergent prosperous way down. For those needing the bigger vision beyond the backyard and the neighbourhood, the following ideas provide more insight into the thinking behind both *RetroSuburbia* and *A History from the Future*. I believe these ideas are technically possible, ecologically sustainable and ethically desirable but they could take decades to unfold.



## CITIES ABANDONED OR FEEDING THEMSELVES?

The Cuban food crisis showed the capacity of cities to feed people and the persistence of urban agriculture after the crisis shows how garden and urban agriculture can remain a significant part of the food system in a highly urbanised country of well-educated and moderately affluent people. Of course there are many differences between Cuba and Australia but this well-documented case study turned the tide strongly in favour of the idea that cities can grow a substantial proportion of their food needs.

I know it's a big call but I think it would be technically possible to feed the populations of our current Australian cities from the open space within their metropolitan areas. A speculative retrofit of a Sydney suburb by Ted Trainer shows how a single suburb could be food self-sufficient.<sup>19</sup>

19 Trainer (2014) Redesigning East Hills: estimating the potential for self sufficiency and reduced resource and ecological impact in a Sydney suburb and <http://thesimplerway.info/RemakingSettlements.htm>

Food self-sufficiency for Australian cities would require the labour of a significant proportion of the population and a major change in average diets. The savage shift of economic and social circumstances that would be required for it to be ever attempted through some type of top down command economy would almost certainly be a disaster, potentially precipitating mass migration and possible die off in those populations. Such considerations invite comparisons to the attempts of the Pol Pot government to impose rural self-sufficiency on Cambodian urbanites in the 1970s.

In working through the logic of my more extreme energy descent scenarios (Earth Steward and Lifeboat), I have always rejected the idea that our low-density cities must be abandoned in an attempt to feed people. The space, water and nutrient availability and relatively benign growing climate of Australian urban landscapes would make it technically possible. The other reason why abandonment of cities is unlikely is the relative infertility and unreliable climates that constrain the capacity of our rural landscapes to feed people without substantial infrastructure and effort.

## BIOREGIONAL PERMACULTURE LAND USE ALLOCATION

Between these extremes of food self sufficiency or complete abandonment of cities, there is a lot of middle ground in which urban communities can greatly increase their food production with many economic, social and environmental benefits.

I am certain that we need a great expansion of garden and urban agriculture in our cities, towns and villages. I think that suburban landscapes have the potential to be the heartland of a massive intensification of urban food production feeding those communities as well as providing net exports of some products to hinterlands (where water supply may be more limited) as well as sustaining higher density city centres.

Garden and urban agriculture could easily supply fresh vegetables, moderate quantities of starch staples (tubers, corn and pumpkins), fruit, small livestock products and even modest quantities of fresh milk for most urbanites. Staple grain and pulses are likely to continue to come from better cropping soils in hinterlands or beyond. Red meat production and dairy for cheese is very land intensive and/or input intensive, and is always likely to be an import from



*Garden harvest at the Plummery, Northcote. Photo: Kat Lavers*

hinterlands. Grazing livestock such as sheep, goats and cattle and wild game animals such as kangaroo and deer are likely to contribute significantly to the diets of urbanites, even if average consumption of animal products declines.

While a vegan diet may in theory require the least use of land per person, the practicalities of low energy agriculture in most parts of the world, require some animals to eat weeds, surplus vegetation and wastes, provide manure, pest control and nutritional density in the diet, which is possible but more difficult to get from a plant-only diet.<sup>20</sup>

Apart from debates about the appropriate place of meat production and consumption, the isolation of an agriculturally productive suburb (or metropolitan area) from its rural hinterland and its high density city core is of course an artificial condition that is only likely for some limited period during an extreme natural disaster or conflict. In practice there are complementary trade relationships where suburbs would import grains and livestock products and other crops that are low yielding (such as fuel and animal fodder) from the peri-urban and rural hinterlands.

Urban cores of Australian cities are always likely to be net importers of food but coupled with adjacent industrial zones, could be net exporters of value

20 In *RetroSuburbia* I further discuss this subject in the chapter Sustaining and sustainable diet.

added sprouts and fermented products, fish and greens from aquaponics, as well as many species of mushrooms that take advantage of built environment infrastructure, surplus storm water and nutrients. The proximity of the suburbs to urban core areas creates complementary relationships that would increase total metropolitan food production.



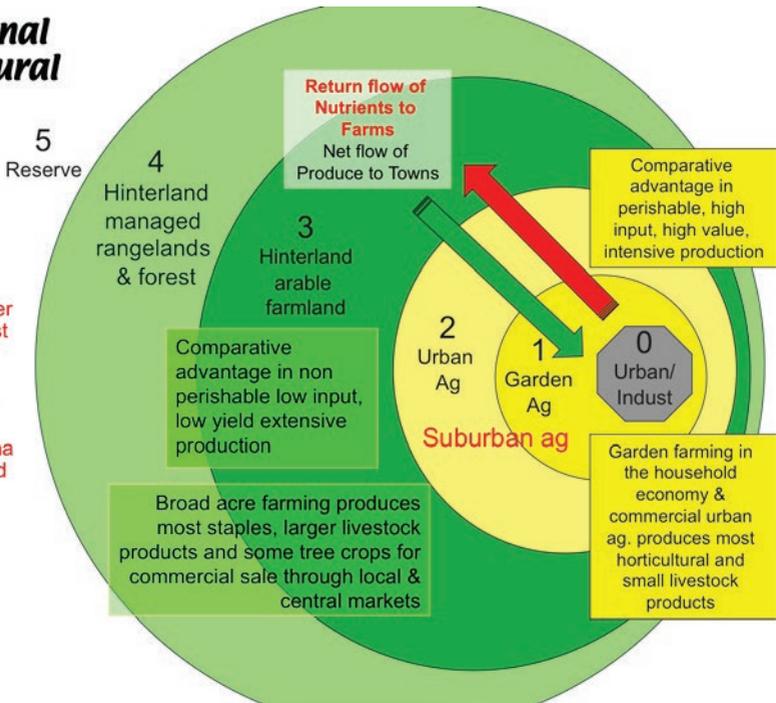
*Storm water from hard surfaces is a substantial water resource with many reuse options.*

The excess of storm water and nutrients that urban cores generate could help boost yields from suburban agriculture. This would further strengthen suburban areas' capacity to be net exporters of vegetables, fruit, eggs and small livestock products to those urban core areas. Thus principles of comparative economic advantage will continue to operate in the energy descent future, just at a smaller scale than in our currently globalised world.

The diagram **Bioregional Agricultural Zones** distills my vision of how comparative advantage might apply in a frugal energy descent economy focused on needs rather than wants.

# Bioregional Agricultural Zones

**Zone size**  
 •Rural zones larger but lower yields/ha, most managed by animals  
 •Urban zones smaller but highest yield/ha most managed by people



## PERMACULTURE ZONING; A PATTERN LANGUAGE OF LAND USE INTENSITY

The original permaculture zoning concept was adapted from traditional land use patterns of northern Germany in the 19<sup>th</sup> century where horticulture, cropping, grazing and forestry formed more or less concentric rings of intensity of land use around each village. In permaculture design it was first applied at a small rural property scale to generate a nested set of zones of decreasing intensity of use around a rural homestead. It has been adapted and interpreted in many ways including conceptually, to map our relationships in urban life.<sup>21</sup>

The permaculture zoning concept is here used to show the relative economic advantage in food production of three zones: urban, suburban and rural that could sustain each major and regional urban centre.

21 For example Hemenway, Toby (2015) *The Permaculture City: Regenerative Design for Urban, Suburban, and Town Resilience*

**Zone Zero (the built environment)** is here interpreted as the medium and higher density urban core of our cities and towns including industrial zones where there is currently little in the way of green open space and what there is is greatly valued for amenity and so not available for significant urban agriculture. These urban areas that are mostly built over have surplus water and nutrients but space and sunlight for growing are scarce.



*Aquaponic basil production, CERES Melbourne.  
Photo: Beck Lowe*

Aquaponics and mycology make the best use of built infrastructure and resources to produce high value perishable vegetables, fish, mushrooms and ferments. While some of this will be done in the household economy, the technical complexity and capital investment required suggest most production will be commercial. Urban core areas will still generate surplus water for export

to suburban garden and commercial agriculture while surplus nutrients might be transported back to arable farming in the hinterlands. A substantial proportion of food currently consumed in urban cores is by non-resident commuters (mostly lunches). In energy descent futures, a majority of commuters and shoppers bringing their own lunches with them will represent a substantial net import of food via the non-monetary economy, mostly from surrounding garden and urban agriculture.

**Zone One (garden farming)** Low density older suburbs with more modest houses are likely to produce vegetables, fruit and plant nursery products as well as small livestock products. These will be consumed by locals as well as residents of the medium and higher density urban core areas. The majority of production is likely to be non-commercial within the household economy (garden farming) following a fairly large-scale removal of non-productive trees from these leafy suburbs.

It is possible that the substantial potential for intensive commercial urban agriculture on public land will be constrained by the desire to keep the mature treed parklands for recreational use (but with low intensity management by livestock, mostly sheep and goats).

**Zone Two (commercial urban agriculture)** In the low-density newer outer suburbs built since the 1980s, there is much less growing space in private gardens but ample public land. Much of it is mown grass or eucalypt dominated parklands of low amenity value. As well as intensive production of perishable vegies, urban agriculture on larger areas will tend to produce staple crops (starch roots, pumpkins, corn), small-scale dairy (mostly goat) and tree crops.



*Garden farming, Melliodora central Victoria*

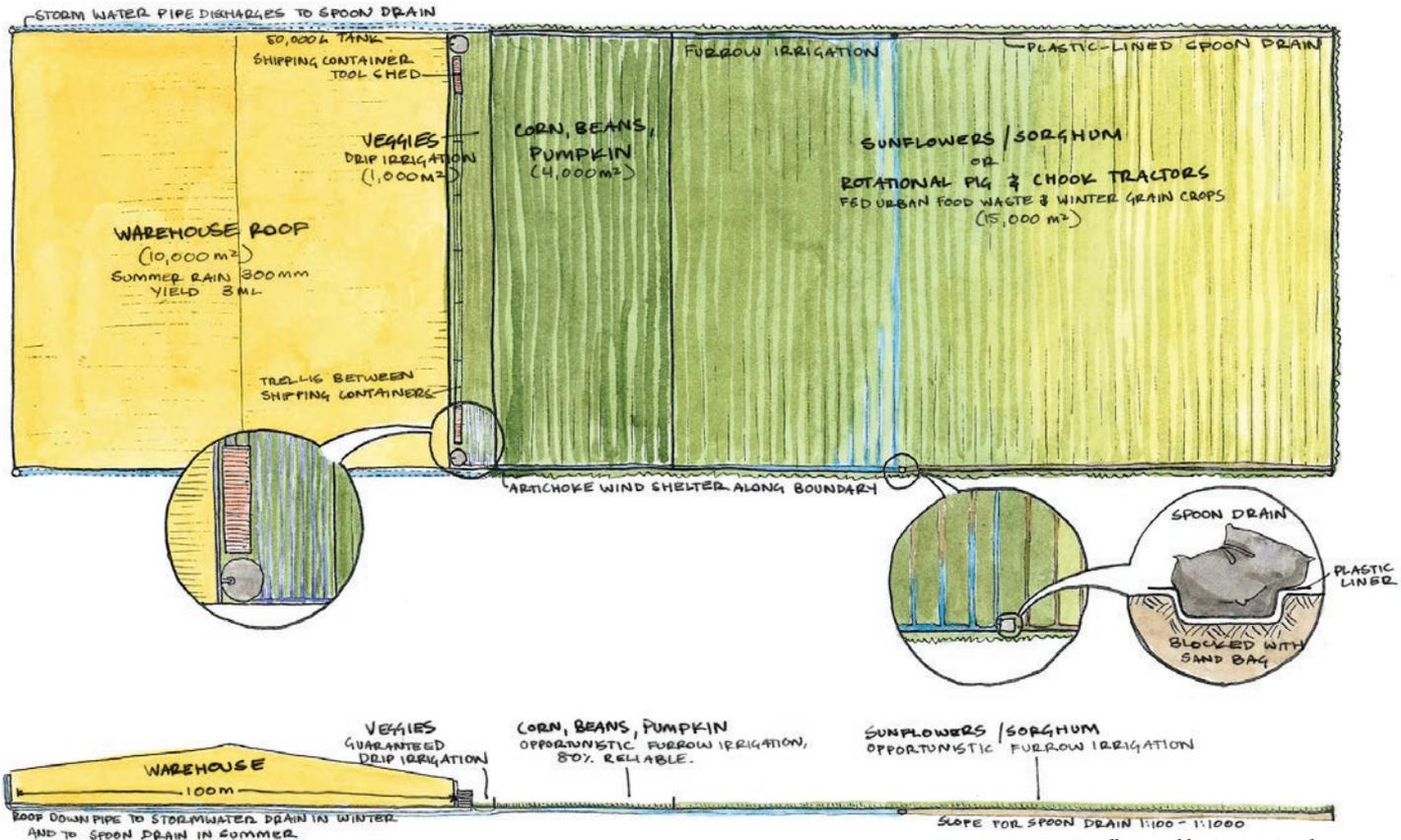


*Outer suburbs with extensive public land with opportunities for stormwater irrigated urban agriculture*

Another key opportunity of these outer suburbs is the large roof areas of warehouses, light industrial areas and shopping centres that could be used to supply water for irrigated urban agriculture. The following design shows a two-hectare urban farm next to a one-hectare warehouse roof that supplies limited reliable irrigation to high value row crops and extensive opportunistic<sup>22</sup> furrow irrigation to field crops.

22 Directing overflow from tanks to augment growth of hardy summer field crops.

OPPORTUNISTIC USE OF STORMWATER ON 2.4a URBAN MARKET GARDEN



### **Zone Three, (rural commercial agriculture)**

As garden and urban agriculture take over much of the market from peri-urban horticulture, and development-driven land values fall, good agricultural land close to cities will return to producing dairy and tree crops. Prime arable land<sup>23</sup> further afield is likely to produce the majority of the dryland staple grains, legumes and oil seed. The unstable climates and limited areas of prime arable land in Australia suggest little if any of this land should be allocated to growing non-food crops (fiber<sup>24</sup> and fuel).

Soils with moderate to good rooting volume and fertility on moderate slopes that are less suited to annual field crops will be mostly growing

- 23 Flat or gently sloping land, with stone free and moisture holding soils suitable for cultivation without significant risk of erosion and degradation.
- 24 In southern Australia, hemp might be the exception because it yields an oil seed (in addition to high quality fibre) and is an ideal rotation with wheat and other staple crops.



*Prime dairy land, Warrnambool Victoria*



*Organic pistachio and carob production, Food Forest SA*



*Sheep grazing improved pastures, central Victoria*



*Wheat harvest in the Victorian Wimmera, the grain bowl of the statemanaged wildlands.*



*Powlett Hill biodynamic grain growers and processors*

broad acre tree crops, especially olives, carobs, nuts and fruit for drying and/or processing.

The majority of farmland in southern Australia is non-arable and only suitable for unirrigated pastures and animal fodder tree crops.<sup>25</sup> These same areas easily produce wool and other animal byproducts and are suitable for timber plantations. Most of this production will be commercial to support the needs of town residents. I take for granted that in energy descent futures, rural communities will again provide almost all of their own food needs in enlarged household and farm non-monetary economies. Most farmland might continue to be private freehold land, but a greater diversity of tenure, ranging from communal ownership to large estates with semi-feudal rights and obligations could emerge and prosper in some scenarios.

### **Zone Four (The managed wildlands)**

The lowest fertility, steeper and semi arid hinterlands that are not viable for farming and more intensive grazing will be important to any viable bioregional economy in energy descent futures, especially those affected by more severe climate change. Climate change will limit the scope of viable agriculture while rangeland grazing, bee keeping,<sup>26</sup> wild harvesting,<sup>27</sup>



*Sustainable yields of meat, honey, firewood and timber from managed wildlands. Fryers Forest central Victoria*

hunting and forestry for fuel and timber, eucalyptus oil etc, from marginal lands, are likely to be more resilient. Water, soil and biodiversity conservation are critical ecosystem service functions performed by these Zone 4 landscapes.

25 Such as tagasaste, willow, acacias, casuarinas etc.

26 See *Holmgren (2011) Beekeeping for the energy descent future* - <https://holmgren.com.au/bee-keeping-for-the-future/>

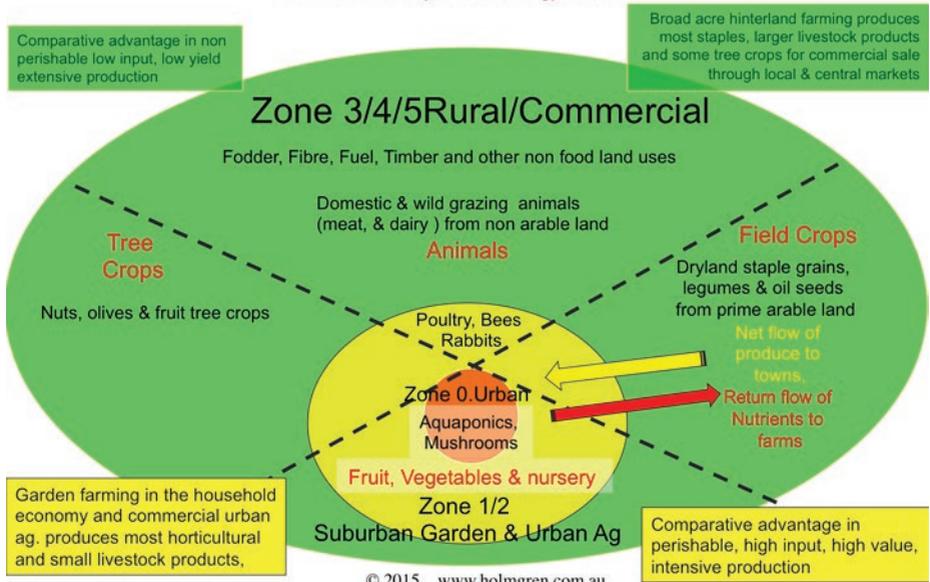
27 Mushrooms, medicinal plants etc.

Healthy hydrologies that sustain irrigated agriculture and human settlements may be of the most important value from watershed landscapes. The majority of the managed wildlands are likely to be some sort of expanded “commons” managed by decentralised communities of interest that could include urban and suburban consumers.<sup>28</sup> Within these natural but managed landscapes there should always be the ecological reference areas, special reserves and sacred sites where observation and inspiration take place without imposing management objectives.<sup>29</sup>

## OBTAINING YIELDS AND DISTRIBUTING THE SURPLUS ACROSS THE BIOREGIONAL COMMUNITIES

### Land Use Allocation for Bioregional Food Supply

Quadrant size is indicative product of relative area & economic value for Australian food systems in energy descent



28 Some transformation or revitalisation of the crown land forests and semi arid grazing leases and aboriginal land that cover most of the continent (not Victoria). See my *A History from the Future* story for one example of how that might happen.

29 This is the true function of permaculture Zone Five, rather than relic indigenous landscape constantly weeded to preserve their assumed state prior to European invasion. These indigenous reserves are more correctly a zone four system because they involve management.

The **Land Use Allocation for Bioregional Food Supply** diagram shows four quadrants to indicate the approximate relative importance of:

- horticulture
- annual field crops
- tree crops
- animal husbandry

and how they overlap with the rural, suburban and urban zones.

Horticulture occupies very little land but yields the highest value per hectare. Fields Crops and Tree Crops occupy modest areas and have moderate yields per hectare while Animal Husbandry covers the most area but yields much less food per hectare.<sup>30</sup>

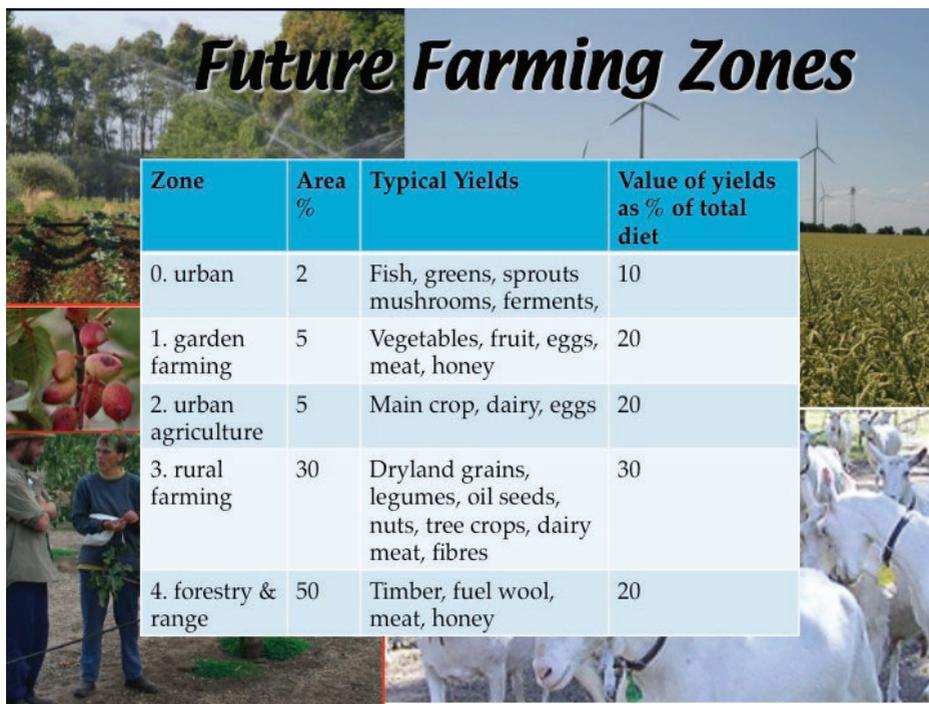
The following table shows the value of food consumed for southern Australian bioregions. The prices that determine this balance of value reflect nutritional density, ease of processing and sustainability of production. For



30 The ecosystem service functions of well-managed pastures and rangelands including soil carbon sequestration, grassland biodiversity maintenance and suppression of wildfires, may be as important as the harvested yields.

example annual field crops may have a soil depletion tax included while a “sustainability premium” for tree crops could make them less of a luxury than they are currently (due to high labour cost and difficulty of mechanisation).

The next table shows that the urban and suburban landscapes of less than 10% of a bioregion might produce 50% of the value of food in the total bioregional diet. Rural farming on 30% of the land might produce 30% of the food value with the remaining 20% coming from forestry and grazing range land (including migratory beekeeping).



## Future Farming Zones

Zone	Area %	Typical Yields	Value of yields as % of total diet
0. urban	2	Fish, greens, sprouts mushrooms, ferments,	10
1. garden farming	5	Vegetables, fruit, eggs, meat, honey	20
2. urban agriculture	5	Main crop, dairy, eggs	20
3. rural farming	30	Dryland grains, legumes, oil seeds, nuts, tree crops, dairy meat, fibres	30
4. forestry & range	50	Timber, fuel wool, meat, honey	20

It may appear that garden farming and urban agriculture could simply be doubled in scale to produce a complete diet, allowing the majority of the land to be returned to wilderness but this is not likely to be the case, at least in Australian landscapes and climates. Farm, range and forest provide food and other space-demanding resources with much less human effort and arguably less fossil fuel subsidy. These complementary foods are harder to produce at a small scale while non-food products such as timber, fuel and fibres can be sustainably harvested without damaging essential ecological

services. In the process, carbon can be sequestered at higher rates than we currently achieve in our managed and unmanaged hinterlands.

Most fundamentally, human management has been a co-evolved part of the Australian landscape for at least 50,000 years and the evidence of recent history suggests abandonment of land does not lead to the recreation of harmonious wilderness. Without the yields and ecological services of these extensive zones managed with the help of animals, fossil fuelled inputs and/or humans need to do most of the work to prevent these zones being damaged by unmanaged bushfires. Heavy use of fossil fuelled inputs to provide nutrients and manage vegetation is ecologically unsustainable while expecting humans to do all of the work is socially unsustainable. The relationships between human and natural systems will be profoundly restructured by energy descent but the interdependency of the human settlements and their hinterlands that was temporarily abandoned through globalisation will increase in energy descent futures.

## THE RETROSUBURBAN DIET

After briefly discussing diet as a “demand” driver in determining land use for a bioregional food system, I have interpreted the sustainable “supply” side drivers to suggest what could be produced where. With this broad picture it is possible to then ask what type of average diet would result if people ate what their bioregion produced the same way households with substantial home production tend to eat what they grow. Recognition and adoption of such a diet might further help drive the vision of a sustainable bioregional food system.

The following table documents what might be the average consumption of primary food ingredients in what I am calling the Retrosuburban Diet. Just like the average Australian diet<sup>31</sup> to which it is compared, this is not a recommendation but an average that happens to be more in line with nutritional recommendations. I have seen this diet emerging in many households committed to home food production, bioregional and largely organic sources of supply mostly outside the centralised system. This assumes the current rapid growth in these trends from tiny beginnings continues or accelerates

31 Based on ABS data from 2011



*A retrosuburban meal of home grown food at Melliodora. Photo: Oliver Holmgren.*

until perhaps 10% or more are growing, buying and eating this way.

The average Retrosuburban Diet includes more vegetables, grains, legumes and eggs but less dairy, meat, fish, sugar and oils than the average Australian diet. The drop in sugar consumption is the most extreme but is moderated by some increase in honey consumption. The diversity of specific types of vegetables, fruits, grains, legumes, dairy and meats etc is greater than in the Australian diet, but only the diversity of meats shows up in the table. The total quantity of food consumed each week of 8.7kg is slightly more than in the average Australian diet (8.5kg) but the energy and protein density is substantially lower and I have assumed that the average retrosuburbanian is more physically active than the average Australian of 2011. Therefore they would burn off more of the calories consumed.

The 60% reduction in animal products in the diet could be achieved by a proportion of retrosuburbanians becoming vegan but I think it is more likely to come about by a reduction in meat consumption and shift to ethically

and sustainably produced meat. It is quite possible that shifts in food habits by those wedded to the centralised food system could see similar reductions in consumption of animal products but I speculate this is more likely to be achieved by a proportion becoming vegan while the rest continue to be heavy consumers of industrially-produced animal products. Of course this division of society between those mostly dependent on the centralised system and those on the bioregional system is artificial but in some future

## AVERAGE AUSTRALIAN DIET

Foodstuff	%	gms/wk
Vegetable	15.3	1293.6
	-	
Fruit	18.1	1531.6
Nuts	0.7	58.8
Cereal grains	11.9	1010.1
Rice	1.6	135.8
Legumes	1.4	118.3
Oils	1.9	162.4
Sugar	6.3	533.4
Salt	0.2	14
Dairy	26.6	2256.8
Eggs	2.5	207.9
Poultry meat	4.3	361.9
Beef & veal	4.0	336.7
Pig meats	2.2	186.2
Mutton & lamb	0.9	77.7
	-	
	-	
Fish	2.2	186.2
	-	
<b>Total</b>	<b>100</b>	<b>8471.4</b>
<b>Total incl waste</b>		<b>24150.0</b>
<b>Meat, dairy &amp; eggs/wk</b>		<b>3613.4</b>

## RETROSUBURBAN DIET (S.E. AUST)

Foodstuff	%	gms/wk
Vegetable	32.9	2800
Mushrooms	0.6	49
Fruit	20.6	1750
Nuts	1.6	140
Cereal grains	20.6	1750
Rice	1.6	140
Legumes	4.1	350
Oils	0.8	70
Honey & Sugar	1.6	140
Salt	0.2	14
Dairy	8.2	700
Eggs	2.5	420
Poultry meat	0.8	70
Beef & veal	0.8	70
Pig meats	0.4	35
Goat & sheep meat/fat	0.4	35
Rabbit meat	0.4	35
Kangaroo & wild meats	0.8	70
Fish	0.8	70
Seaweed	0.2	14
<b>Total</b>	<b>100</b>	<b>8512</b>
<b>Total incl waste</b>		<b>17500</b>
<b>Meat, dairy &amp; eggs/wk</b>		<b>1295</b>

scenarios this division could lead to two parallel food systems with most people getting the majority of their food from one or the other.

The second table shows where this diet might come from considering a range of logistical, economical, ethical and cultural factors that would work to determine the best sources of supply. Following my terminology, garden agriculture is home production in cities and towns consumed by the household and/or exchanged outside the monetary economy. Urban agriculture is commercial production within the areas developed and zoned for urban development including country towns. A minor category, Urban Wild, includes foraged vegetables, herbs fruit, fungi and hunted animals and birds within city and town areas. Rural agriculture includes commercial production beyond urban boundaries, mostly within the bioregion of perhaps 150km but includes some production from well beyond the bioregion. Rural Wild and Sea includes wild forage and harvest whether commercially traded or not from and beyond the hinterland.

The table shows that about half the food consumed comes from the urban area and a little less than a quarter is produced and consumed in the household and community non-monetary economy. While it may be possible for these percentages to be higher and for some people they no doubt will be, I have tried to balance zeal for the vision with pragmatic realism about what could prove practical, economic and socially acceptable to enough people to create a vibrant bioregional food system.

The question as to whether it will be possible to feed the whole population the Retrosuburban Diet is beyond the scope of this vision but in some cases, such as vegetable production, I believe the answer is clearly yes. In the case of wild meats the answer is probably no without a substantial migration of population away from capital cities closer to hinterland resources. In the case of sugar, the Retrosuburban Diet would wipe out 90% of the dietary demand for this crop, freeing up tropical lowlands in Queensland to grow rice and other more appropriate crops. What is clear is that building a bioregional food system in parallel with the current centralised one is one of the best investments society could make to model improvements in health, sustainability and resilience, and hedge against stresses that over the longer term threaten to overwhelm centralised systems maladapted to energy descent futures.

# RETROSUBURBAN DIET (S.E. AUST)

*Source of food in grams per week*

<b>Foodstuff</b>	<b>%</b>	<b>gms/ week</b>	<b>garden ag</b>	<b>urban wild</b>	<b>urban ag</b>	<b>rural ag</b>	<b>rural wild/sea</b>
Vegetable	32.9	2800	1050	70	1050	630	0
Mushrooms	0.6	49	7	7	14	7	14
Fruit	20.6	1750	560	70	560	560	0
Nuts	1.6	140	35	0	35	70	0
Cereal grains	20.6	1750	0	0	350	1400	0
Rice	1.6	140	0	0	0	140	0
Legumes	4.1	350	35	0	105	210	0
Oils	0.8	70	0	0	7	63	0
Honey & Sugar	1.6	140	35	0	35	35	35
Salt	0.2	14	0	0	0	0	14
Dairy	8.2	700	14	0	126	560	0
Eggs	2.5	210	105	0	35	70	0
Poultry meat	0.8	70	21	0	28	21	0
Beef & veal	0.8	70	0	0	0	70	0
Pig meats	0.4	35	0	0	17.5	17.5	0
Goat & sheep meat/fat	0.4	35	0	0	7	28	0
Rabbit meat	0.4	35	17.5	0	0	0	17.5
Kangaroo & wild meats	0.8	70	0	7	0	0	63
Fish	0.8	70	7	0	14	14	35
Seaweed	0.2	14	0	0	0	0	14
<b>Total</b>	<b>100</b>	<b>8512</b>	<b>1886.5</b>	<b>154</b>	<b>2383.5</b>	<b>3895.5</b>	<b>192.5</b>
<b>Total produced including waste</b>		<b>17500</b>					
<b>Meat, dairy &amp; eggs per week</b>		<b>1295</b>					
<b>Total urban/rural</b>				<b>4424</b>			<b>4088</b>
<b>Urban % of diet</b>			(garden ag) <b>22%</b>	(total urban) <b>52%</b>			

## VISION

Those born since the turn of the millennium should live to see and reflect on what role practical models, visions and grand plans played in shaping the world of their old age. Hopefully this brief portrait may inspire those busy with the more prosaic work retrofitting buildings, redesigning gardens and reinventing lifestyles, to remain confident that what they are doing is an essential stepping-stone to a larger vision. Nurturing the children who will be the midwives of a benign new order that respects the earth as our mother, all life forms as our brethren and acknowledges the heritage of ancestors and the needs of descendants, might be the most critical task of all. Most of these midwives will be raised in retrosuburbia.

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