

A portrait of David Holmgren, a man with short brown hair and a slight smile, wearing a light blue button-down shirt. He is positioned on the right side of the frame, looking slightly off-camera. The background is a dense forest with sunlight filtering through the green leaves, creating a dappled light effect. On the left side, there is white text overlaid on the image.

DAVID HOLMGREN

COLLECTED
WRITINGS &
PRESENTATIONS
1978-2006



INTRODUCTION

This collection of magazine articles, conference papers, public lectures, book reviews and other written work plus some powerpoint and video files of presentations by David Holmgren provides a deeper insight into the thinking behind the Permaculture concept and its many applications. Together they trace the ongoing evolution and explanation of the permaculture concept to a wide range of audiences by its lesser known co-author.

*The first edition (1978-2000) included many articles that are referenced in **Permaculture: Principles and Pathways Beyond Sustainability** published in late 2002, David's major contribution to the evolution of the permaculture concept. This third edition also includes 15 recent articles and associated presentations from 2002 to late 2006. Four important articles from 1985, 1993 and 1997 have been added to the earlier collection.*

In making these articles available as an eBook, the author encourages distribution in printed form to students on Permaculture Design Courses. Reproduction of the whole eBook is protected by the author's copyright so those seeking to make the whole collection available or to distribute printed copies outside of the context of a Permaculture Design Course should refer people to the Holmgren Design Services website. Permission for reproduction in magazines and other publications should be sought from the author.

Some of the articles are available on the website as screen readable PDF's but cannot be printed.

References to the articles should acknowledge this eBook or the website, and where appropriate any prior publication indicated in the notes about individual articles.

Feedback by email is welcome but replies to correspondence will depending on available time.

The articles are PDF files (the emerging standard for electronic document transfer). To read these files you will require Adobe Acrobat Reader. Most computers connected to the internet have this software already installed which should automatically open these files. If not, it is downloadable free from the Adobe Web site (www.adobe.com).

Three visual presentations have been included as pdfs rather than the original Powerpoint format. This preserves the font and layout of the original presentation but the animation (used in some of the slides) cannot be seen.

The video interview is in mp4 and divx formats. Mp4 can be opened by Quicktime (on all Macs and many PCs) while divx files can be opened by most video viewing software on PC's.

The audio lecture is supplied in both m4a (podcast) and lower quality mp3 formats.

The Photographic Archive included gives a few historical snapshots of David Holmgren, some of his colleagues who influenced the ideas expressed in the articles, as well as a few of the places and projects where these ideas have been applied. They provide autobiographical links to specific articles.



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PERMACULTURE: DESIGN FOR CULTIVATING ECOSYSTEMS

*This somewhat flippant article was written in 1978 while I was living in the bush in Jackys Marsh, Tasmania. It uses local example to illustrate the ecological approach of permaculture to understanding and managing weeds providing an indication of my thinking on this subject the year Permaculture One was published. It was addressed to the numerous “back to the landers” in the district who I felt were falling into the pioneer mentality of battling nature. It was published in a small circulation local alternative magazine **Touchstone** and later republished in **The Best of Permaculture** edited by Max Lindegger and Robert Tapp (Nascimanere 1986). The selection of an indigenous tree, a globally cosmopolitan fern widely regarded as a weed and a European bramble despised as Tasmania’s worst noxious weed, reflected the concern amongst local landholders about these three species but it was also a deliberate attempt to show that ecological function is not necessarily related to whether plants are exotic, native or indigenous.*

I would like to make a few observations and suggestions concerning certain weeds; Bracken, Wattle and Blackberry. These plants are common throughout Tasmania and parts of the mainland invading badly managed or abandoned farmland, logged and fired bush. To call wattle trees weeds may stir conservationists to defence but the sense in which I describe a plant as a weed is not derogatory as this article will show. An appreciation of the ecology of weeds is my aim. From this we can learn not to hate a plant just because it gets in our way and possibly how to use it to advantage.

Weeds have been described as plants out of place (ie. growing where we don’t want them) which says something about us but nothing about the plants. I would say weeds are pioneer species which colonise disturbed habitats created by humans. Since disturbance in the form of flood, fire, land slip and volcanism are a part of nature, certain plants have evolved to recolonise affected environments and it is these species which comprise most of our weeds. Non-weedy species can become weeds when introduced to a new environment because natural limiting factors such as parasites are not present.

However disturbance of mature ecosystems is the prime cause of weed problems. Mankind has for the last 10,000 years or more been one of the major causes of disturbance mainly through forest clearing and burning. Its appropriate therefore that a whole array of species has evolved specifically to cope with people-created habitats.

It should be possible to recognise weedy characteristics in plants independent of whether or not they are causing us any problems.

Weeds tend to have one or more of the following characteristics:

- Short-lived relative to species of the same plant type.
Eg Silver wattle compared to Blackwood or Eucalypts
- Abundant reproductive capacities by seeding or vegetative reproduction.
Eg Thistles. This allows unstable areas to be quickly colonised.
- Nectar and pollen sources for bees.
Most weeds provide some flow and many are renowned - eg. Paterson’s Curse/Salvation Jane. This is an adaption which encourages a high seed set.
- Fast and vigorous growth. This helps with a quick colonisation.
- Capacity to handle very poor, compacted or leached soils.
Eg. nitrogen fixers such as gorse or wattles. Others are specifically adapted to low humus soils. Eg Mullien.

We can say that in Tasmania, Bracken, Blackberry and Silver Wattle qualify very well as weeds in our ecological framework. What then are these weeds doing all over the countryside?



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Firstly, the much despised Bracken; its quick spreading rhizomous root system stabilises ash (fired) ground, soaking up the soluble nutrients before they are leached, preventing erosion and building up the humus with its copious fronds which die off each season. It is assisted in its spread by being unpalatable to animals. Large pure Bracken stands provide little food for browsing animals so animals go elsewhere and tree seedlings get established (except for light demanding species such as most Eucalypts) in a moist, sheltered, frost-free environment. Being fairly light demanding itself, Bracken dwindles to a few scattered fronds in a well developed forest. Sounds ideal! Of course it is a great fuel accumulator, so although its very growth leads to its elimination, it plays at encouraging fire which will regenerate it. Only natural!

How about Silver Wattle? It comes up after fires too, but also germinates under established Bracken or even in pasture. In the native ecology it can be placed between Bracken and Eucalypts (the Eucalypts always regenerate at the same time as the Acacias but eventually succeed them) but this tree is very versatile in form, habitat and relationships. It is a nitrogen fixer and builds up the humus very quickly. Fast grower? I've seen it 20m high at 10 years old on deep moist clay-loams in the Huon, which rivals any of the world's "weed" trees such as pines and poplars. The Silver Wattle flowers profusely, is a source of pollen for bees and sets seed in huge quantities, which can lie dormant in the soil for years until required to burst into life through some disturbance.

And the Blackberry; that introduced noxious weed of which, Baron von Mueller said in 1895, "deserves to be naturalised on the rivulets of any range". This spiny bramble controls erosion, especially along streams which have been destabilised by land clearing in the head waters. It has deep roots and is partially deciduous acting as a nutrient pump bringing minerals back to the surface, depositing them as humus. It is excellent bee forage and supports large populations of blackbirds which while eating your strawberries, distribute tons of high phosphate fertiliser. The old log heaps covered with blackberry usually have soil incomparably better than the surrounding ground. It is said that nothing grows under this weed. Most natives species are light demanding, but if suitable seed sources are present (eg. native Pittosporum or introduced Elderberry) and rabbit populations are not excessive, then vast areas of brambles will return to mixed forest.

Nature seems set on turning everything into forest; the ideal natural state. So in clearing land we take on a battle which we must consider carefully in case we bite off more than we can chew. Most of the weed problems in the Australian landscape are due to this mistake. More land was cleared than could be effectively managed by the people available. Economic downturns caused people to abandon land for long periods and when they returned (or someone else did) it was head high in blackberries. Typically the people blamed the plants.



IMPRESSIONS OF NEW ZEALAND

*This article was written during my first trip outside of Australia in April 1979 and was published in the newsletter of the then recently formed New Zealand Permaculture Association. It records some of my earliest thoughts about new ecosystem evolution which has been such a focus of later research and writings (see Article 23 - **Weeds or Wild Nature** and other recent articles). Impressions of New Zealand was also included in **The Best of Permaculture**.*

On this trip to New Zealand, my first, I have focussed my attention on the drier hill and high country of the South Island. My first real view of the country was in the Waihopai-Avon area of inland Marlborough.

Coming up the Wairau valley the lack of trees on the vast rugged landscape was obvious. The pine shelter belts with their tops bent by the prevailing winds told of the icy winds which must chill people, plants and animals. The rivers shocked me; wide shingle beds where there should be productive flats. Steep, thinly grassed slopes, barren tops and scree, wildly fluctuating rivers causing untold damage, all indicate landscapes in poor shape. The country as a whole is visibly young and unstable, eroding and decaying very quickly. These are natural consequences of a geologically active land and to most people seem inevitable.

VITALITY:

The other aspect of the country which took me a little longer to see was the vitality of the life forms, native and introduced. Life, primarily plant life, is the way the chaos of upheaval, volcanism and erosion is balanced. Order, stability and conservation are the characteristics of living systems; ie. ecosystems. Tremendous vigour in the plant systems is needed to colonise and conserve the wildly changing earth. The paradox that struck me is that the vitality of the life here comes directly from the chaotic forces of land movement which provide a diversity of microclimates, drainage and soils. The young soils in this country, in spite of their poorly developed ecology, have the capacity to support vigorous plant growth.

In parts of the Avon Valley I have seen the regeneration of native forests which is most encouraging. The pioneer “weed” Kanuka covering the shady slopes provides conditions for the Lancewood, Mahoe, Matipo, Olearia, Coprosmas, Wineberry, Fuschia, Broadleaf and Beech to grow and thrive. In places the process was more advanced with Kanuka, many 100 years old, remnant in vigorous beech forest. Totara and Matai specimens indicated the ancient podocarp forest which once grew there.

The streams in these forests are stable, with bogs and flushes marking where minor tributaries enter, acting like massive sponges, storing water to be released over dry periods. Large number of wasps and bees working the honeydew and other forages indicate a potential yield. Skins and hides from feral animals are another product. The yields should be considered as bonuses because the real value of the steep land forests is to provide stable aquifers and river systems which are necessary for intensive long term management of the flat lands where most of the people live. Japan learnt centuries ago that to maximise the stability and long term productivity of the flats, steep lands need to be in forest. New Zealand must learn the same lesson.



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INTRODUCED PLANTS:

Before coming here I was aware of how a huge range of introduced animals flourished but I had no idea of the vigour of introduced plants. In Tasmania, which has a similar climate to much of the South Island, many plants which are naturalised here have to be nurtured as garden plants. We do have some introduced “weed” shrubs and trees: Gorse, Sweet Briar, Tree Lucerne, Willow and most widespread of all, Blackberry. Here I have seen Pines, Spruce, Larch, Fir, Alder, Ash, Poplar, Oak, Hawthorn, Barberry, Rowan, Cherry, Plum, Gooseberry, and many others naturalised, and the landholders are struggling to exterminate them with the use of dangerous chemicals. The “weeds” will win.

For me it was interesting to see native Tasmanian Eucalypts and Wattles naturalising, but not the Blue Gum (E.globulus) which has been so widely planted in the Canterbury region. The Blue Gum is a coastal tree unaccustomed to hard frosts, a poor choice for large scale planting. The place where I saw Eucalypts and Wattles thriving was at Hawkeswood in North Canterbury. What appeared from Highway 1 to be a typical Tasmanian wet sclerophyll forest was in fact a whole new forest system in the making. It shows potential that no pine plantation could. I will go into some detail on its present state and possible evolution to show the Permaculture way of looking at the land.

THE HAWKESWOOD FOREST FROM A PERMACULTURE PERSPECTIVE:

The dominant trees are Eucalypts between 100 and 150 feet tall, the larger ones being E.delegatensis and E.regnans. Elm, Oak and Ash up to 100 feet look to be of a similar age. The tops of the tallest trees were windblown from the prevailing wind, suggesting they had been planted out on open ground. All the largest trees showed signs of fires and there were some burnt and dead trunks of deciduous trees. Two distinct generations of Eucalypt regrowth, obviously from the fires, had regenerated thickly but not under the large deciduous trees where light levels would have been too low. The older, fire-regenerated Eucalypts were up to 120 feet - very straight and only 2 feet diameter, indicating an age of less than 50 years. Silver Wattle (Acacia dealbata), a short-lived, fire regenerated nitrogen fixer, was abundant and formed a scrubby edge along the highway. Blackwood (Acacia melanoxylon) was regenerating in a gully from an old straggly 50 foot specimen. The younger ones look destined to be tall straight timber grade trees. Young seedlings of Oak, Elm and Ash were coming up through an understory of Sycamore, Blackberry, Plum, Hawthorn, Gorse, Mahoe, Coprosma, Black Matipo, and Cabbage Tree. Sycamore and most of the natives seemed to be taking over as the dominant understory from the thorny “weedy” shrubs.

As would be expected in a wet sclerophyll forest, the Wattles and Eucalypts, except Blackwood, were not regenerating and unless another fire comes through the eucalypts are destined to be succeeded by deciduous trees, and native trees and shrubs. Each plant paves the way for others which will succeed it leading to longer lived species and a more stable forest type.

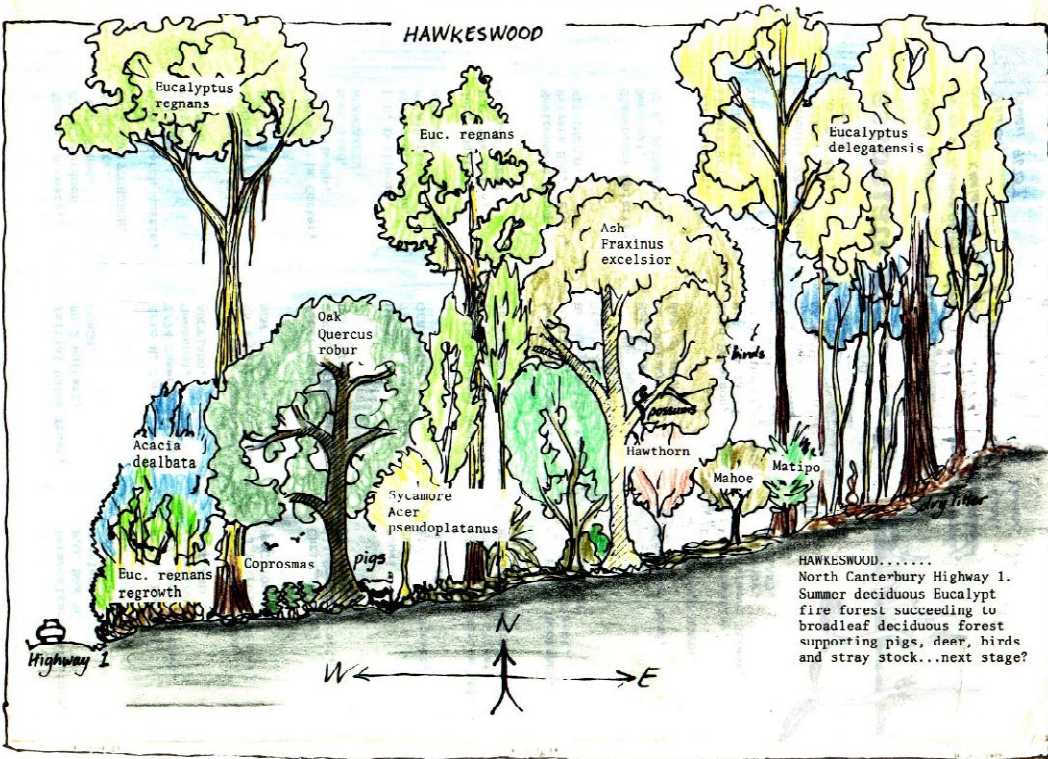
SUCCESSION:

This process of succession could be directed by suitable under planting, to provide increased yields and continue the soil and aquifer development already occurring. According to a NZ Forest Service hunter familiar with the area, enormous numbers of pigs have been culled from Hawkeswood, indicating the great forage potential. The potential value of selectively logged trees was obvious.

Tentatively, I would like to suggest under planting with Black Walnuts, European Beech, Horse Chestnut, Hickories, and some of the American Oaks. These are all long lived, relatively slow growing trees of special timber value which also provide useful forage (nuts and seeds) for pigs and deer. These animals could be farmed allowing for resting and rotations to enhance the natural regeneration.

Honey, particularly from the Eucalypts and Wattles, would be a continuing yield for some time, but special timbers and animal products would be the main yields in the long term.

I hope this small account of Hawkeswood gives one example of how permaculture principles might be applied in the NZ landscape. Permaculture is not just forest farming. It is the way of working with nature to provide livelihoods for ourselves and our descendants.





AN ECLECTIC APPROACH TO THE SKILLS OF READING LANDSCAPE AND THEIR APPLICATION TO PERMACULTURE CONSULTANCY

This paper was presented to the First International Permaculture Conference held at Wauchope NSW in October 1984 along with a slide show of personal landscape readings. These ideas emerged out of a productive engagement with Haikai Tané, a land use planner and resource ecologist who I worked with during two visits to New Zealand in 1979 and 1984. It also drew on my early years working as a permaculture consultant to address the skills needed to work successfully in this field. The paper was also an implied criticism of the hubris surrounding Permaculture Design Courses as adequate training for Permaculture consultants which prevailed within the movement at the time.



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INTRODUCTION

One of the fundamental issues of permaculture design consultancy is the need for a thorough understanding of the processes shaping the landscape and their interaction with land use, contemporary and historical. This need is critical because permaculture relies more on working with natural processes than in transforming the landscape through high energy inputs. As a corollary to this, permaculture must be site-specific if it is to be attuned to the particular combinations of energies and form.

The lack of skills in reading landscapes is a major impediment to permaculture development and consultancy. The use of these skills is implicit in permaculture but little attention has been given to their development. Guidelines for development of skills must be informed by the larger scale goals of sound land use systems and the land ethics needed to sustain them over generations.

A consultant designer must rely on a limited period of focus before giving advice to a client. If that advice is to be of great value the consultant designer must have some particular skill in quickly recognising the nature, limitations and prospects of the particular piece of land.

A sound understanding of landscape has conventionally arisen from two rather polarized approaches:

The first approach involves long experience working particular land, seeing it respond to various stresses and changes. Through a combination of trial and error, oral history, tuning of the senses to particular local forms and processes, and general absorption of knowledge by growing up in the natural environment, traditional farmers often develop a very thorough understanding of their land and the influences affecting it. However, this understanding is often so site-specific, and lacking in comprehension of underlying processes, that it is of little value in another landscape. This approach has never been as developed in Australia as in countries with a peasant culture, and, with rapidly changing rural ownership and far reaching changes in land use and farming methods due to the emerging post-industrial economy, this approach is even less relevant.

The second approach requires the survey of the characteristics of geology, soils, vegetation, water resources, wildlife, etc. in standard format which allows comparison with other sites.

This data is studied by specialists and then applied to land use planning and management issues by agricultural scientists, foresters, soil conservators and other applied science professionals. Land managers then use the results of this work in on-farm decision making. Geographers and landscape planners may contribute an integrative or synthesising approach but generally it is assumed that the land manager integrates the information to create coherent and balanced land use systems. Because of the costs

involved, the formal and professional approach provides only broad brush management techniques for application over diverse landscapes. Also, as could be expected, currently profitable farming enterprises are the focus of most research.

CONSULTANT DESIGNERS - LEARNING TO READ THE LANDSCAPE

The permaculture designer needs to be familiar with both approaches. Extensive personal experience in managing a range of land types is not possible but a consultant should have “hands on” experience of working land in some form. Practical experience is also necessary to understand the significance of anecdotal information. I’ve found that “old timers” can be very knowledgeable about land use issues and details, but that it’s necessary to ask the right questions. What they view as interesting may not be half as important as comments let slip, as an aside.

Familiarity with all the historical, conservation and development studies in a region, the sources of map information, and public services able to provide published or unpublished material can take some time to develop, a task more difficult for those operating away from capital cities.

However the information from personal and anecdotal experience and scientific sources is an inadequate data base on landscape for effective consulting in permaculture.

To summarize the inadequacies;

- permaculture is site specific, requiring a fine grained rather than broad brush approach;
- projects are rarely large enough to employ the services of specialists; and
- available information is geared to existing land use systems and may be of marginal value for alternative strategies.

The third option available is the ***conscious development of skills in reading landscape***. Reading landscape may be defined as the gleaning of information about the environment by direct observation. Visual phenomena are the primary source but extension to the other senses, and their associated phenomena is implicit in my definition of reading landscape. The organization of the information received is through the patterns as they present themselves in the landscape, cutting across the traditional divisions between natural sciences. Thus pattern recognition is the central activity in reading landscape.

We all have some skill in this area, but I believe the development of these skills to a high level is essential for effective permaculture consultancy. The ability to be able to quickly assess basic site characteristics such as soil drainage, moisture retention, erosion risk, nutrient status, pH, flooding, runoff, wind, frost, fire potential, rainfall and land use history with little or no collaborative information, is a basic tool of trade.

A broad understanding of the major processes of soil formation and degradation, ecological colonization, succession, competition and symbiosis at work on the site is necessary if a consultant is to give the landholder an overview of the biological potential of the land and the natural limiting factors affecting it, before considering planning and design options. Skills in reading landscape can help, in both strategy planning and detailed design and specification.

I have identified four aspects which contribute to building skills in reading landscape through my own experience.

1. Application of Science
2. Field Naturalism
3. Contemplative Awareness
4. Indicators / Rules of Thumb

1. Application of Science

Scientific disciplines, especially ecology and geography provide frameworks useful in reading landscape.

Three levels of scientific endeavour can be discerned:

- description
- classification
- explanation

In some ways the whole process of reading landscape can be seen as an aspect of the descriptive process. This is explained further in field naturalism (below).

Classification involves the grouping of elements with certain similar properties and is the way science organizes the diverse phenomena of nature into manageable subjects.

Classification: Questions such as “what eucalypt species is that?”, constantly arise in studying landscape. By noting recognized diagnostic features used in the relevant taxonomic system, identification is possible using references and keys. Once identified, a range of published and other authoritative information about the type or species can be referred to. Given that it may be time-consuming to refer to specialists for identification of “species” of rocks, soils, plants, and animals, a consultant should, ideally be capable of this for the region covered. Although not reading landscape, this is a companion skill expanding the usefulness of pattern recognition. More general classification systems help us to recognize processes and phenomena in the field, eg. eutrophication in a lake or river, or sheet erosion in a paddock. In soil science, quite an elaborate system of taxonomy has developed, similar to the taxonomy of plants and animals, but validity and usefulness of the system is uncertain. The assumption that existing soil “types” have a direct relationship to soil origin and development appears to be very questionable.

In fields where taxonomy is more soundly based, such as botany, scientists are inclined to believe the classification system is reality itself rather than a construct of our minds. In making use of scientific classification we should never fall into this trap.

Explanation, the third and most advanced level in the application of science is the theoretical-predictive form. Theoretical science recognizes the underlying relationships between structure and movement in spatial processes, and through abstraction, seeks to explain these.

Many areas of landscape interpretation are still without well formalised theories useful in explanation and prediction. Most theories which are of direct interest come from the two integrative disciplines of ecology and geography (eg. ecological succession, watershed evolution and location theory). Ideally, consultants should have a working knowledge of the theoretical aspects of these two disciplines. That means understanding just what phenomena theory does, and does not explain, and being able to make practical use of it to explain and predict, rather than the “garbage in garbage out” process common at institutions of learning. This working knowledge is best achieved by constantly testing theory against observations in the field. All too often land managers and their advisors have a poor understanding of fundamental landscape processes and academics have little direct experience of the phenomena in context. As with the use of taxonomic classification, the application and testing of theory is hardly reading landscape, but it helps make sense from the chaos of undisciplined observation. When practised as a matter of course it can lead to the formulation of hypotheses which are useful within the range of the consultant’s work, even if they do not represent an advance in general theory. This can be achieved, not because the consultant has become an expert in the particular field, but because of the cross-fertilization of ideas from fields academically unrelated from one another.

2. Field Naturalism

This involves the skills of careful observation and recording of the landscape. The intention is to experience the diversity of nature first hand, learning to move carefully, patiently watch (and listen, feel, taste and smell) and objectively record. There need be no other particular purpose. This activity may reinforce the theoretical understanding of landscape or it may simply remind us of the metaphysical mystery of nature. I record wild and cultivated landscapes with a camera and notebook, occasionally sketching or taking samples. Sometimes I simply photograph the beautiful, other times I take shots for historical record to see the changes with the passing of seasons or years. On other occasions I attempt to capture a subject which clearly illustrates process through form, something most people find hard to see (maybe you have noticed that permaculture¹ is difficult to portray on film because the forms are not distinct and the most interesting aspects involving process may not be visible in a static image).

¹ The word permaculture here is used in a plural sense. It can be a verb or a noun, too!

Bushwalking without particular goals or targets, especially away from tracks is useful in developing a familiarity with landscape. So many people who bushwalk, isolate themselves from the environment by strenuous exertion which literally shut down the senses, and rigid targets and timetables which reinforce everyday patterns of work from familiar man-made environments. Although wild landscapes can provide great stimulation, we should keep our field naturalist’s eye fully focused even in built-up city spaces. It is the ways in which nature adapts to mankind’s activities and structures that are often most instructive in the design of cultivated ecosystems which can reflect a working with nature rather than against it. Thus, I often find delight in urban wasteland, the marginal spaces on otherwise carefully managed farms and old abandoned gardens. Weeds (from herbs to trees) are remarkably instructive on history of land use and abuse and Nature’s responses to repair and heal. Militaristic thinking about weeds, whether motivated by “ecological morals” or exploitative greed is counterproductive in understanding landscape. The real challenge of weeds is firstly to understand the processes of disturbance and degradation they are responding to and then how to harness their healing work for a rapid succession to a more advanced and productive state. These insights are much assisted by “seeing it from the weeds’ point of view”. Thus the field naturalist approach allows us to identify with any and all lifeforms independent of whether they are beautiful or ugly, rare or ubiquitous, useful or noxious, to help broaden our perspective and in the long term act more effectively in creating and managing cultivated ecosystems.

3. Contemplative Awareness

This is where the mind is “out of gear”, but the senses are fully attuned. No purpose or objective directs the thoughts which come and go. Mountain tops seem particularly favourable places for this state of mind. The distance allows us to see the woods instead of the trees, and the view from above gives a new insight into the broad patterns of landscape and our place in them. Looking down, we can recognize from new perspectives places we think we know, see the connectedness of the landscape in other ways than the linear imagery of foottracks and highways. As terrestrial creatures we live on a two dimensional curved surface where everything is in front of everything else. What is most noticeable is the interface between terrestrial features and the atmosphere - the skyline. Although very revealing, this view shows little of the complexity of the spatial connection between elements on the surface.

As George Gester shows in his incredible book of aerial photographs *‘Grand Design: The Earth From Above’* the aerial view seems to X-ray the landscape revealing previously hidden forces, structures and processes. Is it any wonder that people have traditionally regarded mountain tops closer to God?

Viewing landscape at night also tends to encourage this state of mind. The loss of colour and depth seems to help break down our pre-conceptions of what a tree, building, river or other familiar form looks like, as textures, outlines, and edges invisible in daylight reveal hidden aspects. Haikai Tané, describing experience in field survey work in the high country of NZ for the Lands & Survey Dept., said his greatest insights into the nature of the landscape were at dawn, before that first cup of tea, or after dinner, around the campfire relaxing. I might add that Haikai tends to choose rather special spots to camp when out in the field. The insights resulting from contemplative awareness may appear as direct and isolated perceptions of the “truth” but generally are the surfacing of mental distillation resulting from observation, both conscious and unconscious. It seems that many of these observations may originate from the inputs of peripheral vision rather than direct focused sight. Contemplative awareness can be fostered by the way we work and live but it certainly cannot be forced.

4. Indicators / Rules of Thumb

The three approaches described so far represent fairly long term investment if we are talking about becoming effective designers. I’ve been improving my skills through these sorts of activities for over ten years and in the last five years I’ve become conscious of their importance in consultancy work, but it is only in the last twelve months that I’ve started to experience the practical benefits in paid work. Much of those benefits come through recognition of “indicators” or “signposts” in landscape and formulation of rules of thumb appropriate to particular land systems or situations.

From experience in scientific identification using taxonomic classification combined with pattern recognition skills developed through field naturalism, and contemplative awareness, it becomes possible to “recognize” rather than formally identify species. Eucalypts within limited land systems recognized at a distance by foliage texture, tone and density, tree form, associated species etc. This sort of short cut is essential if consultants are to usefully use limited time, but it also assists in the casual assimilation of information which fosters the synthesising insight of contemplative awareness.

Indicator plants are basic tools of trade, and can show hidden properties of the site and soil such as structure, drainage, moisture retention, pH, general fertility, specific mineral deficiencies or toxicities including salt. The use of indicator plants is very context dependent especially with regard to land use and management activities such as burning, plowing, fertilising, grazing etc. A good example is the interpretation of acidity using Sorrel (*Rumex acetos*), Fog grass (*Hofcus lanatus*), and Cats Ear (*Hypochaeris radicata*). In high rainfall pastoral country of southern Australia these plants are common in waste spaces and unmanaged pastures. They are generally regarded as indicators of acidity but their complete absence from a super-phosphate treated and grazed clover pasture does not necessarily indicate a moderate pH. Conventional management of clover and grass pastures has led, over thirty years or more to very acid conditions which eventually

show up as failure of the clover to nodulate even though increasing stock health problems do provide a warning in many cases. Right up to the failure, the pasture may contain no acid soil indicator plants though if the pastures are left ungrazed and unfertilised even for short periods, these species soon invade. Thus the pasture management completely masks the acidic conditions.

Animals can also be used as indicators of conditions but are generally less specific than plants because animals are mobile and adapt to varying conditions through behaviour patterns. In southern NSW I found Lyre bird activity related with forest litter and humus levels. Generally Lyre birds are considered wet sclerophyll forest birds where litter and humus levels are high and thus invertebrate soil and litter fauna which form the bulk the birds’ food are more abundant. Dry ridge forests, free of regular burning, are quite attractive to Lyre birds if the soil is moist. Interestingly enough scratching and mound building by the birds appears to have a significant effect on fuel accumulation and thus fire risk. This simple example illustrates the ever present traps with correlation leading to a misleading picture of the causal agent. A common misinterpretation is for people to believe plant species growing in, say very poorly drained or salt wind exposed environments, actually prefer those conditions because that is where they are found. Generally these species grow much better in more moderate conditions but they are less competitive than species specifically evolved to make use of the favourable environment.

Other examples of the use of indicators are; parallel soil ridges and stone piles as signs of previous cultivation; checking tree butts for fire or ringbarking scars to identify events in the history of the land; checking tree crown growth form for winds which inhibit growth; and checking rocks in a stream bed to identify the upstream geology and likely mineralogy of soils on adjacent alluvial flats.

Rules of Thumb represent a further distillation of general skills in reading landscape and a more accurate assessment of landscape characteristics. For example being able to recognize the difference between a chainsaw felled tree and one felled with an axe and crosscut from weathered stumps can allow the dating of a logging operation as prior or after the introduction of chainsaws in the 1950’s. Similarly, familiarity with rates of weathering and decay of particular species in a given environment can allow the rough dating of much earlier logging or ringbarking. Another example involves the salt pruning effect along the coast. Understanding how resistant a particular plant species is to salt winds, from frequent observations of its growth habits and degree of salt pruning, allows an assessment of the relative severity of salt winds at a particular site where the plant is found growing.

Hopefully this discussion will provide some ideas and examples of how skills in reading landscape can be developed and applied in permaculture consultancy and emphasise the need for much more work in this field by everyone concerned with land development and management, if we are to achieve the goal of sustainable land use.



RESPONSE TO DRAFT PRELIMINARY DISCUSSION PAPER ON THE BIOMASS POTENTIAL STUDY OF VICTORIA 1985

*The discussion paper by the Victorian Solar Energy Council (now Sustainability Victoria) was an example of an earlier generation of biofuel proposals which responded to high fuel prices of the 1970's and early 1980's. The main proposal in the report was an ethanol industry in northern Victoria (to supply of 20% of Victoria's liquid fuel, by 2000, from Jerusalem artichokes). Low world oil prices through the 1980's and 1990's prevented this and other agricultural biofuels become reality in Australia. My critique and questioning of the original proposal's bias towards agriculture rather than forestry as a source of sustainable biofuels is very relevant to the renewed debate over net energy yields (or losses) of these alternatives to oil. See Article 35 - **Biomass Fuels from Sustainable Land Use: A Permaculture Perspective**, for a more recent overview of the sustainability and net energy of biofuel alternatives. The recent rises in fuel prices marking the peak of global conventional oil production, has spawned a huge number of new biofuel projects and proposals with the debate now reaching the mainstream media. This like many other issues around global oil peak are tending to fracture both mainstream economic and ecological thinking along surprising lines creating new divisions and alliances.*



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27th June 1985

Mr Ron Mendelsohn
Victorian Solar Energy Council
10th Floor, 270 Flinders St.
Melbourne, 3000

Dear Mr Mendelsohn,

Following our conversation yesterday I am writing to comment on the *Draft Preliminary Discussion Paper* on the *Biomass Potential Study of Victoria* carried out by the V.S.E.C. As requested, I am including information about myself and the type of work I do. Enclosed is a general C.V. and a business brochure.

I would like to comment on a number of issues raised by the study not as an 'expert' with specialized knowledge but as someone concerned with the development of sustainable land use systems.

SOLID FUEL

The almost complete lack of information on the use of wood fuel is recognised in the study. The wood industry is growing rapidly but has been largely ignored in energy planning. I believe this is partly because its grass roots growth independent of government and large corporate investment has been contrary to the expectations of economists and planners. The harvesting of firewood as an enterprise is almost completely ad-hoc gathering of dead wood from forests and farmlands with little control over the resource or management of it. A large but unknown proportion of firewood utilization is completely outside the monetary economy through people gathering their own. This aspect must be considered in any planning for more systematic utilization of firewood resources. Wood fuel is a natural by-product of any silvicultural land use. Although specific firewood plantations may be justified in some cases, in general the net energy balance of such schemes is likely to be less favourable than integrated silviculture of mixed forests (both existing and those established by low input techniques such as direct seeding) for multiple products and functions. In this context urban forestry should not be ignored in either its present ad-hoc contribution to firewood resources through pruning and removal of urban trees or the great potential to use waste land in and near urban areas for multi-purpose forests managed on a coppice with standards system. In considering the pollution from wood burning technology, the species of wood and the degree of cure should not be ignored in any assessment. Some combinations of equipment and fuel could be most suited to urban areas.

AGROFORESTRY

Agroforestry is a simple example of integrated land use which attempts to balance pastoral and forestry values. Large scale development of systems such as wide spaced Radiata pine could significantly reduce available animal fodder over whole regions. To maintain pastoral productivity, fodder trees such as tree lucerne, willow and poplar should be considered. Agroforestry of sugar pod trees such as carob or honey locust should be investigated but will require more research and longer lead times than the use of fast, easy to grow species mentioned above.

SUGAR TUBERS

The study's findings that Jerusalem Artichokes have more potential than sugar beet agrees with my own impressions. However, I am sceptical that large scale cropping of any root crop could be carried out on land at present under pasture in the northern irrigation areas without acceleration of soil degradation processes including erosion, compaction and structure loss. New methods of cropping and return of some organic matter may help but in my opinion any change of use must not only maintain the present status of our soils but reverse present decline if such systems are to be sustainable. As with agroforestry for fuel crops, sugar tuber cropping will reduce available pasture for animals. The study does not consider how mash from alcohol fermentation could be used as animal feed. Could it offset the loss of pasture in terms of total feed value? Would it require animals concentrated in feed lots around ethanol plants? If so what are the implications in terms of nutrient recycling/effluent disposal? How would the energy budgets of such systems affect the overall calculations of energy efficiency?

NET ENERGY YIELDS

The last question above raises a fundamental doubt I have about projections of net energy yield in the study. Howard Odum, ecologist and foremost authority on energy analysis had this to say about biomass conversion in *Energy Basis For Man And Nature* Odum and Odum, McGraw-Hill '81.

'Whereas solar production of biomass can yield a small net energy, it is negative if too much high quality energy is fed back in the process. For example food and wood to heat homes can be supplied in small amounts as a continuing renewable product from solar energy. But concentrated conversion to higher quality energy such as fuels or electricity becomes a negative net energy. In the future when fossil fuels are gone we probably will make our liquid fuels from biomass. But this will be a form of energy consumption not a rich source to stimulate the economy the way fuels have been up to now. We need small pilot plants for research now so the process will be ready when needed. As long as only wastes

are used the conversion may save energy provided that taking biomass away from the soil does not reduce agricultural fertility.'

Calculations by Odum (in fossil fuel equivalent units) for a conversion project in NZ using sugar beet show a yield ratio of 1.6 but when lost farm production is considered the yield becomes negative at 0.9. Even assuming Jerusalem Artichoke is considerably more efficient, the net yield of 5.6 quoted in the report (table 6) is vastly different to Odum's. Without knowing the details of the methods and assumptions used, I suspect that not all the indirect inputs have been considered and that conversion ratios to equate energy inputs of differing 'qualities' have not been used. Although the figures in Table 6 may be useful for some comparisons of different biomass options the issue of net energy yield is simply not academic.

Despite reservations about the energy efficiency of liquid fuel production from biomass and the environmental impact of large scale fuel crop production, I am very interested in the potential for integrated systems providing solid and liquid fuels among other products. I commend the V.S.E.C. for its contribution in this important field and look forwards to further contact.

Yours faithfully,

David Holmgren.



ABORIGINAL LAND USE

*This edited article is based on lecture notes from a presentation to Landscape Architecture, Planning and Design students at RMIT (University of Technology) Melbourne in March 1990, 91 and 92 as part of a course unit called Environmental Context. In presenting my version of the new conception of the aborigines as interventionist land managers, I used Odum's systems ecology framework to draw out some of the lessons for modern society. As with many other subjects on which I write, the ideas were developed in relative isolation from the new academic and scientific work which was being done in the field, so much so, that the notes for the first lecture had virtually no relevant references and it was only by referral from others that I discovered references which might give credibility to the ideas. Publication of Tim Flannery's **Future Eaters** has since raised these issues to public prominence.*

INTRODUCTION

As we enter the final phase of industrial culture it is essential that we have the intellectual framework to comprehend the changes all around us and move towards appropriate new forms of society, technology and economy. Design will play a central role in this transformation. The permaculture concept of land use, developed by myself and Bill Mollison in the early 1970's uses design and ecology as its foundations.

The changes underway involve coming to terms with the limits to industrial culture. Some understanding of the means of existence of the 95% of humans who have existed on the planet over the million-odd years of human culture before industrial urban society, should prove useful in this task. The particular pattern of Australian hunter-gatherer society prior to the arrival of Europeans was the most durable example of human culture having spanned at least 40,000 years (through at least one ice age) on the driest and most infertile continent on earth.

In comparing and understanding the way of life before and after European settlement, land (or natural resource) use can be a good starting point. Ecology provides a framework and criteria for understanding hunter-gatherer and modern industrial societies and economies. Within this framework a deeper understanding of land use in the two cultures is then possible.

Ecological Comparison of Hunter Gatherer and Industrial Society

Factor	Hunter Gatherer	Industrial
Energy source	Solar (biological) resources	Biological and fossil fuels resources
Energy flow	Small proportion of energy flows (annual surplus) harvested for human needs	High proportion of annual flows plus capital stock harvested for human needs
Technology	Simplicity in technology and infrastructure	Complexity in technology and infrastructure
Economy	Steady state, domestic centred and small part of total culture	Global monetary economy based on continuous growth dominating other aspects of culture
Adaptability	Strong persistence of culture but great flexibility in face of external environmental change	Constant change in culture but critical dependence on continuity in external environmental conditions



GLOBAL INDUSTRIAL EXPANSION

From an ecological perspective, the major elements of global industrial urban culture were already established in western Europe at the time of Australia’s colonisation. Colonisation was in fact one of the major elements of this new global culture. It is the pioneering edge or wave front of industrial society which moves across the globe, extracting resources and overwhelming indigenous peoples.

The decimation of the Celtic clan culture in the Scottish highlands¹ and takeover by sheep grazing enterprises to supply the English textile industry last century graphically illustrates that this wave was advancing on many fronts.

Today, the displacement and dispossession of the Amazonian and Indonesian indigenous rainforest peoples, is the last advance of this pioneering edge of global industrial culture: In these cases as their forests are converted into wood products for consumption in Japan, Europe, N. America and Australia.

ABORIGINAL LAND USE

Within this conceptual framework it is possible to make sense of Aboriginal land use patterns prior to white colonisation.

Aboriginal society made use of the whole landscape, though to varying degrees, with some areas heavily populated and managed while some areas (extensive rainforests) were virtual wildernesses. In Victoria the most extensive areas of rainforest occur on the Errinundra plateau in East Gippsland. This area was only populated by small groups of banished individuals from both the Gippsland and Monaro tribes. In Western Australia the tribes of the S.W. regarded the dense Jarrah and Karri forests as evil places to be avoided with only rarely used paths traversing them.

The most densely populated and used areas tended to have one or more of the following characteristics:

- High mineral fertility
- Moderate rainfall
- Edges along permanent streams, lakes, wetlands and coastlines as well as between major land systems supporting different food and other resources.
- Vegetation structure tending to open forest or woodland but with sharply defined edges of denser vegetation along gullies and other sheltered sites
- Pockets of elevated mineral fertility and organic matter.

1 MacKenzie, A. *A History of the Highland Clearances* 1883

While the first three characteristics may be seen as fixed aspects of the landscape even these changed quite dramatically over the long cultural memory which directed aboriginal land management. Ability to adjust to these changes with no substantial cultural changes evident in the archeological record is indicative of the great adaptability of the culture.

The last two characteristics were to a large extent a creation of land management practices over centuries. In fact it is appropriate to regard the landscape at the time of white colonisation as a cultural landscape well suited to human habitation rather than a wilderness. This is well support by historical and ecological evidence.

Some examples:

- The demise of some animal and plant species (eg. Hare-footed rock wallaby in N.T.) can be traced to the cessation of aboriginal management indicating long co-evolved dependence. The Hare-footed rock wallaby is now increasing in numbers with the revival of aboriginal style mosaic burning.
- Open woodlands where forest now exist (eg Piliga Forest in northern NSW)
- Very old large trees in areas where today periodic bush fires make the survival of trees beyond 200 years highly unlikely.
- Pockets of mature fire sensitive rainforests with fully developed soil profiles within fire prone landscapes (eg. Arnhem land, Wilson’s Prom.)

EUROPEAN ATTITUDES TO ABORIGINAL LAND USE

A superficial assessment of the historical record suggests that early observers regarded the natives as disorganised foragers of the meagre sustenance available from a depauperate and hostile environment.

There is some truth that this was their understanding. Myopia on the part of the Europeans was natural enough for an invading dominant materialist culture trying to comprehend a subjugated and essentially non-material culture. In addition the early soldiers, convicts and bureaucrats were products of the newly emerging urban industrial chaos of late 18th century England. They were the first truly decultured people on earth, disconnected from nature. The foods they brought with them were products of industrial/ colonial culture (white flour, tea and white sugar), and their comprehension of land and nature was minimal. Is it any wonder they failed to understand the people or the cultivated landscapes they found in Australia?

However there are two other factors which complicate the picture.

Firstly, by the time any literate person recorded observations of the natives in particular parts of the country, the people were already suffering from the onslaught of infectious

diseases introduced by the Europeans. In many areas the diseases preceded the whites via infected aborigines.

Secondly, it was policy of the colonial authorities not to acknowledge that the natives “worked” the land because under English common law “working” the land by indigenous people was evidence of ownership in lieu of title documents. Many early settlers and other observers noted in quite matter of fact terms that the aborigines managed the land through deliberate use of fire and other means.

All this is rather ironic when one considers where and how exploration and settlement of the country by whites actually occurred. It was the amenable and accessible nature of the indigenous cultural landscapes and the often helpful local people which were critical to early success of the whites. Attempts at exploration and settlement of wild areas little frequented by aborigines generally ended in failure.

Pastoral grazing, particularly of sheep is well known as our greatest industry and that until recently Australia was said to ride on the sheep’s back. The pastoral wealth which was the economic base of the colonies before the gold rush represented a direct harvesting of the accumulated biological capital of the most productive of the terrestrial systems managed by aborigines, the fertile grasslands and open woodlands. In most grazing regions the final replacement of native pastures by sown and fertilised pastures has only been completed in recent decades. Aboriginal wealth has been, in a very real sense the source of our wealth. Widespread recognition that the balance of native pastures and the sheltering and soil maintaining native trees and shrubs which was found by the early graziers was in fact the optimal balance, has come very recently (through Landcare). More slowly dawning is the realisation that this balance was a culturally maintained one.

LAND MANAGEMENT PRACTICES

The seasonal movements of aboriginal groups followed specific and culturally-embedded patterns which allowed for the harvesting of food and application of management practices to the particular land system. Harvesting and management were often effected by the same activity done in (apparently) the most casual manner. Timing of these activities was determined by precise synchronous cues in the natural environment.

The major management tool used by aborigines to shape whole landscapes, make them habitable and comfortable places to live and most importantly, productive of traditional foods, was fire. Pre historian Rhys Jones coined the term “fire stick farming” to describe this land management process. There is considerable debate about the frequency and intensity of aboriginal burning, but there is substantial evidence that the net effect was far from random or chaotic. In fact I would say the landscapes Europeans found could not have evolved without great regularity and precision in the use of fire over thousands of years.

USE OF FIRE

It is my view that over much of Australia fire prone land systems such as heaths and grasslands were burnt as often (annual dry season) and as soon as they would burn. By this process only the driest sites would burn (generally northwest aspects and ridges with shallowest and lowest fertility soils). Gullies, southerly slopes and more fertile sites would act as fire breaks.

The effects of the fire regime were manifold:

- it created open accessible ground along all routes used to traverse the particular land system.
- it shaped mature trees creating nest hollows where burnt branches died back and base hollows which were used for shelter including ancient revered birthing trees.
- it stimulated the growth of lush green grass high in protein which attracted kangaroos and other herbivores, stimulated flowering in heath land plants (rich sources of nectar) and was frequently critical in stimulating germination, fruiting or tuber formation of a diverse range of food plants (orchids, yams and beans).
- it created, over time, an incremental decline in the mineral fertility and organic matter content of the soil with an associated ecological drift to more fire prone vegetation. Although this may appear to be a form of land degradation the nutrients lost from the burnt areas in smoke and water are mostly absorbed by unburnt areas adjacent and often down slope. Over time, these areas become more fertile with ecological succession to less fire prone rainforest type vegetation. Consequently these “islands” provided different food sources and habitat for food animals which utilised the seasonal productivity of the burnt areas.

CAMPSITE ENRICHMENT

A second land management practice which reinforced the patterns created by fire was camping at the same traditional sites. These sites were always subject to the most gentle fires which protected them from hotter fires and allowed the nutrient accumulation mentioned. By eating along the way but defecating around camps, hard seeded berries and fruits such as native cherry and kangaroo apple were casually planted. Over time selection on the basis of sweetness and size as well as ability to use the elevated fertility of the midden site produced improved strains similar to cultivated varieties of fruit developed by agricultural people.

Collected and hunted food brought to camp for preparation and consumption obviously contributed to nutrient accumulation at middens. Black soil profiles up to 3m deep under

middens on otherwise low fertility sand 150 years since these were last used, testifies to the substantial and permanent changes created by these habits. Historical and ecological evidence suggest these sites were gardens of selected food plants growing in ancient fire-free, closed canopy groves within otherwise open country.

CULTIVATION

A third management technique was the disturbance created during digging to harvest important tuberous rooted staples such as Myrnjong or Yam Daisy. By digging to harvest yams, crowding which would otherwise limit growth was avoided. Introduction of food species to other suitable sites has also been recorded.

AQUACULTURE

Aboriginal use of aquatic food resources is well known and the most extensive midden sites are often located adjacent swamps, estuaries and rivers. Substantial structures described as fish traps were common up the Murray river before they were blasted to allow passage of boats. What is less well known is that these structures were also used to culture fish by separation of young from adults and predators from prey. While the european invaders had a natural understanding of the use of the grassland ecosystem by grazing stock, they had no cultural experience of the use of wetlands to culture food resources [aquaculture].

LESSONS FOR US FROM ABORIGINAL LAND USE

This new view of aboriginal land use has substantial implications for Australian society in the post-industrial era.

Firstly, coming to terms with the past is an important aspect of forging a new future. Recognition that our wealth is largely a heritage of unsustainable exploitation of natural resources which were husbanded for millennia by the aboriginal stewards is important in that it may reduce our arrogance at being creators of our own affluence and puts into perspective land and other claims by the descendants of these stewards. Learning to own the barbaric genocide which is part of our heritage without counter productive personal guilt is important. At the same time it is essential that we recognise that the process is continuing on the last frontiers in the tropical rainforests of the underdeveloped world on behalf of the affluent [us] in the overdeveloped world.

Secondly, the view that arises from a reaction against industrial culture sees nature as pristine and pure while humanity is a destroyer of nature. Implicit in this view is the assumption that we are separate from nature, the same assumption which sustains its ruthless exploitation. The heritage of aboriginal society and landscape shows us that being a part of nature does not mean passive acceptance of all elements of nature without intervention to direct and channel its forces for our long term benefit.

Thirdly, the changes which have been wrought on Australian ecosystems since white settlement have been so deep and fundamental that we should regard reconstruction of indigenous ecosystems to be, at best a form of gardening, rather than establishing self-sustaining nature. Without the original land managers and their “songs”, restoration of these ecosystems is futile dream. Remaining wilderness areas should be valued as exactly that, rather than representative of the environment in which aboriginal people lived.

Fourthly, forging sustainable patterns of land use in the post-industrial era will demand that we fully accept and make use of the foreign species we have introduced while learning to value and use the species and ecosystem fragments of the indigenous environment. This is beginning to be expressed by the current wave of interest in cultivation and selection of native food and fodder species as well as a review of the value of our native timber species. The emergence of a truly indigenous agriculture will take generations and will involve a fusion of our foreign and indigenous heritage.

Finally, the ‘greenhouse effect’ (climatic change) and other global environmental changes may force us to rapidly redevelop a flexible generalist culture and land use pattern, where aboriginal modes of behaviour, if not specific practices, will be the only survival option after the rapid collapse of our specialised industrial culture.

What is certain is that there are no more frontiers to exploit and that a sustainable economy on this driest and most infertile continent will demand that we invest the substantial wealth we have in repairing the productive capacity of the land. Without that urban culture will rapidly decay.

In the design professions, most of the present areas of work are at best irrelevant, at worst destructive. If we are to see an adaptive response to real issues then the focus for design will shift from the urban to the rural environment, from the built to the cultivated landscape, from creating new infrastructure and buildings to learning how to adapt and refurbish existing ones. Perhaps most important of all we will see a devolution of design skill from elitist professional practice for government and corporations to practical integration of design into all aspects of ordinary domestic, commercial and community life.

RECOMMENDED READING

Odum, H.T & Odum, E. **Energy Basis For Man and Nature** McGraw Hill 1981
Use of ecological and thermodynamic principles to provide an integrated understanding the physical foundations of the natural and human world. Puts environmental, economic, political and technological issues in a comprehensible context. This book is possibly the single most useful text I could recommend for understanding the world around us.

Mollison, B. & Holmgren, D. **Permaculture One** Tagari 1978
Along with the other permaculture books by Mollison and/or Holmgren, this first one explores the principles and some of the practices of sustainable land use for the post-industrial era.

Crosby, A.W. **Ecological Imperialism: The Biological Expansion of Europe 900-1900** Cambridge Uni Press 1986.
Excellent ecological history of the biological sources of european success in N.America, S.America, Australia and N.Z. showing the importance of disease, weeds and pests along with domestic plants and animals.

Rolls, E. **A Million Wild Acres: Two Hundred Years of Man and an Australian Forest** Nelson 1981.
Documents the changes in the natural environment and land use history of the Piliga Scrub since settlement. Includes excellent documentation of the emergence of massive forest regeneration on open pastoral woodlands last century to create the Piliga forest.

OTHER REFERENCES

Hallem, S. **Fire and Hearth** Aboriginal Studies Institute Canberra.
An excellent review of the historical evidence on the use of fire by aboriginals in the S.W. of Western Australia.

Jackson, W.D. **Ecological Drift: An argument against the continued practice of Hazard Reduction Burning in The South West Book: A Tasmanian Wilderness** A.C.F. 1978.
A description of the concept of ecological drift in the context of S.W. Tasmania and the effects of burning, aboriginal and european.

Gee, H.M. **Aboriginal Man in The South West** Book
Refers to the journals of G.A. Robinson 1829-1834, a major source of original observation of the Tasmanian aborigines and the work of pre historian Rhys Jones who coined the term “fire stick farming”

Hynes, R.A. & Chase, A.K. **Plants Sites and Domiculture: Aboriginal Influence Upon Plant Communities in Cape York Peninsula in Archeology in Oceania** 17(1), 1982.
Gives ecological evidence for the creation of plant communities [gardens] at campsites by aboriginal people.

Rose, D.B. **Exploring An Aboriginal Land Ethic in Meanjin** vol.47 no.3 Spring 1988.
Excellent description of the use of the land by Yarralin people in N.T. and the contradiction between modern and aboriginal views of wilderness.



SUBMISSION IN RESPONSE TO A REVIEW OF RURAL LAND USE IN VICTORIA

This submission written in May 1991 was a response to the Victorian government's Review of Rural Land Use (draft 1991) which was commissioned to primarily address long standing concerns in Victoria about the loss of prime agricultural land to urban and rural residential development.

*This submission and the included substantial extract from a previous submission to the local planning scheme written in October 1989, reflected my involvement in rural land use planning issues at that time. My partner, Su Dennett and I, were active in the local Residents and Ratepayers Ass and the new local planning scheme (the first in our area) was a controversial subject. I recall thinking at the time, that Meldrum Burrows, the Melbourne planning consultants, were having trouble dragging the reluctant and conservative local shire council into the 20th century of segregated land use planning (zoning). My submission was an attempt to lure the consultants into what I believed was the 21st century of integrated land use planning (permaculture). It was doomed to being ignored but in the process I further developed ideas of rural resettlement and cluster (body corporate) development which I had first expressed in print in Prospects for Rural Development published in **The Permaculture Journal** (Issue 18, 1984).*



The Rural Land Use Review submission was also influenced by my experience as an expert witness in a Planning Appeals Tribunal hearing into a large and inappropriate rural residential subdivision being opposed by a local community group.

*The sections on the planning impediments to revegetation and forestry in rural areas reflects my 1987 research work on revegetation and farm forestry later published in 1994 as **Trees On The Treeless Plains: A Revegetation Manual for the Volcanic Landscapes of Central Victoria***

*The ideas expressed here came to fruition nearly ten years later in the **Fryers Forest Eco-village** development [see Article 24 - **Starting Community: Some Early Lessons from Fryers Forest**]. The environmental development code in the Daylesford Submission outlines the principles we applied to the planning of Fryers Forest Community.*



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This submission addresses the following issues raised in the Victorian government's draft review:

- Data base on rural land use
- Rural residential development
- Hobby farming
- Tree based rural land uses

The government and those who worked on the Review are commended for providing some sorely needed information on rural land use and raising some of the issues which need to be addressed.

Some of the assumptions behind the following submission challenge those which appear to underlie the Review. Within a limited submission it is not possible to fully justify assumptions, assertions and explain recommendations. Background documents have been provided which go some way to achieving this.

DATA BASE ON RURAL LAND USE

The Review makes clear that it is impossible to answer basic questions about critical planning issues such as the loss of prime agricultural land because the base data is lacking. In particular the decision of the Australian Bureau of Statistics to exclude small producers from their statistics is revealed to be a major failure to collect relevant data for planners and decision makers. It would appear from the Review that diversification of agriculture into non-traditional enterprises also goes unrecorded.

The effects of these failures are insidious in that they allow decisions to be made on the basis that fewer larger enterprises represent trends in agriculture industry and rural land use. Larger "more efficient" economic units becomes a self fulfilling reality.

Concurrent processes of experimentation, diversification, niche and local marketing, household (non-monetary) revitalisation and economic efficiency through cost reduction rather than output maximisation all become invisible by this ignoring of the small and the "marginal".

It has been argued by some planners and economists that economic revitalisation, especially at times of contraction, arise out of the margins rather the dominant structures and processes of the old economy. I believe agriculture and the rural economy is in the early stages of such a revitalisation as part of the transformation following the end of real economic growth in the early 1970's.

The failure of planners and decision makers to ask the right questions of their statisticians is not confined to agriculture.

Despite the mounting indirect evidence of long term economic contraction, economists continue to rely on indicators which show growth, albeit problematic. This so-called growth

is based largely on economic activity to forestall environmental, social and fiscal debt, paper shuffling and addictive consumerism rather than any sustainable development.

Thus the failure of information systems to answer the issues raised by this Review are part of a much wider and deeper failure by decision makers to grasp the fundamental and unpredictable transformation of the rural economy.

I would now like to address two closely related and powerful processes which are transforming the rural economy and landscape and yet are still not well understood by planners and policy makers, in part due to failure of information systems;

RURAL RESETTLEMENT

We are seeing the third wave of rural resettlement in Australia's history; a process which has been building gradually over 20 years and now affects most rural areas, but especially those within commuting range of urban centres. The resettlement process has predominantly involved urbanites of Australian birth but has been right across the socioeconomic spectrum. It has been unplanned and unpredicted by government. It has been driven primarily by lifestyle considerations and has often been at apparent economic cost to the participants. The economic, social and information impediments to rural resettlement have been substantial. The fact that it has persisted under these conditions indicates we are dealing with a fundamental and powerful process.

Because of the poor information base, inappropriate land tenure patterns and options and contradictory values and desires on the part of the migrants, many negative effects have been noticed.

The Review discusses the effects of rural resettlement as two issues; rural residential development and hobby farming. The division between these is arbitrary because there are many (in fact most in areas of low land cost) rural residential blocks over 2 or 4ha which produce no substantial agricultural produce. On the other hand small scale production of horticultural and other produce (often from rural backyards and small allotments) is rising again after continuous decline since the 1940's. Much of this produce is consumed in producing households, bartered, or sold in ways which escape the agricultural statistics. Hobby farmers are almost all driven by the same sorts of values that drive other ex-urban rural residents. Although substantial agricultural produce from hobby farms does enter the market, land management is in the final analysis driven by residential and lifestyle values not market driven.

In many ways it is more appropriate to see the difference between the two as one of class. The well-to-do buy larger acreages and generally invest their surplus capital in agriculture (and forestry), be it traditional or innovative and experimental. Those of limited means buy smaller allotments and often fail to develop the productive potential of their land because of a lack of time or capital and information.

The Review quite correctly points out many of the positive aspects of hobby farming which usefully counters the prejudice common amongst the agricultural establishment. The Review considers hobby farmers as part of the larger grouping of part time farmers which includes many who once made a living from the land but have responded to severe economic conditions by obtaining outside income.

If the figures quoted from the 1981 survey (Barr and Almond) on proportion of part-time farmers are correct then poor commodity prices must have greatly increased that proportion over the last decade. In my own shire, one which is still considered rural by any standard and with a significant amount of prime agricultural land, there are between 5 and 10 farmers who would not be part time or semi retired living partly from sale of land.

The Review also correctly identifies hobby farmers as aggressive information seekers, and frequently, as innovators in new industries and methods. The role of self directed farm research and innovation is critical in developing new, more appropriate forms of agriculture given the clear evidence that formal research is not capable of responding to all the new factors affecting agriculture. Organic agriculture serves as a dramatic example. Individual organic farmers who have done their own research under highly unfavourable social and economic conditions over decades are providing the technical basis for the current explosion of organic farming while the agricultural establishment is just in the process of an about-face and has begun some work in the face of grass roots demand.

In contrast to the favourable analysis of hobby farming the Review identifies rural residential development as a process taking agricultural land out of production in ways which cannot be reversed and reducing the viability of commercial agriculture on adjacent land through a variety of processes. In addition it suggests (in section 2.3) it is unsustainable on the basis of servicing costs, energy use, loss of agricultural land and land management problems. On face value these points must be accepted as effects of current forms of rural residential development.

I agree that the problems associated with this form of land use are severe but I think the Review fails to acknowledge (mainly due to lack of any appropriate data) the substantial contributions rural resettlement (in all forms) is making to rural and regional economies and the great potential for this process to be the economic engine of revitalisation of rural communities, restoration of land and development of new forms of agricultural intensification which are truly sustainable.

In addition, the comments on social equity (section 2.2) fail to recognise that policies preventing rural resettlement on small allotments represents a severe inequity on class lines. It is ironical that the very people who are willing to accept lower “standards” of physical and other services in return for a greater sense of control over their own environment and a better quality of life would be denied this on the basis that it is cheaper to provide them with the services they do not want in cities.

It has been pointed out in the Review and elsewhere that new rural residents often do demand services and that to avoid adverse environmental and other impacts of the land use, governments must provide services. These effects are symptomatic of either the urban lifestyle that new rural settlers bring with them or the inappropriate physical design and tenure forms of current rural residential development based on either old titles or new “cookie cutter” subdivisions which are offered to them by the market place.

These two issues are at the heart of the problem of rural residential land use. If they could be solved then the bold vision stated above could be realised.

URBAN vs RURAL LIFESTYLE

The first problem is essentially a social one. New settlers bring with them a mixed bag of urban values evolved during the post war golden age of consumerism and affluence. They generally seek a cleaner environment, simpler lifestyle, independence and self reliance. Many, often unconsciously, mistrust the capacity of the “system” to go on providing the jobs and the goods indefinitely. However, they also generally choose land and build houses which more reflect the dreams of affluence, locking them into commuting to work to pay the mortgage. The very process of commuting, while it results in significant capital inflow to the local community, ties people to the urban system they have tried to escape from. The personal and financial costs of commuting are often underestimated. Neglect of property development and management, lack of community involvement and increasing need for services such as mains electricity, sealed roads, convenient town water, child care and other social services plus demand for consumer compensations for the hectic lifestyle can all become dominant. Thus the country is urbanised with all its attendant problems long before the arrival of the suburbs.

On the other hand, many new settlers follow a different path. They often have less capital to start with and buy cheaper land further from centres of employment. They generally become owner builders through necessity or choice, living in partially completed houses for years, commuting part time, taking any local work or living on social welfare. They spend more time in the natural environment and on developing their properties even if with less capital, frequently producing some of their own food and developing small enterprises. They get to know neighbours and develop local networks. In the process they become poor by all the standard measures and there is no doubt about some of the difficulties they face. Some slide into lethargy and lose vision but many of these are people who, if they had stayed in the city, would have been worse off and more of a problem to the rest of society. Some become hard working country people, develop new skills often embodying their ideals of environmentalism and frugality and a few become a new breed of farmers or self employed bootstrap entrepreneurs.

These two portraits show the problems faced by new rural settlers. If people could be assisted by social policies, appropriate information and financing to reduce their demands

on services, become more self reliant and focus their considerable energy on home based employment including appropriate forms of agriculture then rural settlers could lead the way in developing more sustainable ways of living while revitalising their local economies and communities. My assumption is that virtually all current economic and landuse processes are unsustainable and it is only through the radical change which individuals and families are capable of will sustainability be achieved. Urbanites, as a group, are less likely and less able to provide a model due to the regulatory and social constraints of urban life while commercial farmers are so critically dependent on global economic forces which are the very source of unsustainability.

LAND TENURE

Most rural resettlement occurs on freehold titles. People often buy as much land as they can afford to maintain control over their living environment or provide a base, real or imagined for an agricultural enterprise or self reliance. Many settlers are aware of appropriate design principles such as those embodied in permaculture and some seek professional advice. However allotments are poorly located or too small to allow any rational planning of appropriate land use, water supply, access, shelter, fire protection, solar access or house siting.

The Review suggests that residential development should be confined to lower quality land to protect prime agricultural land. As pointed out in the attached extract submission to the *Daylesford and Glenlyon Rural Areas Planning Scheme* (October 1989) the prime agricultural land is also best for rural residential development and all the other environmental, servicing and planning problems of subdivision become much worse on lower quality land. While this may be seen as acceptable from the point of view of the agricultural establishment it will be strongly resisted by environmentalists and planners generally. The enclosed presentation to the AAT about the adverse affects of a 75 lot (2ha) subdivision at Riddells Ck graphically illustrates the issues (pages 3&4).

Smaller numbers of new settlers share land in various ways on collective titles for the sake of community or economic necessity. However, the inability to get home loans means development is even more constrained than on private allotments while the absence of good land use planning and other factors leads to neglect of the commons with people focusing their resources on owner built monuments.

New forms of land tenure, such as cluster development have the potential to solve the environmental impact and service provision problems while giving people what they seek. The submission to the *Daylesford and Glenlyon Rural Areas Planning Scheme* describes the benefits of cluster development, the impediments to its spread and proposes an Environmental Development Code as a mechanism for encouraging and regulating cluster subdivision across rural land use zones.

The new subdivision act makes any distinction between conventional and cluster development irrelevant. The key issue is the existence of a body corporate which is accountable to the lot holders and has control over common land and infrastructure. This creation of another tier in local planning control is the key to three critical issues;

- the residents’ desire for a secure environment
- the economic provision of physical (and social) services
- the sustainable and productive use of land

Of particular relevance to this Review, the planning scheme submission provides a positive way to address the issue of agricultural productivity showing how it can be maintained and increased through appropriate rural residential developments. I am claiming that the adverse effects of current development on agriculture can be replaced by benefits rather than simply ameliorating those effects or transferring the costs to other sectors including the natural environment. This claim must either be dismissed as absurd or further investigated since its ramifications are so great.

It can be correctly argued that rural residential cluster developments which are already beginning to emerge, are up-market developments where the lifestyle will be distinctly urban and the land use recreational (eg horses) rather than agricultural.

Any innovative developments tend to be up-market but as the process and form becomes well established costs will fall and a wider market will emerge.

Secondly, the fact that no significant agricultural production may occur is not a fundamental criticism, in that unlike conventional subdivision, the bulk of the land can be returned to broad acre uses in the future (by decision of the owners in the body corporate).

Thirdly, the more fundamental problem of unsustainable urban consumer lifestyle in a rural environment must be addressed through the combination of social policies indicated above while the body corporate tenure pattern provides a physical and self regulatory framework which can be used to facilitate the development of local employment, productive land use and community.

Recommendations

Conventional forms of rural subdivision should be severely restricted. Existing subdivisions and old titles will continue to supply market demand for conventional freehold title.

Body corporate type development should be supported by appropriate physical and social infrastructure policies, land use planning controls, subdivision guidelines, community education, and agricultural and silvicultural extension services. Development of prime agricultural land should be allowed where the capacity for

agricultural use is largely preserved or equivalent productive capacity is developed through diversification and/or intensification.

The second recommendation will be essential to avoid severe inequity. Without any alternative a policy of containment of rural resettlement will lead to social discontent and eventual failure of the policy.

The connection between these issues and the burning issues of urban sprawl and infrastructure costs addressed in the current discussion paper *Urban Options for Victoria* are obvious.

REVEGETATION

For the purpose of this discussion, revegetation is defined as the whole range of tree and woody plant natural regeneration, seeding and planting on rural land whether it be production oriented or not. Thus I am including farm forestry and new tree crop enterprises along with revegetation to stabilise degraded landscapes and local ecologies and improve amenity.

In the same way that rural living and hobby farming are different manifestations of the same underlying social movement, the myriad forms of tree planting are parts of powerful underlying social movement. The current decade long increase in rural revegetation follows a pattern similar to previous waves of tree planting in rural Australia late last century and again in the 1930's when economic recession combined with intense interest and innovation around what today are called environmental issues.

There is no doubt in my mind that trees and tree based land uses are, along with increasing soil organic matter are the real solutions to the critical problems of land degradation, unsustainable rural economies and greenhouse imperatives. However, at present there is a conceptual rift between revegetation for environmental and economic needs. This is artificial and counterproductive. There is a bewildering array of state and federal policies and programs to encourage revegetation. While integrated productive systems like agroforestry are supported by lots of motherhood statements, the net effect of policy and resource planning has been to encourage very limited forms of industrial forestry concentrated in areas close to major processors.

FORESTRY

Because of the experience with industrial forestry, tree growing for timber is being increasingly seen by both traditional farmers and many new rural residents as a noxious and unsustainable industry. Thus while traditional agricultural land use remains largely unregulated, forestry is subject to stricter controls.

We have the absurd situation around Ballarat where intensive chemical farming (potatoes) is allowed on private and public land in water supply catchments with only the most

limited controls while the conifer plantations can better protect soil and water resources and return a greater income from the same land. Data from existing plantations of the Ballarat Water Board clearly show that a perpetual Redwood forestry system (no clear felling) on much of this land could increase returns from timber while even further improving amenity and water values.

Other forms of forestry based on native species also have potential to economically compete with traditional agriculture given the right regulatory and financing framework and market development. Environmental benefits, local employment and economic development opportunities from many of these systems would be far greater than from current industrial forestry.

While the Review acknowledges trees as a valid "agricultural crop" much more will be needed to be done if forestry is to achieve its appropriate place as a rural land use. One of the enduring changes brought about by the last great wave of interest in trees (the 1930's) was the establishment of the softwood industry. I believe the rural and wider community is ready to take up the challenge of appropriate forestry for the next century if government became serious about addressing the financial, information and market impediments to farm forestry.

Recommendation

Planning controls should encourage forestry, not agriculture where it will better protect soil and water resources, generate more local economic development and especially where the species, silvicultural systems and plantation design provides multiple values.

REVEGETATION AND RURAL RESETTLEMENT

New rural settlers and hobby farmers are major participants in revegetation, probably being responsible for more natural regeneration of native vegetation, woodlots, shelterbelts and amenity plantings, timber and tree crop plantations than traditional farmers despite the undeniably substantial activity by traditional farmers in recent years. The simple process of destocking during subdivision and sale of partially treed hill country in central Victoria and other parts of the Murray Darling basin is creating new hardwood (mostly durable species) forest resources in critical ground water recharge areas at a faster rate than all the farmer initiated and government funded revegetation work combined.

Recommendation

That Federal and State governments fund the product and market development research as well as appropriate silvicultural and processing systems to economically manage forests of durable hardwoods being created by natural regeneration as a result

of rural resettlement and more environmentally sensitive attitudes of land holders generally.

In many grazing and more intensively farmed areas, loss of trees has been severe and low cost natural regeneration is not possible (due to severe grass competition) and on prime agricultural land would represent poor use of the land resource. On the other hand it is the lack of well designed shelter which is the greatest impediment to agricultural intensification of Victoria’s prime agricultural land through high value horticultural (including tree) crops¹.

In these areas subdivision results in an explosion of tree planting. It can be argued that this process is unplanned and will not generate economic land use. However, it is more appropriate to view much of this activity as a form of chaotic experimentation which, given the abysmal level of appropriate silviculture information in Australia is quite adaptive. As a result of these experiences, the information and skill base is developed and the local genetic resource is expanded with better adapted species, provenances and varieties being recognised. In this way non commercial plantings function as arboretums and trial plots for future tree-based land uses appropriate to a more intensively settled rural landscape.

The problems of pine plantations near rural subdivisions may be seen by some planners as an example of the incompatibility of residential development and primary production. However, from a designers’ point of view these problems simply reinforce the need for rational design and control of land to gain the benefits of integrated uses without the conflicts.

The separation of land uses which has dominated planning this century is no longer economically, socially or environmentally appropriate so the design issues involved in integrated land uses must be addressed.

Local government planning schemes are a very blunt instrument for this purpose while body corporate design of rural residential development can and must integrate forestry as well as agriculture with residential development. Without appropriate design, conflicts associated with unplanned natural regeneration and tree planting in rural residential areas will become worse than those experienced in already forested residential areas. The net result is that trees eventually are regarded as a “cost” rather than the highly productive multi-purpose solar energy harvester which they truly are.

Recommendation

That government encourage appropriate forms of residential development on prime agricultural land as a mechanism to fund and facilitate sustainable agricultural intensification of our best farm land.

¹ See Holmgren, D. *Trees On The Treeless Plains: Revegetation Manual For The Volcanic Landscapes of Central Victoria* for detail design information relevant to intensively farmed landscapes.

**EXTRACT FROM 1989 SUBMISSION TO
DAYLESFORD & GLENLYON RURAL PLANNING SCHEME**

CLUSTER SUBDIVISION

The Cluster Titles Act provides the ideal legislative framework for integrated rural land use patterns focused on residential needs. As an alternative to “cookie cutter” traditional subdivision which eliminates rural land uses in favour of a super suburban landscape, cluster subdivision has many advantages.

The recommendations in the consultant’s report to allow subdivision in either a cluster or traditional form are a substantial advance over the past situation where the Shire Council has knocked back a cluster subdivision proposal in Hepburn but then allowed a traditional subdivision plan for the same site. However, it will require more than simply allowing cluster subdivisions if developers are to take up this more complex process let alone use it to the best advantage of the local community.

Cluster subdivisions which retain most of the land in common ownership under the body corporate would make continuation of existing agricultural uses possible. Infrastructure development can provide services at lower total cost to the community and the environment than in conventional subdivision.

AGRICULTURE IN CLUSTER SUBDIVISIONS

Appropriate land use prescriptions for the common land can be incorporated into the development plan of a cluster subdivision which then has the same force of law as a planning scheme. **Within the limitations of land use and environmental prescriptions it is in the interests of the body corporate members to maximise the return from the land by lease to farmers who are in a position make use of it.**

Problems for farmers, such as stray dogs and noxious weeds, usually associated with rural residential development, would be resolved by the combined effects of appropriate internal bylaws (which would apply to all residents), and the economic leverage of anyone negotiating a lease.

Low levels of equity and need for capital to develop and diversify farming are major problems for the agricultural sector of the economy. Cluster subdivision is an alternative to both subdivision and sale of lower productivity sections of a farm, or schemes to involve outside investment.

Agricultural productivity of the deep volcanic soils within the shire are not maximised by the current usage pattern of livestock and broad acre cropping. Intensive development with tree crops and market gardens would provide livelihoods from small acreages of volcanic soil. However the greatest impediment to intensive use of this land

is the absence of appropriate infrastructure development (particularly water supply, shelter, and access). While this infrastructure is normally seen as part of the costs of the enterprise, appropriately designed residential subdivisions can effectively create the ideal environment for these intensive land uses at little extra cost. **Thus appropriate residential development can actually foster more intensive agricultural use of land by providing internal infrastructure at a lower cost than in conventional agricultural development.**

There are many other planning and land use issues such as effluent disposal, fire planning, provision of water supply, power and other services, revegetation and conservation of native vegetation, which can be positively dealt with within the framework of properly designed cluster subdivision.

The cluster titles act provides a flexible land tenure and development framework for integrated land uses. Innovative rural residential developments in other states such as Crystal Waters, north of Brisbane have had to use less suitable legislation but show the potential to resolve land use conflicts and provide people with access to developed rural land at reasonable prices.

IMPEDIMENTS TO CLUSTER DEVELOPMENT

1. It is clear that while developers can make substantial profits without much effort, and while planning schemes provide no incentive to developers, these more sophisticated forms of subdivision are unlikely to eventuate.
2. Cluster developments which incorporate agricultural uses of the common land, especially broad acre cropping and grazing will require large parcels of land around the same size as current economically viable farms. Clearly where the ownership pattern is already fragmented, integrated development is highly unlikely. The most suitable properties (from a planning perspective) are those close to existing services, especially those on the fringe of the townships. Properties with at least some deep volcanic soils for ground water supplies, effluent disposal and intensive agriculture as well as some treed sedimentary country for multipurpose dams, natural regeneration recreation, wildlife and wood supplies would be ideal. **Properties which fulfil these criteria are few in number.**
3. There are very few examples of rural cluster development so that costs and returns to developers are unclear. Because the land development process will generally involve provision of water supply, power, framework tree planting as well as fences and roads, capital requirement will be greater than for conventional subdivisions where lot holders pay for many of these costs following purchase.

However, purchasers of small rural allotments are becoming better informed about the costs of providing electricity, water supply and access on undeveloped land. Therefore it is more likely that they will recognise the value in well designed and developed lots in a rural cluster development.

4. At present, there is only the choice of “serviced” town blocks, undeveloped rural land or owner developed small blocks. My experience in designing infrastructure on rural allotments and hobby farms has convinced me that the costs of integrated infrastructure development are considerably less than individual development and that allotments serviced by integrated developments would be highly sort after. **However, as with any innovative process, investors expect high returns and without a favourable regulatory environment only the most committed developer is likely to provide an example.**

ENVIRONMENTAL RESIDENTIAL DEVELOPMENT CODE

A separate set of regulations should apply to cluster subdivisions which meet strict environmental and land use criteria. These regulations should be framed as functional criteria which can be applied to different landscapes and zones. This would result in different solutions in land use allocation, ratio of common to private land, infrastructure systems and actual size of lots. **The incentive to developers would be the ability to increase the number of allotments allowable under the proposed zones.**

A similar set of regulations should apply to multiple occupancy development by registered community settlement co-operatives.

The concept of an environmental living zone has been proposed locally based on innovative examples such as Village Homes in Davis California where urban developments have occurred following similar criteria to those proposed here in a rural context. The real difference is that this proposal uses **tenure system** rather than **zoning** as its primary regulatory mechanism. In this way it would function as a proactive planning mechanism which would stimulate desirable development against a background of zoning control.

The code should involve the following elements (*with specific examples in italics*).

1. A survey of the property recording all the natural characteristic of the land and all existing infrastructure. (*A land systems format and topographic base map with appropriate contour intervals, soil types, springs and surface hydrology existing vegetation and any land degradation, existing improvements and land use, as well as any natural or cultural heritage features of local significance*)

2. Analysis of microclimate, fire risk, soil hazards including impeded drainage, erosion, salinity, water resources, access and views.
3. A land use plan based on the above surveys and analysis showing all allotments, access and service reserves, and land use allocation of the remaining common land. (*Catchment protection areas for water supply dams, service reserves, road reserves, drainage line reserve, effluent disposal reserves, managed native forest, agricultural land, land management service centre.*)
4. An infrastructure plan showing all services and infrastructure associated with the designated land uses. (*Roads, power supply, telephone, fencing, water supply and distribution systems.*)
5. Requirement to provide a water supply system which would allow reliable supply for domestic and modest garden at each allotment. (*Water supply dams or bores, pumps, pipes, header tanks and distribution systems*)
6. Substantial reserve capacity to ensure adequate supply to houses gardens in drought years and allow development of appropriate irrigated cropping or horticulture on the common land.
7. Reticulation and/or fire fighting equipment adequate to deliver water to all houses and any other substantial buildings on the property in a fail safe manner in the event of a bushfire.
8. Well designed access roads constructed to service all allotments and integrated with a system of farm tracks to give access for fire fighting, land management activities and recreational use of the land by the residents. Standards of construction to ensure minimal environmental impact and where possible integrate roads in multi-functional roles. (*Sealed roads in higher density developments. All earthworks to involve topsoil stripping and replacement on finished work, roads designed as divisions between land uses, using roads as routes for underground services and fire breaks, use of dam walls for gully crossing where possible, contour road table drains as feeder channels to dams.*)
9. Provide adequate common parking areas close to allotments to allow safe parking for non-resident vehicles without adverse environmental impact.
10. Site all allotments to allow effective effluent disposal in an effluent reserve planted to suitable vegetation which, where possible, performs secondary functions. (*e.g. a common orchard which acts as a fire break for the house allotments.*)

11. Provision of underground grid power to all allotments or where extension of the grid would involve excessive environmental impact and/or cost, then an autonomous system to service an energy efficient house on each allotment and any facilities on the common land. (Where grid power / allotment exceeds \$15,000 at current prices, autonomous systems based on solar voltaic cells, batteries and standby generator.)
12. Produce a revegetation plan which include appropriate tree planting, direct seeding and/or natural regeneration to perform the following functions:
 - a. wind shelter of allotments and agricultural land.
 - b. privacy screening and framing of views of and from allotments
 - c. wildlife corridors
 - d. water body and drainage line protection
 - e. effluent and storm water absorption areas
 - f. reinforcing fenced boundaries between different land use areas.

(*Well designed multipurpose shelterbelts and natural regeneration areas all fenced will perform many of these functions simultaneously*)
13. Areas of existing native vegetation or plantations should have management plans which reflect sustainable use. Any clearing of forest for agricultural or residential use should be minimal and be compensated for by the revegetation plan.
14. The proportion of the land under permanent vegetation will vary widely but should never be less than 20%.
15. Species selection for revegetation should be on **functional criteria** but with preference for local indigenous over Australian native over exotic species.
16. Planning controls for any agricultural land which indicate permissible and prohibited uses and procedures for allocation of leases over whole or part of the land.
17. Site all allotments to allow construction of a energy efficient house with 70% solar access during midwinter.
18. An internal building code specifying energy efficient and fire resistant house design. (*Long east west {within 20°} axis with >50% of glazing facing north and >75% of the north face glazed, slab on the ground construction, internal thermal mass, R2.5 wall insulation, R3 roof insulation, enclosed eaves, roofs fixed as for high wind areas.*)

19. Size of allotments should be between 0.2 and 0.4 ha depending on the land type. *(Positioning of allotments may or may not be clustered but any adjoining allotment should be separated by a privacy planting on common land reserve at least 10m wide.)*

20. Ability to create between 2 and 4 times the number of lots allowable under the zoning controls. *(Actual number would depend on the degree of infrastructure development and management systems which are in place before lots go on sale.)*



HISTORICAL PRECEDENTS FOR PERMACULTURE

This brief article was written in 1991 but apart from circulation at PDCs has not been published. It has a strong link to my thinking at the time about indigenous agriculture in Australia expressed in Article 5 - Aboriginal Land Use



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The permaculture texts, particularly *Permaculture One* and *The Designers Manual* include references to traditional systems of land use which illustrate many aspects of permaculture including systems based on perennial plants including trees.

ABORIGINAL LAND USE

In *Permaculture One* aboriginal land use is recognised as a system of sustainable agriculture which provides a reference point for the development of future sustainable systems. Since *Permaculture One* was written, evidence and wider recognition of the profound and deliberate shaping of the Australian environment to provide the needs of the aboriginal peoples has increased, especially through the work of ecologist and archeologist Rhys Jones.

GARDEN AGRICULTURES

Examples of garden agriculture abound and provide clear evidence that these household based systems are both highly productive and sustainable. The multi layer garden agricultures of Central America and S.E. Asia provided more direct models for permaculture¹ which have been especially applied in tropical and subtropical areas.

LARGE SCALE FOOD FORESTS

The tree crop agricultures described by Russell Smith² especially those of the Mediterranean region provided evidence of productive broad acre land uses on marginal lands. A question which arises from the work of Smith, Mollison and Holmgren is; if forest based agricultures are so productive why are there so few examples?

Archeological evidence that forest farming was much more widespread in the Middle East, Mediterranean and European regions before the rise of civilisation with cities, standing armies and extensive grain agriculture is gradually accumulating but why have so few examples persisted into and through the historical period. I have developed a hypothesis which explains the demise of forest farming in these regions over the last few thousand years which is compatible with the evidence that such systems are productive as well as sustainable.

Forest farming is here defined as the management and culture of forests to provide a large proportion of people's needs. Traditional forms of forest farming generally provided fruit, nuts, honey and animal products in abundance along with wood products. These systems along with intensive garden agriculture provided for people's needs. The sorts of natural forests from which cultivated systems could have evolved in temperate and Mediterranean climates tend to be soft leaved, mostly deciduous forests with high mineral

¹ see Extract from Anderson, E. *Plants Life and Man* 1952 in *Permaculture One*

² Smith, J. Russell *Tree Crops and Permanent Agriculture* Devin-Adair. New York 1950.

fertility and “mull” humus soils rather than coniferous forests with acidic “moor” humus soils or sclerophyll systems with skeletal fired soils (typical of Australia).

The favourable forests have a high proportion of nut bearing species (oaks, chestnuts, walnuts, beech, hazels) which provide protein, oil and starch rich foods which can be stored as well as providing concentrated forage for forest ranging animals and birds used for food (pigs, turkeys etc). While these forests are very resistant to burning, they do not recover well if destroyed by crown fire.

Prior to the development of standing armies, tribal conflicts rarely made much impact on the economy and environment. The New Guinea highlands at the time of contact provides a good model of this type of warfare. The development of city states, standing armies and warfare in the Middle East about 4,000 years ago³ would have had profound implications for peoples dependent for forest farming.

Standing armies provided the resources for conquest and appropriation. Fire became a important strategic weapon in conquest. Food forests could not be easily burnt but the determined efforts of well organised armies with the right weather conditions could have destroyed almost any forest. Recovery from such an attack could have taken several generations.

After centuries of warfare with armies moving back and forth across the Middle East it is not surprising that grain agriculture would have developed a distinct strategic advantage. The burning of grain crops and destruction of silos devastated local communities and economies but recovery was possible over a few seasons.

There are many documented examples of the burning of managed forests in more recent times by which dominant peoples subjugated forest dwelling and dependent peoples. The Clearances (firing) of the Scottish highland forests in the seventeenth century is a good example. This devastated the economy and culture of the Highlanders who ran highland cattle in the diverse and productive forests. The ecological effects were catastrophic and the pastoral farming of wool for the British textile industry which replaced the forests ensured no regeneration.

The current destruction of the Amazonian food forests and dispossession of the indigenous peoples by beef cattle ranchers is one of the final stages of a historical process which has spread from the Middle East over the last 4,000 years.

An important aspect in the destruction of forest farming is that in almost all cases the forests, if not the livestock in the forest were part of the commonwealth of the communities which husbanded them. Ownership in the western sense was rare. The invaders often used the legal excuse that these forests where not owned by anyone.

3 Mumford, L. *The City In History* Penguin 1961

Fire destruction by hostile foreigners was a major cause of the demise of indigenous forest farming. However an equally important contribution to their demise was ironically the very success of cultures based on forests. Naturally rich forests which became progressively modified by indigenous peoples to increase their productivity provided the wealth which allowed civilisation and urban culture to develop.

Little is known about the mysterious Etruscan who predated Roman civilisation in central Italy but it is known that they developed a highly productive tree crop agriculture and that the central Italian landscape which the Romans inherited was the resource base from which the Empire sprang. Once Rome established domination over colonies the inflow of external resource reduced the importance of local systems. Affluence led to land amalgamation and degradation, loss of agricultural skills and dependence on foreign food. When the navy could no longer ensure the arrival of the grain ships from N. Africa attempts to redevelop local production were largely a failure. The natural and cultural resource base had been destroyed. Amongst other impacts, deforestation of the uplands led to hydrological changes which gave rise to the Pontine marshes. These marshes were a source of malaria affecting the people of the area for the next 2,000 years until they were drained and maintained dry by the planting of Blue gums early this century.

The demise of the Mycenaean civilisation in the eastern Mediterranean provides another example of dependence on forests. Marshall Massey⁴ puts the case for ecological catastrophe in the Greek islands about 1200 BC which prevented the resettlement of whole areas for over four centuries. The wealth and culture of the Mycenaeans was based on land resources but the nature of their land use is not known. However in the eastern Mediterranean mountain cloud forests collected moisture which sustained aquifer systems necessary for productive agriculture and urban development on the lower slopes. Desertification and loss of the soil resource would have followed loss of the high forests. The details of these processes are not known from the historical record.

What these examples illustrate is that once stable productive systems are destroyed by misuse it can take centuries to recover and the original systems and productivity may never be achieved. Forest farming which evolved out of climax forests would have been particularly vulnerable to permanent destruction. It is hard to imagine peasant peoples without external resources creating the grafted chestnut forests from barren hillsides which Russell Smith described on Corsica. These are clearly manipulated remnants of natural forests.

Goat pastoralism, limited plantings of tough tree crops such as olives and carobs and small patches of arable farming on areas of topsoil deposition is the pattern of traditional agriculture in much of the Mediterranean hill country. Restoration of the Mycenaean or Etruscan landscapes would require the dedication of generations of an affluent society assuming it were possible.

4 Massey, M. Carrying Capacity and the Greek Dark Ages in *Co-Evolution Quarterly* no. 40 1983

Productive sustainable agricultures must include storages of biological wealth which are essential to productivity and provide a buffer against stress. In agricultures based on annual crops soil organic matter is the great biological storage which must be nurtured and can include humic acid structures which are thousands of years old. Forest farming systems include the additional storage of long lived trees. These are much more resistant to destructive social conditions than soil organic matter which can be easily whittled away. However once mature forest systems die as a result of climate or hydrological change brought about by over exploitation of more fragile catchment forests the losses can be sudden and irreversible.

It could be argued that the spread of potatoes as an alternative staple to grains in Europe was so fast partly because potato crops stored in the ground represent an even greater flexibility in the face of warfare which ravaged so many regions of Europe in the 16th and 17th centuries.

The lessons of history are that sustainable agriculture cannot be maintained without a stewardship ethic embedded in an enduring culture which transcends the twin wars against nature and people which have particularly characterised the emergence of western civilisation during the last 4,000 years.

This historical perspective clearly reinforces the permaculture perspective that tinkering at the edges of existing industrial agriculture is largely a waste of effort and resources given the magnitude and global nature of our crisis. The objective of sustainable agriculture is an illusion without addressing the incredibly destabilising forces of militarism, growth economics, consumer culture, global inequity and population growth.

Conversely any stability claimed for forest farming/permaculture, will be worth little without a culture which can protect such systems from over exploitation, greed and conflict over many generations.



GARDENING AS AGRICULTURE

The original version of this paper was written as part of the Orange Agricultural College Sustainable Agriculture course material in 1991. In reviewing the reasons why so much emphasis was given to gardening in permaculture I was also aiming to demonstrate the difference between permaculture as a conceptual framework for sustainable development and gardening as a sustainable system of food production.

In this updated version I refer to important new statistics on the scale of household food production and also make the link to the sustainable cities debate in which food production has been largely ignored.

Implicit in permaculture literature and action is the belief that gardening is central to a sustainable land use and culture. Gardening is an important form of agriculture right across the globe and I believe sustainable land use in a low energy future will involve more gardening and less broad acre and commercial farming. For a person raised in the culture of Australian farming and committed to broad acre sustainability this may appear a silly proposition. A superficial understanding of permaculture and its applications has led some people to conclude that permaculture is essentially about gardening and is irrelevant to commercial agriculture. I would dispute this but in this article I will concentrate on showing why gardening is important and I will identify the major impediments to the rise of gardening as agriculture in Australia.

By **garden agriculture** I mean small scale intensive production systems associated with homes and primarily providing for household needs, although tradable surpluses may be produced. Human labour rather than machines provide the major power input. In permaculture site design language we are talking about Zones 1&2 which rarely involve more than 1/2 acre.

This definition covers a diverse range of systems, varying according to climate, landscape, culture and economy but productive and ecologically sustainable gardens tend to reflect permaculture principles such as:

Biodiversity

Large number of crop species and varieties plus associated species including weeds

Complexity of physical design

Integration with housing and extensive infrastructure (water supply, fencing, trellising, greenhouses etc)

High nutrient absorption capacity

High levels of organic matter, perennial crops and/or continuous cover crops. Composting, mulching and animal forage system to return crop, household and other wastes.

Information Rich [observation]

High inputs of information and management, mostly informal, and generated from within the system.

Gardening has been a central focus for permaculture for the following reasons:

- Gardens are the most energy and resource efficient forms of agriculture particularly in the production of perishable food.
- There are methods suitable to all climate zones and land types which can be practised on a sustainable basis



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- Gardening is very democratic, being available to almost all people as a way of providing some of their needs without much dependence on technology or financial resources.
- Gardening is a simple way to increase awareness of the processes of nature and our ultimate dependence on them.

In many parts of the world, garden agriculture continues to produce much of the food, particularly in tropical areas where gardens are ideally suited to production of traditional staples (carbohydrate foods) as well as fruit and vegetables. Small livestock, especially poultry are often an integral part of garden agriculture. In most cultures gardening is done by women within the household economy. Documentation of this non-monetary production is very poor so it is difficult to quantify, but there is evidence that it remains central to household nutrition for perhaps a majority of the world's people¹.

Produce markets absorb surplus from home gardens which form a continuum with fully fledged commercial farms of one hectare and less providing a livelihood for families.

AUSTRALIAN PROSPECTS

In affluent countries including Australia several generations of cheap food prices relative to wages has resulted in a decline household production. Gardening remains the most important recreational activity for Australians ahead of sport. Most gardeners concentrate on ornamentals and in general, gardening may be regarded as consuming more resources that it produces.

But recent Australian statistics² show that 6% of vegetable production is from home gardens and that despite our large fruit production for export, home gardens produce 4% of Australia's fruit crops. Egg production by domestic hens is 16% of total production although deregulation of egg production may show that some of this yield was previously illegal small scale commercial production.

The relatively low density of Australian cities and towns and high levels of sunshine (a limiting factor in the productivity of intensive garden agriculture) combined with cheap reticulated water means Australia has substantial natural and infrastructure capacity for garden agriculture within urban areas where the majority of the population live.

The substantial rural resettlement occurring around urban areas with its associated development of water supply, shelter and fencing is generating capacity for slightly larger scale systems able to supply households and local markets.

Gardens can provide a complete human diet, but are most resource efficient in the provision of fruit and vegetables as well as small livestock protein. It is in the production

1 Vandana Shiva, the Indian eco-feminist has discussed this issue in *Staying Alive: Women Ecology and Development* 1989
2 *Home Production of Selected Foodstuffs, Australia year ended April 1992* Australian Bureau of Statistics

of these more perishable and nutritionally important foods rather than grain staples that garden agriculture has a major role in any future sustainable Australian agriculture.

HORTICULTURE AS FARMING

Part of the problem for those involved in broad acre agriculture in taking gardening seriously as a form of agriculture, stems from the failure to comprehend the importance of horticultural industries generally. The value of commercial horticulture in Australia including vegetables, flowers, fruit and nut production is approximately equal to that for wheat, our most important broad acre crop³.

Horticulture occupies only a small proportion of agricultural land but the inputs of non-renewable resources are very high. Fruit and vegetable production is a major source of environmental and food toxins especially in Australia where broad acre agriculture does not make use of as many pesticides as in Europe or North America.

Water use in commercial horticulture is very high, with South Australian Riverland vegetable production requiring 13 megalitres per hectare (compared to 2-4Mlit/ha for typical home food gardens). Much of the market gardening around population centres in Australia can be considered as a form of "shifting cultivation" which degrades prime arable land before conversion to residential, commercial and industrial development. In general, commercial production of fruit and vegetables in Australia can be considered as some of the most unsustainable farming.

Intensive poultry production for meat and eggs is even worse in terms of energy and resource consumption, pollution and toxins as well as being undesirable in terms of animal welfare.

While development of more sustainable systems of commercial horticulture and poultry husbandry are essential, the relative ease with which it possible to produce fruit, vegetables, eggs and meat in the home garden without the use of chemical and other non-renewable inputs suggest garden agriculture needs more careful consideration in the debates over sustainable agriculture as well as sustainable urban development.

PRODUCTIVITY: GARDENS vs COMMERCIAL FIELD HORTICULTURE

Net productivity (in terms of demand for resource inputs, land area and even labour) of garden agriculture can easily exceed that of commercial systems for the following reasons:

1. Utilisation of already collected or concentrated sources of organic wastes associated with settlements (eg garden waste, food processing and catering waste, animal and human manures). Although these can be potentially recycled to intensive commercial agriculture clustered

3 ABARE '88 cited in *ESD Agriculture Working Group Report* 1991

around population centres, many of these resources are too diffuse or difficult to efficiently collect and transport. Food processing and catering waste in our affluent society includes large amounts of valuable protein which is a very valuable supplementary feed for domestic poultry. Human waste, the most valuable source of plant nutrients generated by settlements, remains problematic because of water borne centralised sewerage systems, but newer site-based composting toilets are less costly, as safe, and recycle the nutrients to gardens. The high inputs of nutrient rich organic matter can develop mature humus soils with water and nutrient holding capacities, with an ease of management unknown in field agriculture.

- 2. Very low levels of crop wastage due to ability to use less than perfect produce which would not survive transportation or appeal to purchase based on appearance. The home gardener will generally accept less than cosmetically perfect produce. (In the case of tree ripened fruit, salad greens and sweet corn, the quality is generally superior that which can be provided by the centralised market system). Use of continuous cropping vegetables such as celery, use of seedlings for salads, small and over-sized fruit gives very high yields of usable food.
- 3. Self sown vegetables in mature gardens can provide a substantial yield with very low labour input. The use of gardens as informal nurseries to produce tree seedling and other plant materials for expansion can be achieved without significant reduction in primary production.
- 4. The built environment of houses, fences, walls and trellises substantially increase the potential productivity and microclimate diversity of gardens compared to field agriculture. While this infrastructure may be costly if considered only as a part of the production system, in well-designed gardens all these elements have a diversity of functions including amenity, climate control and security.
- 5. The hard surfaces of roofs and pavements provide opportunities for water harvesting either directly or via tanks which are not available to field agriculture.
- 6. Gardens are amenable living and working environments which naturally foster levels of observation and intervention not possible in field production.
- 7. It is frequently noted how easy it is to garden organically while commercial production can be much more difficult and require less than ideal compromises. Complex integrated systems of crop rotations

and combinations which are quite manageable at the garden scale are usually unmanageable in field conditions. If integrated systems and bio diversity are essential characteristics of sustainable systems then gardens will have a decided advantage over field agriculture in this regard.

THE FOOD SUPPLY CHAIN

The efficiency and easy development of sustainable garden agriculture are significant enough to justify its consideration in any serious discussion of sustainable agriculture. However, it is in the rest of the food supply chain where gardening has the potential to dramatically reduce the resources currently devoted to transport, processing, marketing and preparation of perishable food and therefore make a major contribution to sustainability. Large scale centralised market systems can never achieve such efficiencies.

“Intermediation” is the provision of additional services by middle men which increases when an economy expands and has been a major factor in the development of modern industrialised agriculture. “Disintermediation” occurs during periods of economic contraction⁴. Garden agriculture can be thought of as a radical form of disintermediation where whole sectors of the economy are bypassed.

While the disintermediation of industrial forms of transport, processing and marketing by gardening are clearly resource savings for society, they also show the fundamental conflict between the push for sustainability and the conventional commitment to economic growth. In the same way that the agricultural input industries will never contribute to their own contraction⁵ the sectors which take the output of commercial agriculture to the consumer have a necessary interest in maintaining the centralised marketing system.

GASTRONOMY

Culture and lifestyle factors are integral to any future expansion of garden agriculture.

A sophisticated garden-based cuisine using in-season, fresh produce with minimal processing requires very different domestic habits and skills to the fridge-based, processed, year round food culture common in Australian and other affluent countries. It is only with the development of a social and seasonal food culture that the extraordinary potential productivity and resource efficiency of garden agriculture will be realised.

4 Described by Paul Hawkin in *Co-evolution Quarterly* 1981 as a positive expression of economic adaptation to emerging ecological realities

5 For a discussion of this issue see Reeve, I. *Sustainable Agriculture: Ecological Imperative or Economic Impossibility Rural Development Centre* UNE 1990

Some affluent countries with a strong peasant tradition such as Italy have not lost these seasonal and local priorities in their gastronomic culture, despite their affluent urban lifestyle. In Australia there are signs of an emerging gastronomy⁶ more concerned with local, fresh, in season ingredients from sustainable sources for use in simple and healthy but refined dishes rather than the pastiche of food combinations overloaded with flavours and protein-rich ingredients which characterise the Australian mainstream.

FUTURE SCENARIOS

If the dominant powers in the global economy can keep commodity prices down (especially energy) and financial resources concentrated on so-called ‘productive investment’ to give “sustained economic growth” and relative affluence, and if ecological debt including global climate change can be avoided then garden agriculture can be expected to remain a marginal part of food production in western countries including Australia. However, the increasing status of home grown and local fresh produce will result in the more affluent, employing food gardeners and buying from boutique organic local producers.

If on the other hand;

- commodity prices rise substantially in response to environmental, political or other constraints on supply, or
- economic contraction, high unemployment and declining living standards become entrenched

then garden agriculture can be expected to expand rapidly.

The major impediment to expansion of garden agriculture remain:

1. **Cheap food:** relative to wages, the price of fresh food in Australia continues to be very low while the diversity and quality of produce is generally good despite some problems with low nutrient value and residual pesticides.
2. **Lack of skills:** although gardening continues to be a major recreational activity, skills required for efficient garden production of fruit and vegetable are at a low level following several generations of affluence.

GRASS ROOTS ECONOMIC DEVELOPMENT

Conventional economic analysis suggests that the lack of economies of scale will prevent garden agriculture enterprises from ever affecting mainstream agriculture. The minimum size of “viable economic units” continues to grow to an extent that our grandfathers would have thought incredible. Agricultural economics is so focused on this necessary expansion of farm size in response to technological and economic forces that it fails to consider the developing niche at the other extreme.

6 Discussed by Graham Pont in *Acres Australia* no.4 1991 and elsewhere

Observation of markets and industries undergoing progressive concentration and expansion of unit size suggest that this very process leaves vacant niches providing new opportunities for very small scale, even micro, technologies and enterprises which emerge out of new attitudes, values and participants. Rather than seeing a swing back to more modest scales of production, this polarisation of the scale of production is the common pattern. The successes of boutique breweries and natural bakeries has occurred at the very time that increasing conglomeration and standardisation dominate the brewing and baking industries.

Health and environmental concerns have resulted in a resurgence of interest in home garden production and an increase in existing gardeners scaling up their activities to provide some surplus for sale through local markets, roadside stalls etc. Use of this surplus through barter, LETS systems and monetary sale can provide a testing ground for development of genuine commercial production.

It can be argued that much of the small scale sub-commercial production from gardens and hobby farms is subsidised (by the operators) and is often very inefficient in use of resources. Alternatively, small scale production can be seen as the ad hoc first stages of research and development from which will emerge new commercial crops, land use systems and skills. This research and development would inevitably involve refinement and simplification of methods plus additional investment in equipment and development of marketing strategies for it to generate viable and efficient commercial enterprises.

It has long been argued⁷ that small businesses are the real source of economic renewal but the notion of the household as an even broader wellspring from which enterprises emerge has been largely ignored by economists and planners. Economic analysis by Marilyn Waring on the unpaid work of women⁸ confirms that even in western countries, the household economy is still the foundation on which the monetary economy is built. If Australian agriculture is to ever be truly sustainable then it needs a foundation which is a post-industrial equivalent of peasant culture in which large numbers of people have the experience and skills of garden agriculture.

SOCIAL CHANGE / SOCIAL REVOLUTION

Clearly the transformation of gardening from a leisure activity for affluent Australians which consumes resources and creates pollution to an efficient and productive form of agriculture will involve a social and economic revolution which most commentators would dismiss as highly unlikely in the foreseeable future. However several important factors tend to be ignored in these sorts of dismissals of radical social change:

7 See Jane Jacobs classic urban planning treatise *Life and Death of Great American Cities* written in the early 1960's

8 Waring, M. *Counting For Nothing*

- Firstly, the duration of the “foreseeable future” continues to contract despite the exponentially expanding human resources being devoted to predicting, planning for and adapting to assumed futures. The future horizon is certainly shorter than the time take for someone to become a expert food gardener and probably shorter than the time for many tree crop species to come into full production.
- Secondly, when the problems of undesirable environmental change (eg. the greenhouse effect / climatic change) become severe and the total failure to deliver “sustained economic growth” becomes accepted then truly efficient ways to occupy the burgeoning unemployed may be more readily accepted and supported by policy makers.
- Most importantly, the changes proposed do not depend on institutions, governments or corporations, but primarily involve changes in the lives of individuals and families. The capacity of individuals for cathartic change means people can adapt very rapidly when the need arises.

SUBURBAN RENEWAL

The Australian suburbs with their generous private and public open space, sunlight and water supply could become edible landscapes productively employing large numbers of people in providing for the needs of their households and generating surplus for trading.

It is interesting to note most planners promoting the sustainable city concept ignore the great potential of the Australian backyard to be a part of a sustainable future. Instead the backyard is viewed as a land and resource consuming anachronism in the environmentally conscious 1990's. Nothing could be further from the truth. The fact that the current suburban landscapes are not sustainable is less to do with their density or even design than it is to unfavourable social and economic conditions. A change in those conditions will see a very flexible adaption of the suburbs despite the inevitable frustrations about how it would have been so much easier if we had **planned** for a low energy sustainable future. The problem of how to retrofit higher density cities for a low energy sustainable future will be much more problematic.

AGRICULTURAL RENEWAL

If the proposition that garden agriculture based on the household economy is a significant issue in the sustainable agriculture debate, then the natural reaction of those involved in existing horticultural and small livestock industries may be to see it as yet another threat to their survival.

However if we recognise the household as the foundation and wellspring for the formal economy then we can see that garden agriculture will in the long term reinvigorate

commercial agriculture with new farmers, locally adapted methods and integrated production systems to meet the severe challenges of sustainability in the low energy future. Most importantly, a nation of gardeners will, through their common experience of the joy and pain of food production, provide a cultural context in which farming for a living will be seen as a form of stewardship of the highest order demanding respect and a fair price.



NATURAL GARDENING AND INTENSIVE BIOLOGICAL GARDENING: STRATEGIES FOR SUSTAINABLE GARDEN AGRICULTURE

This 1991 paper follows on from Article 8 - Gardening As Agriculture and deals more directly with the issue of appropriate garden methods. I sought to minimise the arguments over best techniques by providing a strategic and inclusive overview. Peter Harper, the ecologist and organic garden manager at the Centre for Alternative Technology in Wales responded very positively to this paper and it was published in their Journal in 1995. He found the ideas had a direct parallel with his own teachings on the subject and provided evidence in his disputes with the teaching of permaculture in Britain which he believed only gave credence to the natural gardening approach. This revised version of the article includes more current references.



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Within the broad church of organic gardening literature and practice there is a bewildering array of strategies, methods and techniques. Permaculture is seen by many as one particular set of organic gardening techniques which appear to contradict many of those applied by more traditional organic gardeners.

In fact, permaculture is a design system rather than a set of techniques and is eclectic enough to incorporate radically different strategies and techniques. Permaculture provides a conceptual framework within which it is possible to better understand and apply strategies and techniques which will prove ecologically sustainable over time.

I find it useful to think of organic gardening methods as a continuum between two extremes or polarities. One of those polarities has been called natural, wild, or low input gardening, the other as intensive biological gardening.

Natural gardening is a “do little, observe lots” approach which aims to focus the natural processes of climate, soil, plants and animals to provide food and other yields with minimal inputs or intervention. It is most eloquently described by the Japanese farmer/scientist/philosopher Masanoba Fukuoka in his classic text *The One Straw Revolution*¹. Most of the methods associated with permaculture and popularised by Bill Mollison reflect this wild or even ‘do nothing’ approach. Other popular organic gardening writers such as Jackie French² have favoured this approach without using the permaculture label. Another example of the ‘low input’ approach has been the promotion in the British permaculture movement of the “forest gardening” writings and model garden of Robert Hart³ as a distinct alternative to traditional organic gardening for cool climate permaculture.

The traditional land management methods of many indigenous hunter/gatherer peoples including the Australian aborigines have been reinterpreted in recent times as forms of gardening and farming which can now be seen as archetypical of natural gardening.

For example by disturbing the yam beds during harvesting, aboriginal women were cultivating the soil and thinning the tubers, allowing the plants to produce more and larger tubers. By picking and eating the largest, sweetest fruit and defecating near ancient camp sites, indigenous people planted and fertilised the seeds of better varieties of their favourite fruits⁴.

Even the more interventionist slash and burn gardeners of the wet tropics such as the Highlands of New Guinea used a cycle of natural fertility renewal to provide for the gardens which themselves mimicked the structure of the rainforest and contained trees which were described as “mothers of the forest” (pioneer species which would return the site to forest once it had become too dense to harvest and fertility had declined).

¹ Also see Fukuoka, M. *The Natural Way of Farming* Japan Books 1985

² French, J. *Beyond Organic Gardening: The Wilderness Garden* Aird Books 1992

³ Hart, Robert *Forest Gardening* Green Earth Books

⁴ See Article Five - *Aboriginal Land Use* in this collected writings

Detailed ecological studies⁵ of Highlands gardens prior to modernisation show them to be the most energy efficient form of agriculture yet studied. Until recently these gardens, together with the surrounding rainforest, provided the total needs of one of the world’s most densely populated rural regions.

Intensive biological gardening involves much more control of natural processes to get the highest yields while not sacrificing quality and ecological sustainability. In many ways the biodynamic methods of gardening (and farming) based on the teachings of the German philosopher Rudolph Steiner⁶ epitomise this approach. Human labour is used to make very high quality composts and to deep dig garden beds which are often raised. Planting is intensive but highly planned to allow each crop and individual plant to achieve it full potential. Homeopathic preparations such as the “500” spray are applied to soil at particular moon phases to increase soil biological activity, plant vigour and resistance of pests and diseases as well as quality of harvested produce.

John Jeavons classic Californian gardening book *How to Grow More Vegetables than you ever thought possible from less land than you can imagine*⁷ provides a less esoteric version of “biodynamic gardening” showing that a combination of human labour, design and very high fertility can produce staggering yields without the use of toxic pesticides or artificial fertilisers.

In other ways many of the design ideas associated with permaculture especially the integration of structures for maximising yield from small urban gardens also fit into the intensive biological model. Many of the permaculture books including Bill Mollison’s *Introduction to Permaculture*⁸ and Ross and Jenny Mars’ *Getting Started in Permaculture*⁹ give many ways to make better use of limited space and recycled materials to increase food production, but Robert Kourik’s *Designing and Maintaining Your Edible Landscape Naturally*¹⁰ is perhaps the most complete text for integrating intensive managed food production into modern living environments.

Another element in the intensive approach is the use of soil and leaf testing to determine the specific mineral deficiencies and using minerals to correct these underlying inhibitions to high yield, high quality and pest and disease resistance. The issue of what is “correct” testing, interpretation and remedies is hotly debated within the broad organic farming movement and for gardeners the cost of testing remains an obstacle. However there is a lineage of method beginning with the great American soil scientist William Albrecht¹¹ and

5 Rappaport, R. The Flow of Energy In An Agricultural Society in *Biology and Culture in Modern Perspective Readings form Scientific American* W.H. Freeman 1972

6 Steiner, R. Agriculture: A course of eight lecture BD Agriculture Association London 1972 and other books such as Koepf, Pettersson & Schaumann *Bio-Dynamic Agriculture: An Introduction* The Anthroposophic Press New York 1976

7 Jeavons, J. *How To Grow More Vegetable: than you ever though possible on less land than you can image* Ten Speed Press 1976

8 Mollison, B. *Introduction To Permaculture* Tagari 1991

9 Mars, R&J *Getting Starting In Permaculture* Candlelight Trust 1994

10 Kourik, R. *Designing and Maintaining Your Edible Landscape Naturally* Metamorphic Press 1986

11 Walters, Charles, Jr. (ed) *The Albrecht Papers* Acres USA 1975

continued today by some of the most experienced consultant agronomists such as Neal Kinsey¹² both in America and Australia which is showing that intensive organic gardens can benefit greatly by correcting remaining natural imbalances or ones induced by overuse of specific, even organic, fertilisers.

Pre-industrial models for modern intensive biological gardening can be seen in both eastern and western civilisations wherever the pressure of limited land and numbers of people have prevailed for long periods of time. F. H King¹³ described the intensive farming (read ‘gardening’ methods) of the Chinese at the turn of the century. King was an agricultural scientist who laid some the foundations for the debate about sustainability of food production and the need to recycle human waste.

Also from the turn of the century the Russian naturalist/anarchist Peter Kropotkin in *Fields, Factories and Workshops of Tomorrow*¹⁴ draws together the evidence for the practicality of super intensive garden scale agriculture based on the same French intensive horticultural methods which later became a source for John Jeavons’ methods.

The broad nature of the natural and intensive approaches are compared and contrasted by focussing on a range of functional characteristics. The following tables summarise those comparisons.

	Natural Gardening	Intensive Gardening
Form	Determined by natural site conditions, but often as a multi layered food forest with sunny edges and openings. Plant density reflects soil depth and moisture holding, rainfall and climatic factors.	Integrated with built environment, careful design and placement of structures to make optimal and multiple use of limited space and light as well as labour.
Process	Natural processes and limitation of seasons and soils dominate the system.	Human skill including design, culture and outside resources transform natural limitations of soil and climate.
Resource Inputs	Minimal capital or energy investment other than in the land.	Moderate capital and energy investment in structures, irrigation, initial plant stock, nutrients and mulches.

12 Kinsey, N & Walterns, Charles. *Hand On Agronomy* Acres USA 1993

13 King, F.H. *Farmers of Forty Centuries* Rodale Press (facsimile edition of 1911 pub)

14 Ward, Colin (Ed) Kropotkin: *Fields, Factories and Workshops of Tomorrow* George Allen and Unwin 1974

	Natural Gardening	Intensive Gardening
Physical Labour Inputs	Low input, mainly in establishment and harvesting.	High establishment input and then consistent labour in management as well as harvesting.
Information Inputs	Mainly from careful observation (can involve large amounts of time)	High external information input via seeds, pest control agents, soil tests, books etc.
Structures	Few built structures other than fences to exclude inappropriate animals. Materials used often grown on site (eg. bamboo)	Trellis, pergola, raised bed, terrace, attached solar greenhouse and shade house, small livestock housing, compost bays and fencing.
Soil Development	Nutrient pumping, foraging and fixing plant species including trees, green manures (including “weed” species), living mulches. Possible imported minerals and organic matter during establishment.	Balancing of deficient major and trace elements with rock minerals. Sheet mulch of imported materials mainly during establishment. Use of deep aeration forks and/or deep digging.
Fertility Maintenance	Naturally distributed manures from managed small livestock and wild animals. In situ decomposition of crop wastes.	Optimal recycling of on site vegetation, animal manures, household wastes, grey water and possibly human waste, via deep litter yards, hot compost heaps, worm farms etc. In BD use of ‘500’ and other homeopathic preparations
Irrigation	Minimal irrigation, use of natural runoff from hard surfaces etc. to swales and other absorption structures	Regular irrigation by hand or reticulation from reliable external water supply.
Perennials	Provide main framework and climate control with trees used as trellises. Seedlings and wild types accepted.	Physically separate from annual (often deep dug) beds but close biological interaction. Grafted stock selected and sited for multiple functions including shade and beauty. Regular pruning, use of dwarf stocks, multigrafts,

	Natural Gardening	Intensive Gardening
Annuals	Many self sown and hardy types including those adapted to minimal water and few added nutrients. Shade tolerant and long bearing. Higher yielding selected types mainly on edges and disturbed pockets.	Selected varieties for high yield, ability to use water and added nutrients, small size, disease resistance, shade tolerance and value as perishable food (eg. lettuce before potatoes). Close spacing, continuous cropping, companion planting.
Pest Control	Mostly by natural resistance and natural predators sustained by diverse garden and surrounding environment	Integrated pest management using resistant varieties, cultural methods, biological controls and introduced predators, lures and some use of low toxicity pesticides.
Weeds	Few plants regarded as noxious, most used as nutrient foragers, living mulches, animal feed. Persistent weeds eliminated in pioneer preparatory phase by animals (eg. pigs) or careful site selection, alleopathic barrier plants and full use of light.	Surface cultivation and/or mulch used to control germination and young weeds. Hand weeding to hot compost or animal feed. Persistent weeds eliminated during establishment phase by deep sheet mulching and follow up hand weeding. BD weed “peppers”.
Propagation	High proportion of self sown annuals, vegetative reproduction plus broadcasting and undersowing. Seed saving of a few key productive species and varieties. Grafting of self sown trees in situ.	Seed often purchased for wide diversity of varieties. Seedlings often raised in greenhouse for transplanting. Tree stock grafted (often multi grafted) to optimal rootstocks.
Animals	Periodic controlled direct grazing by suitable poultry breeds, beneficial wild animals (lizards and small insect eating birds) encouraged by diverse habitats and forage. Harvesting of wild pest species.	Small livestock (rabbits, poultry) in well managed deep litter yards or movable cages on lawn areas. Feeding and collecting of manure for composting. Very limited controlled foraging. Bees often on the roof of sheds.

	Natural Gardening	Intensive Gardening
Yields	Modest per unit area but high per unit of labour. With high skills and evolution over time, system may become very productive of a limited range of food crop plus abundant secondary and backup yields. High seasonal variation.	Exceptionally high productivity per unit area. With good design and management productivity per labour unit can be high. Wide range of valuable food crops with moderate seasonal variation.

This framework allows us to play with the apparently competing aims of productivity and stability. By characterising the extremes, existing garden models and recommended methods can be appreciated for the pro and cons and relevance to particular situations without judgments about what is right and wrong. In this way we can explore and accept a wide range of techniques, methods and options while remaining committed to evolving more sustainable and productive garden agriculture.

Most gardeners influenced by permaculture place more emphasis on the natural gardening approach but in its ideal conception permaculture design should aim to combine the minimal input self regulatory aspects of natural gardening with the people - friendly character and high yields of intensive biological gardening. In its broadest conception, this ideal is a new expression of the constant search within the organic movement for the “holy grail” of high productivity and sustainability [*so much depends on time/skill - see the “yields” row above*].

Inevitably most good permaculture gardens tend to lie somewhere between the two extremes described in the table with compromise and trades-offs rather than sublime synthesis being the norm¹⁵.

By adding another dimension to this polarity between natural and intensive gardening it is possible to integrate another apparently great polarity, in the search for sustainable food production that between the scientific and the spiritual. Proponents of both the natural and intensive approaches may understand and interpret their successes (and failures) in terms of hard scientific and pragmatic materialist explanations or alternatively in terms of spiritual attunement to esoteric (hidden) forces and beings. This divide may be philosophically much more contentious and confusing than the natural/intensive polarity but again an understanding of the spectrum allows everyone to see a broader context for considering what is appropriate.

¹⁵ I have to say that the worst examples of permaculture inspired gardens combine limitations rather than the advantages of both approaches. In these cases, the use of elaborate structures and massive amounts of imported organic materials are used to create jungles of a diverse range of marginally useful species which may or may not supplement the residents’ externally supplied diet.



WHOLE FARM AND LANDSCAPE PLANNING

*The original version of this article was written for the Post Graduate Degree in Sustainable Agriculture (by external study from Orange Agricultural College N.S.W.) and was presented to a seminar for South Australian Permaculture Design Course graduates in Feb 1992. It incorporated and refers to work done with Haikai Tané in New Zealand and the research work later published in **Trees On The Treeless Plains**. It reflects my long concern with melding and adapting a range of methodologies appropriate to larger scale farm and landscape planning with the better known permaculture site planning methods.*



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SUMMARY

Permaculture design and development projects have been informed by two very different approaches; site analysis and ecological models. While these have been useful and complementary, they are not adequate to deal with larger scale landscape planning and whole farm redevelopment. A broader range of approaches based on more fundamental ecological and systems theory concepts can contribute to the evolution of more sophisticated permaculture design methods for sustainable landuse.

The land systems concept integrates relevant information about landform, climate and biophysical resources of soil, plants and animals into a pattern language which is both ecological and geographical. It provides a foundation for sustainable land use planning and development which reflect permaculture principles.

The strategic planning process widely used in urban planning can be applied to whole farm planning where complexity and limited power and resources make master planning methods ineffectual or counterproductive. Any whole farm planning processes should address the four fundamental development streams of landscape, homestead, infrastructure and enterprise. This approach provides a framework for the integration of rural residential development and intensive integrated land uses as successional development phases.

Network analysis provides an additional conceptual planning tool which can complement zone and sector analysis in whole farm planning.

ECOSYSTEMS AS MODELS

In seeking to understand nature and applying those lessons to our own use of land and natural resources, permaculture has relied heavily on the ecosystem concept in which plants, animals and the physical environment form a functional and self regulating system. While the ecosystem concept has great value, it is not very good at dealing with the spatial geography of gardening, agriculture and land use planning. Geography, and the site design and land use planning professions, provide a diverse range of concepts and methods to deal with this critical spatial aspect of design.

THE SITE BASED APPROACH

The evolution of permaculture design has relied heavily on the site based approach even though broader geographical concepts¹ have been important elements in the permaculture design toolkit.

¹ The permaculture zoning concept was based on larger scale analysis by geographers of landuse distribution around towns and villages on the plains of Germany in the late 19th Century. Yeomans keyline farm landscape planning concepts were also central to permaculture. Mollison in **Permaculture: A Designers Manual** goes further to include broad landscape planning and land use allocation issues as "site factors" (pages 55-56)

The concept of ‘the site’ used in permaculture is similar to the use of the term by the design professions² to mean a limited parcel of land often focused on a central point which is generally a dwelling or building.

The site based approach to permaculture design has several advantages.

- Encourages small scale nucleated cellular development which reflects the natural growth patterns of organisms and human energy efficiency.
- Well suited to residential sites, the primary concern of permaculture designers
- Encourages distinct systems which reflect the particular nature of the site.
- Provides a focal point for applying the permaculture zone and sector planning tools.

Ideally broad landscape planning principles would determine development sites, but this is generally only possible in the design of new villages or homestead developments on larger farms. Elsewhere designers and owners are working within constraints determined by history and limited resources. Although examples of sound landscape planning, especially Yeomans’ keyline landscape design concepts, have been highlighted by Mollison in the *Designers Manual*, he provides no integrated framework for large scale landscape planning and design.

THE BIOREGIONAL APPROACH

Another approach to understanding landscape which Mollison has extensively used³ is the general patterns of design solutions which are relevant within broad climatic regions. More local permaculture design refines this process to develop bioregionally distinct assemblages of plants and methods towards a new “indigenous” culture of place. This process is very important and has only just begun.

OTHER APPROACHES

However there is a need for permaculture methodologies which can deal with broad acre farming and rural village at the landscape planning rather than site design level.

In my own development of permaculture design methods over the last two decades I have adapted a range of approaches to see how they complement, reinforce and reflect permaculture principles.

One of the conclusions of this work is that the same planning framework can be applied to make existing broad acre uses more sustainable, as well as fit new, innovative, intensive

2 See Lynch, K. *Site Planning* MIT Press 1971 a basic text I used when an Environmental Design student and Alexander, C. *Pattern Language* for a better understanding of the site concept

3 The whole layout and organisation of the *Designers Manual* reflects design solutions grouped by broad climatic regions.

land use and appropriate residential development into the landscape. These land uses can evolve in a successional way without the need to wipe the slate clean and start again with each change of ownership or input of new capital and resources. With the undesirable consequences of existing forms of rural residential development in Australia well documented, new forms based on sound planning and design principles are urgently needed⁴. Without appropriate rural resettlement it is unlikely for the intensive and fully integrated land uses envisaged in permaculture to develop because of shortages of capital, infrastructure, labour and skills.

THE LAND SYSTEMS CONCEPT

The land systems concept integrates information about climate, geology, landform, soils, natural vegetation and wildlife to identify land types which can be read in the field and mapped. At the simplest level it has similarities to vernacular ways of identifying different land types which focus on a dominant tree (eg Red Gum country) or soil and landform (eg black soil plains). It has evolved from principles put forward by Downes and others⁵ and used in a number of countries since the 1950’s as a basis for land capability planning, development planning control and land rehabilitation.

Land systems are generally considered to be “large and heterogeneous land units with a distinctive and repeating pattern of more homogeneous units called Land Components”. Land Systems are typically mapped at 1:50,000 or 1:100,000 scale while Land Components are generally mapped at 1:10,000 or 1:25,000

The greatest problem with the land systems concept is that the recognition, mapping and use of land systems information seems to depend on knowledge of several different scientific disciplines combined with skills in reading landscape, which are not formally taught in academia. Different land systems surveyors can come to different conclusions about system and component characteristics and boundaries. Different theories about past and present geomorphological, pedalogical and ecological processes can result in different conclusions about the nature of land systems.

In an attempt to standardise soil and land survey information, description of land and soil features follows agreed procedures and definitions such as outlined by McDonald et al⁶. These approaches do not include any judgments about land, soil or ecosystem formative and evolutionary processes. In my view this attempt to make land and soil surveying a more consistent process capable of being done by anyone with modest training does not achieve the holistic integrated understanding of landscape which is possible when surveyors are highly skilled and attuned to their environment.

4 See *Submission In Response to a Review of Rural Land Use in Victoria* David Holmgren Hepburn. Central Victoria May 1991

5 A more recent account of the principles and techniques is given by Gibbons, F. R and Haans, J.C.FM *Dutch and Victorian Approaches to Land Appraisal* Soil Survey Papers no.11 Soil Survey Institute: Wageningen, Netherlands [1976]

6 McDonald, R.C. Isell, R.F. Speight, J.G., Walker, J., and Hopkins, M.s. *Australian Soil and Land Survey Field Handbook* Inkata Press Melbourne 1984

Haikai Tané, my teacher on land systems took a much more flexible approach. He defined a land system as;

A heterogeneous land unit with a characteristic pattern of physical terrain, energy regimes and biophysical resources.

- Physical terrain include the bedrock or sediments which make up the landscape (geology) and the land shape (topography).
- Energetic Regimes (sunshine, heat, wind, rainfall and water movement, frost and fire) act on physical terrain via geomorphological and climatic processes.
- Biophysical resources (soil, plants and animals) are the results of interaction between physical terrain and energetic regimes over time scales from hundreds of millions of years to annual cycles and events. Biophysical resources are renewable resources useful to humanity.

In describing soil as a result rather than a primary determinant, Tané is reinforcing the Keyline and Permaculture concept that the characteristics of soil are amenable to change while the climatic and geomorphological processes are not as amenable to sustained manipulation on any substantial scale.

Native vegetation associations, generally dominant tree are often the simplest indicators of lands systems which can used by anyone able to identify local plants as a way into understanding local land systems. However tree associations are often characteristic of whole bioregions and inconspicuous ground flora or elusive animals may better reflect and characterise system and component units. Frequently key species regarded as totemic for aboriginal peoples will be missing due to land use history. The fact that indigenous ecologies were, at least in part, the result of long standing land management practices, combined with changes brought about by species extinctions and invasions and soil fertility changes, makes native vegetation a still useful but incomplete measure of any land system.

Soil descriptions do provide a more fundamental indicator of land systems but soil surveying and taxonomic identification is a highly technical field which few can understand, let alone interpret.

The land systems concept allowed us to describe and evaluate land independently of current land use priorities, values and economics to see the land more akin to how aboriginal people's understood it⁷. This understanding of underlying biological potential of land goes beyond simple notions of land capability defined by the absence of noticeable land degradation.

⁷ Ecologists in central and northern Australian have found aboriginal descriptions of land types closely match land systems descriptions

Where land uses do not make full use of the landscape potential and its resources, degradation in some form can be expected (reflecting the permaculture principle that unused resources become pollutants).

The failure of more simplistic land capability methods focused on more obvious erosion hazards to recognise the slowing emerging problems of dry land salinity and acidification is a powerful example of the need to better understand the underlying nature of landscapes and their patterns of variation.

An indication of the strength of the land systems approach is provided by the early studies done of Kangaroo Island in South Australia prior to clearing much of the island for agriculture. As a result of those studies in the 1950's, the leading Australian soil scientist Northcote warned the government of the day that salinity would emerge following the clearing of specific land systems as a result of hydrological changes in the landscape even though there was little direct evidence of salinity in the natural landscape. That advice was ignored and today landholders and the taxpayer are having to pay for remedial revegetation work.

Land systems provide a framework within which a deeper more context rich understanding of permaculture sites can be considered and a basis for broad acre whole farm planning and more intensive, including village, development. In particular, mapping of System and Component boundaries is recognition of the more subtle and unseen edges within landscapes beyond the more obvious ones depicted in the generalised descriptions in the *Designer's Manual* and other permaculture texts. If the creation of edges by farm development follow land system and component boundaries they are more likely to be efficient and sustainable while reinforcing an underlying landscape harmony.

Further permaculture design and development proposals would be less likely to include inappropriate or unworkable systems⁸. While the land system concept does not of itself define sustainable land use it does provide a sound foundation for their design.

Examples of my own mapping and interpretation of land systems is documented in *Permaculture in the Bush*⁹, and *Hepburn Permaculture Gardens*. In the first case, the development site is all within one land component. In the second the site straddles the boundary between two land systems. A casual survey of the surrounding district can identify other gardens or relevant land uses which are sited on similar land and can provide examples of what grows well and other land management hazards and opportunities.

It is interesting the degree to which people expect the land in a particular district to have the same characteristics and the surprise when they grasp the mosaic pattern of soils

⁸ For example; Very few high value fodder and food trees thrive on ancient, infertile, waterlogged or shallow soils. High density plantings cannot be expected to thrive in low rainfall areas without irrigation.

⁹ Holmgren, D. *Permaculture In The Bush: The design and development of a homestead on the far south coast of N.S.W.* Nascimanere 1992

and land systems which is the norm across almost all landscapes. Where government Land Systems studies are available I use these as a base from which to more specifically interpret and map land units at a scale relevant to property planning.

WHOLE FARM PLANNING

While land systems provide an excellent foundation for permaculture landscape, farm and community planning and design, they are only one element in the planning, design and development process.

In the *Designers Manual*, Mollison explores several different methods of design, indicating some of their strengths and weaknesses. More broadly permaculture designers have drawn heavily on site design methodologies of the architecture and landscape architecture professions. For larger scale projects, the master plan which outlines all the physical elements for later detailed design and specification has been used.

The trouble with master plans is that they almost invariably need radical modification due to unforeseen problems and opportunities which emerge during the process of development. This is especially the case when dealing with complex and evolving systems.

Long ago the urban planning profession abandoned master planning as too rigid and inflexible for dealing with the complex nature of cities where the planners could not control all factors or even fully understand their influence.

To deal with complexity of cities urban planners adopted strategic planning¹⁰. Today strategic planning (in name at least) is everywhere because rapid rates of change and complexity have made it a mandatory minimum.

In dealing with novel and evolving living complexity, permaculture planning and design must use methods with maximum flexibility.

Strategic planning can be applied in many ways but the core concept is the development of a strategy which embodies your objectives without being specific about the precise forms of designs which will express that strategy.

The strategy planning process can be seen a series of steps with feedback at each to refine the previous steps. Thus in practise the process can be closer to the apparently chaotic processing of informal decision making where we start out with some information and ideas which are refined in the light of experience.

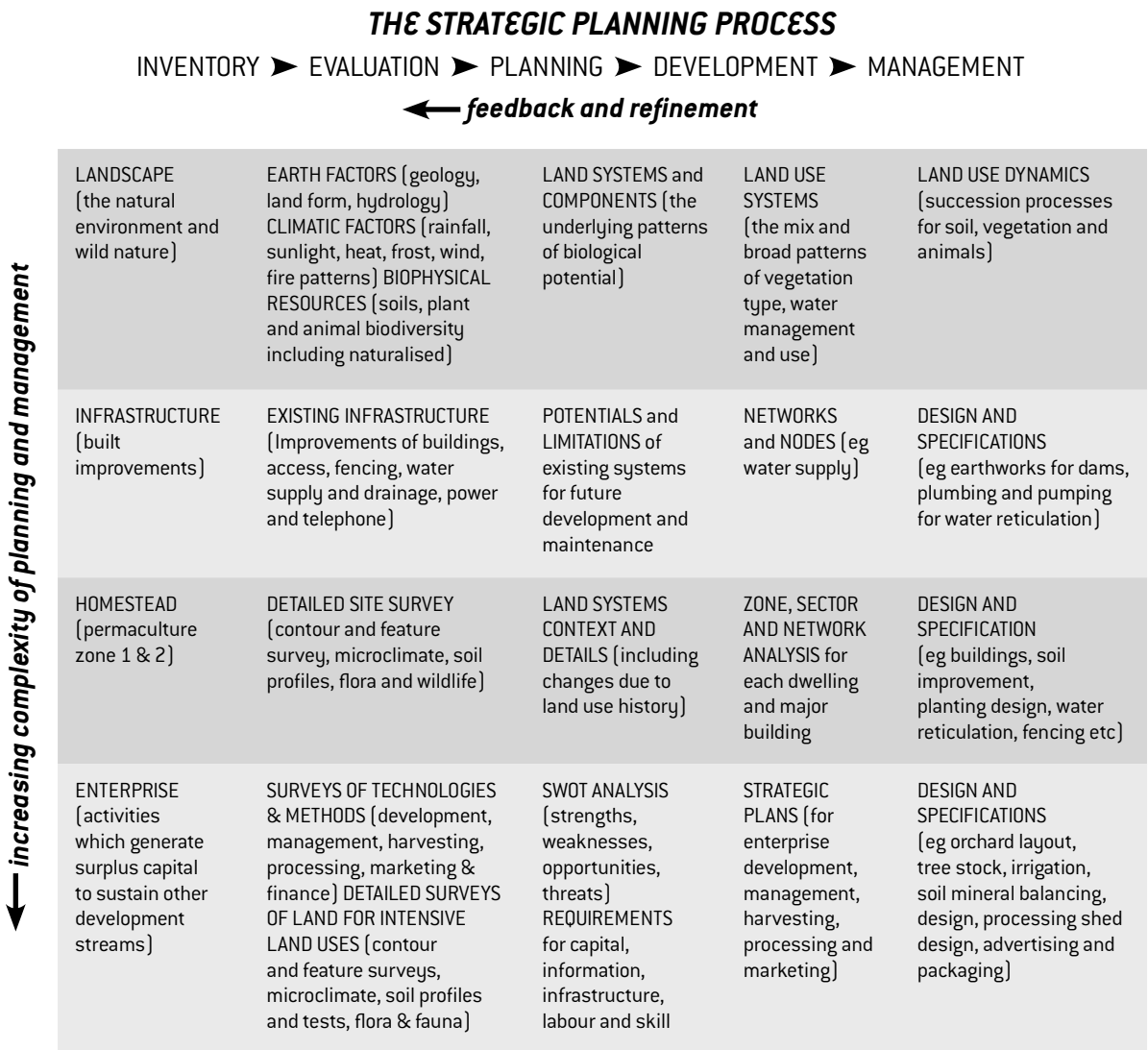
10 Strategic planning was developed by military planners who accept uncertainty, complexity and uncontrollability as the normal decision making environment. General Eisenhower once said, plans are useless but planning is essential.

I see the steps in the strategic planning process as follows:

- **Inventory:** collection of relevant data
- **Evaluation:** organisation of data into comprehensible patterns
- **Strategy:** general directions and frameworks for development
- **Design:** particular forms which express the strategy
- **Management:** process of physical creation and management

The following chart¹¹ illustrates the application of this process to permaculture (whole) farm planning. Any farm consists of an interweaving of the four development streams of Lands, Infrastructure, Homestead and Enterprise.

THE FOUR DEVELOPMENT STREAMS OF PERMACULTURE FARM PLANNING FOR INTENSIVE LAND USES



11 Adapted from *Developing A Tree Crop Farm* by Tané, H & Holmgren, D. paper to the 1984 New Zealand Tree Crops Conference. These ideas were further developed and applied in Holmgren, D *Trees On The Treeless Plains: A Revegetation Manual for the Volcanic Landscapes of Central Victoria* 1987 Report to Project Branchout and published in 1994 by Holmgren Design Services.

Landscape is the natural foundation which can be best described using the land systems methodology. Land use degrades and/or evolves the landscape and its biophysical resources. Sustainable land use focuses the natural forces towards providing for human need while continuing to perform the landscape’s essential functions.

Infrastructure is all the built “improvements” added to landscape which facilitate or enable the land use but are not its purpose such as fencing, water supply, access, maintenance facilities, power supply and even shelter. Sustainable planning of infrastructure reflects and reinforces the natural landscape and its boundaries rather than ignoring or masking them. Landform fencing is a common example.

The **homestead** is the domestic environment of the farm, which tends to be ignored in more conventional approaches to farm planning. The domestic (non commercial) aspects of the farm correlate roughly to the permaculture zones one and two. It is a microcosm of the farm which can;

- provide some household needs more efficiently than the monetary economy
- be a refuge during environmental or economic catastrophe from which farming can reestablish.
- provide a testing ground for new ideas, processes and species before they are applied on the broad scale.

The **enterprise** is the economic engine of the farm, linked to the wider society and economy. Husbandry, hard work and management have traditionally been seen as the keys to making a living from farming. Today it requires consideration of design at one end of the business, especially where tree crops and other new land uses are involved, and marketing and finance at the other end where the customer and partners have become critical players.

Each development stream has its own dynamic and critical factors, all are important but there is an increasing complexity of planning and management as we move from landscape to enterprise, especially in the case of intensive land uses. However the landscape and its free ecosystem services always remain the foundation and reference point for sustainable agriculture. Experience with land degradation shows that the complexity of planning, and the management to rehabilitate landscapes, are great.

INFRASTRUCTURE NETWORK DESIGN

The concept of the site is central (literally) to permaculture design but site selection for rural homesteads depends on understanding the opportunities and constraints created by landscape and infrastructure. Analysis of farm landscapes will often show many sites with good homestead potential (eg good drainage, gentle slopes, favourable aspects etc) for development. Consideration of access, water supply and power will often determine

if and how that potential might be realised. Where several activity centres or nodes are planned, the networks which link the nodes (eg access and water supply) become critical to the effectiveness of the total design. Using a scoring card to sum multiple factors can often be useful in making a decision between alternatives¹². Once a site is selected there are considerable savings in energy and resource use from close clustering of farm facilities and intensive land uses around the homestead site using the zoning concept. A farm with a house on a hilltop, sheds at the front gate and garden on the river flat may appear to reflect good individual site selection but difficulties in transport and communication between these separated activity nodes results in wasted time and energy as well as impeding integration between functions.

On the other hand the homestead as a focal point for clustering of all activities using zones and sector analysis has its limitations.

- Firstly the size of a site may not be large enough to accommodate all functions without excessively compact development or spreading across unsuitable land. This is often the case in steeper landscapes and on commercial farms where processing facilities, animal yards and other facilities require more space than all of the domestic (non-commercial) homestead facilities.
- Secondly physical separation can sometimes be an advantage to reduce adverse impacts or create new opportunities. For example large scale farm business facilities may involve noise or smell not compatible with a homestead. While permaculture design should aim to both integrate the living environment with its means of support and keep enterprise activities small scale and environmentally benign, some degree of segregation may be necessary. A farm retreat cottage is generally more attractive when at a remote location.
- Thirdly integration between functions can require physical separation. For example a high barn on a ridge top access entrance to the homestead providing gravity supply tank water to a homestead on the lower slopes creates a bi-nodal development pattern¹³ where use of slope (gravity) becomes more important determinants of location than zones and sectors.

Taking this idea further it can be seen that the location of infrastructure serving any activity node becomes a powerful factor changing the location and relationship between the permaculture zones. For example the easily accessed and monitored edge of a long driveway becomes a natural place to extend homestead plantings (the traditional driveway avenue). A water main from a distant supply dam provides opportunities for linear extension of irrigated plantings close to the water main. Perhaps most importantly

12 See both *Permaculture In The Bush* and *Hepburn Permaculture Gardens* for examples of this design tool.
13 See Mollison *Permaculture: A Designers Manual* (figure 3.11 and figure 7.2)

landform fencing which constrains and directs vehicle, animal and pedestrian access will extend and constrain zones.

In the design of rural villages and hamlets, and more complex farms characterised by

- multiple integrated land use enterprises
- more than one residence
- significant on farm processing facilities or farm tourism,

network analysis of landscape and infrastructure with multiple nodes of activity become critical to practical and sustainable design.

Indicative evaluation of traffic and material flows along access routes, pipes and wires is often required to see how the generators and receivers of flows can be arranged in clusters, daisy chains and parallel circuits. The design of informational network and industrial processes offer insights, patterns and models which could be adapted to whole farm and landscape planning.

KEYLINE PLANNING

On many farms in sub-humid landscapes keyline planning¹⁴ will reflect and reinforce a lands systems analysis and provides a sound basis for such network planning. Dams can be considered as the nodes where runoff is directed by contour diversion channels and pattern plowing. Flood channels, pumps and pipelines distribute the water from dam which are themselves potential activity centres for wildlife, aquaculture and recreation. Sensible location of roads and tracks along ridges and beside collection channels and crossing dam walls can then be determined which provide vehicle access to the whole landscape and reinforce the water harvesting and distribution systems as the dominant feature of the landscape.

A network of vehicle access routes with intersections and loops which will offer the greatest flexibility in land use will then become evident. Intersections of access routes on generally sloping or flat well drained sites will generally have appropriate relationships to the water harvesting network for development as houses or other activity centres. Thus development sites can be seen as the nodes or activity centres of the access network which are almost diametrically opposed to the dams in the landscape on gentle slopes of ridges with good water and cold air (frost) drainage, water supply options, microclimate modification, fire protection, recreation and other benefits.

The advantage of this method is that it reveals all the potential dam and development sites and allows for current land use without precluding future intensification of landuse and settlement patterns. For example, appropriate uses of a prime dam site may include grazing and cropping but generally not orchards or timber plantations and certainly not house sites.

14 see Chapter 7 of the Mollison *Permaculture: A Designers Manual* and Yeomans *Water For Every Farm*

In a similar way potential road locations can be used as vehicle access routes across open paddocks with upgrading dependent on future development so long as new fencing or tree plantations across or along the route are avoided. Where short term uses are incompatible with long term optimum potential, the use should ideally have achieved its purpose, paid for real cost of establishment and use infrastructure which can be salvaged before the need for the long term potential is likely to be realised. This example of strategic planning provides a context for the application of the options approach described by Mollison¹⁵.

VOLCANIC LANDSCAPE PLANNING

The classic keyline analysis may not always be appropriate but the principles of network analysis can still be used. For example in the cool temperate volcanic landscapes of southern Australia¹⁶ with deep free draining red soils, dams are restricted to drainage lines with springs and/or water holding soils. The shape of the land does not follow the classic keyline form of primary and secondary ridges and valleys and the absorbent soils shed little in the way of runoff to dams. Moisture holding soils and good quality ground water mean keyline analysis and water harvesting and distribution strategies have more limited application. On the other hand, the elevated, flat and relatively treeless nature of these landscapes makes wind exposure, and shelter to ameliorate it perhaps the most critical landscape planning issue. In these landscapes, a network analysis of existing and possible shelterbelts and other plantings, can identify nodes where shelterbelts intersect wood lots and other treed and naturally sheltered areas, which become the activity centres or development sites for homesteads, animal yards and barns, orchards and other intensive land uses etc.

If planning and design of farms is to be sustainable then it must be flexible enough to provide for existing occupants and land uses while allowing future occupants and land uses to be accommodated by building on and complementing existing developments. Keeping land use options as open as possible is most important in a rapidly changing world. Of even greater importance is the need to move away from the slate being wiped clean each time there are changes of ownership, landuse and subdivision. The decay of farm homesteads and infrastructure when land is subdivided for houses, the loss of paddock trees when new vineyards are planted or the wholesale replacement of farms by pulpwood timber plantations all waste existing assets and values, in the same way that urban redevelopment generally starts with demolition of existing buildings. When each phase of settlement of more people in the landscape or addition of new and more intensive land uses can be accommodated in a way which build on and reinforces good existing design we are closer to the essence of sustainable development.

15 section 3.5 Mollison *Permaculture: A Designers Manual*

16 See Holmgren, D. *Trees On The Treeless Plains: A Revegetation Manual for the Volcanic Landscapes of Central Victoria* Holmgren Design Services 1994



DEVELOPMENT OF THE PERMACULTURE CONCEPT

*This article was written in December 1991 and an edited version was published as **Uncommon Sense in Permaculture International Journal** (issue 44) September 1992. It provides some perspective and context on permaculture and its influence and evolution after 15 years in the public domain. This article also formed the outline for a well promoted public lecture on permaculture presented in Bendigo and Ballarat in early 1992 as well as a later presentation to a large public audience as part of the National Permaculture Conference in Adelaide in Feb 1995.*



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Permaculture means different things to different people and even its advocates are not clear about the boundaries of the concept or its potential applications. These uncertainties stem from the holistic nature of the concept and its progressive development since first enunciated by Bill Mollison and myself in the mid 1970's.

The original conception of permaculture (as outlined in the book, **Permaculture One** in 1978) was of an agricultural system based on perennial plants, modelled on natural ecosystems and developed through the application of design. The aim was a permanent agriculture which could sustain the needs of current and future generations.

SUSTAINABLE DEVELOPMENT

The more recently developed concepts of *sustainable development* and *sustainable agriculture*¹ are clearly related to the central notion of permanence at the heart of permaculture.

The sustainability debate has shown a very deep confusion about the processes and systems which support life and humanity. The lack of conceptual tools to incorporate previously ignored free environmental services into calculations used by economists and decision makers is painfully obvious.

The work of systems ecologist Howard Odum² which strongly influenced the development of the permaculture concept provides a theoretical framework and accounting tools for sustainability but is today largely unknown or ignored.

ENERGY ACCOUNTING

In the 1970's there was a flurry of research in this field but it declined along with oil prices in the 1980's. Odum was one of the leading ecologists who developed a systems approach to the study of human/environment interactions which used energy as a currency to compare and quantify the whole spectrum of natural and man made elements and processes.

Within the permaculture movement, Odum's work has not been widely recognised (and confused with the work of his better known brother Eugene Odum) even though it confirms permaculture's concern with sustainable use of natural systems as the foundation of any permanent culture. Mollison makes only passing reference to this work in **Permaculture: A Designers Manual** (page 13).

Odum's work shows clearly there are no "free lunches" and that although natural systems can provide a sustainable basis for human needs, they will never be able to sustain a high energy industrial society. The transition from an unsustainable fossil fuel based economy,

¹ Reeve, I *Sustainable Agriculture: Ecological Imperative or Economic Impossibility?* Rural Development Centre UNE Armidale 1990

² Odum, H *Environment, Power and Society* Wiley 1971.

Odum, H. & Odum, E. *Energy Basis for Man and Nature* McGraw Hill 1979 provides an accessible text on this important work.

back to a solar based (agriculture and forestry) economy will involve the application of the embodied energy that we inherit from industrial culture. This embodied energy is contained within a vast array of things, infrastructure, cultural processes and ideas, mostly inappropriately configured for the “solar” economy. It is the task of our age to take this great wealth, reconfigure and apply it to the development of sustainable systems. The most potent and flexible embodied energy lies within people, especially in self aware and self directed individuals.

Mollison (in **Permaculture Two**, 1979) makes it clear that permaculture is a design system for the integrated provision of human needs rather than simply a system of garden agriculture. The notion of consciously-designed productive landscapes was one of the claims for permaculture as a new concept. While traditional sustainable landscapes (eg. S.E. Asian rice paddy culture) reveal remarkable design, these systems evolved over many generations largely through trial and error and worked from a limited natural and cultural heritage. Today we are in a position to bring together elements from many bioregions and cultures in designed systems.

Mollison claims virtually no limit to the productivity of highly evolved permaculture systems; without high labour or capital (energy and materials) inputs. Even more modest claims of permaculture productivity depend on intensive information inputs substituting for labour and capital. A bioregional species collection and a thoughtful gardener with a basket and secateurs may not be the prevailing image of the “information age” but they are practical expressions of the genetic resources from across the globe and interactive human design processes which are gaining mainstream recognition as central to the information age.

Odum’s more recent work shows that information systems in natural and human systems are energy intensive to develop and maintain. Even the embodied energy in human potential, although more durable than industrial and urban infrastructure and tools, may depreciate over time in a low energy future society. This is a very uncomfortable realisation for all of us raised on the mythology of material progress and human invincibility but there really are no free lunches (over the long run).

PERENNIAL AGRICULTURE

Permaculture is about design of systems from “first principles” rather than accepting existing industrial agriculture as a starting point. The principle, derived from observation of ecosystems which led to the conception of permaculture was that stable and productive terrestrial ecosystems tend to be dominated by perennial plants and in particular trees. Thus agriculture should be constructed in like fashion using species selected for their usefulness to people.

That agricultural systems should be modelled on natural ecosystems if they are to be sustainable is now a more widely accepted concept but the application of the concept

remains problematic. Perhaps the greatest conceptual breakthrough in the agricultural mainstream has resulted from the land degradation problems of salinity and acidification. In essence, these problems stem from a lack of deep rooted and perennial plants capable of using soil water and nutrients. Trees, shrubs and deep rooting perennial grasses and pastures are now recognised as essential components of sustainable agricultural landscapes. The revegetation required is massive in scale and requires the design of productive systems which can provide useful yields while performing the essential passive functions of stabilising the landscape. My own work³ for Project Branchout in Central Victoria uses permaculture principles towards this end.

However, ideas of a tree crop agriculture colonising much of the land currently devoted to annual crops and pastures is unrealistic at least in the Australian environment. There is no doubt that better selection and establishment techniques offer great potential to expand the range of many tree crops beyond the garden and orchard. However, the old and highly weathered soils and low rainfall of Australia suggest that very few trees which provide human food directly are vigorous enough to be a major component of broad acre landscapes.

STRUCTURAL MODELS

On the other hand, the relatively limited areas which are suited to such development still represent vast areas (relative to Australia’s population). In the wet sub-tropics and tropical regions, the permaculture vision of multiple layered highly intensive mixed forest systems has been most widely applied, reflecting many indigenous tropical systems. In cooler areas, the limited factors of light and heat have resulted in systems more akin to traditional European patterns such as the mixed orchard with herbal leys surrounded by hedgerows, while in drier areas, systems reflecting the structure of savannah woodlands have been successful with dense plantings at special sites on the oasis model.

KEYLINE

Permaculture has been partly responsible for the revival of interest in Keyline, a water management, soil development and landscape design system for broad acre agriculture developed by P.A. Yeomans in the 1950’s. Keyline provided an ideal broad scale land development framework within which more intensive permaculture systems could be applied. Like permaculture, many aspects of keyline are now incorporated into mainstream agriculture although integrated examples remain a rarity on the ground.

SOIL IMPROVEMENT

One of the common ideas between keyline and permaculture is with respect to soils. Both concepts place little importance on existing soil fertility as this is a fairly ephemeral aspect

3 Holmgren, D. *Trees On The Treeless Plains: Design guidelines for revegetation of the volcanic landscapes of Central Victoria* 1987 (published by HDS in 1994)

of land which can be consumed or created. However, the notion of soil building rather than simply soil conservation (removing soils as a limiting factor to land use), was overstated in *Permaculture One*. Soil characteristics, if not superficial fertility and suitability to cultivation, are critical issues in permaculture design. While it is possible to turn relatively inert or degraded soils into friable, living fertile soil using appropriate methods, creating soil out of old weathered clay or sand subsoils or rocky substrates is a much more problematic.

TREE CROPS: ECONOMIC BOTANY

The work of J Russell Smith⁴ in describing the unrecognised (by western agricultural science) values of tree crops provided evidence of the historical precedents and productive potential of tree based agriculture.

Further exploration of the field of economic botany confirmed the great diversity of plant (and animal) materials which were potentially available for the design of cultivated ecosystems. Thus permaculture was clearly a divergent response to the convergent focus of industrial agriculture on a narrowing genetic resource base in a few highly bred annual crop plants and animals. In retrospect it can be seen that permaculture was part of a great upsurge in interest in economic botany worldwide.

In Australia the most dramatic expression of this has been the research and popularisation of bush foods. At the time *Permaculture One* was being researched the only sources were from the 19th century⁵. Since then there has been a proliferation of new research, books, television programs, nurseries, etc. associated with bush foods.

The development of specific husbandry and management techniques, as well as the use of particular species, has been closely associated with the permaculture concept. This is a historical accident which arises out of the popularisation of the concept and the now widespread use of some of these techniques and species.

The early focus of permaculture on economic botany has led many to conclude that it is essentially about the growing of unusual crops. However they were only ever examples of the unexplored potential for design of sustainable systems. Permaculture is no more dependent on the usefulness of feijoas than it is on value of apples. Since the revival of economic botany, permaculture literature and practice has focused increasingly on the design of systems and placement of plant, animal and built materials within those systems. This is not to say that the enormous potential of new (and old) crops has been adequately addressed but at least there is enough ongoing interest to ensure that both practical work and some research will continue to provide new resources for permaculture designers to incorporate into systems.

4 Russell Smith,J. *Tree Crops: A Permanent Agriculture* Devain Adair 1953.
5 Maiden, J.H. *Useful Native Plants of Australia*. Compendium 1975

ABORIGINAL LAND USE

As well as advocating the use of native plants and animals, indigenous land use practices were acknowledged in *Permaculture One* as one sustainable model of resource management from which we could learn⁶. Since then ecological and archeological evidence has confirmed the complex cultivated nature of Australian landscapes prior to European settlement. Gradually some indigenous approaches are being incorporated in land use and natural resource management concepts.

NATURAL FARMING

The publication of Fukuoka’s *The One Straw Revolution*⁷ in 1978, the same year as *Permaculture One* was first published, had a great influence on Mollison (see his book review and article *Permaculture Journal* no.3, 1979) and the development of the concept. Fukuoka’s philosophy, observational methods and incredibly productive results provided a valuable example for permaculture to counter the criticisms of it being theoretical and impractical. Fukuoka’s methods provided a framework for incorporation of annual grains into permaculture.

The apparent simplicity of Fukuoka’s methods led to unreal expectations by the inexperienced, and disbelief by farmers. However, the rotations used by Fukuoka (explained in later books) reveal a sophisticated system evolved from an already sustainable and productive traditional land use system in a rich and fertile landscape by brilliant observation and endless perseverance.

Attempts to apply his methods have not necessarily been successful because any sustainable system is context and site specific. However, farmers inspired by Fukuoka or working independently have developed similar methods to produce organic and biodynamic grain. The techniques of growing grains and legumes together, over sowing of crops with no intervening cultivation or use of herbicide, appropriate use of flooding, and animals for weed control are now accepted in agriculture as at least possible. Recent research work by C.S.I.R.O.⁸ on vegetable growing using living mulches and green manure crops (including Clever Clover) without cultivation reflect as least the conceptual influence of Fukuoka’s work.

Perhaps the most universal aspects of Fukuoka’s work, the learning from nature, remains the most difficult for people to adopt and without that no amount of technical information on permaculture will lead to sustainable systems.

6 See *Aboriginal Land Use* for my own explorations of these ideas
7 Fukuoka, M. *The One Straw Revolution* Rodale Press 1978 and *The Natural Way of Farming* Japan Publications 1985.
8 Anon. *Good crops, and an end to soil damage* in ECOS no.69 Spring 1991

SOCIAL CHANGE

Permaculture was proposed as a bottom up evolving system of agriculture which developed directly from human needs expressed at a site and a bioregion rather than a system for modifying existing industrial agriculture. In that sense it was proposed as a truly alternative system which saw unsustainable industrial agriculture and culture as essentially doomed to collapse.

While the timing and process of that collapse were misjudged at the time, today the evidence of unsustainability is far broader and more serious, despite substantial progress in some areas.

The radical perspective of permaculture has also been widely criticised as unrealistic and impractical for affluent western nations. Mollison has continually maintained that we have no choice but to develop local self reliance, but through the 1980's social and economic conditions were very corrosive on any attempts to do so. If economic recession continues in the 1990's then we can expect more action towards local self reliance, though "official" information systems may fail to adequately document these shifts.

ORGANIC AND BIODYNAMIC AGRICULTURE

It is important to realise that permaculture emerged out of a social context in Tasmania with many of the elements of a self reliant rural culture still reasonably intact and a wealth of natural resources from which to create sustainable systems. It is interesting to note that much of the new small scale economic activity in Tasmania has involved value added transformation of neglected or undervalued natural resources such as timber, fish and dairy products.

Much of the new farming/manufacturing enterprises in Tasmania are organic or biodynamic reflecting the strength of these movements in Tasmania. Permaculture can be seen to have emerged out of the organic movement in Tasmania, with the first published outline of the concept in *The Organic Gardener and Farmer* Vol 1. no 1 Feb 1976 published by the Tasmanian Organic Gardening and Farming Society of which Bill Mollison was a foundation member. Today many organic and biodynamic small farmers and gardeners are using a permaculture design framework.

With the development of permaculture as a world wide movement, much of the permaculture activity has shifted to the Third world where sustainable traditional systems are collapsing due to the catastrophic impacts of global industrial culture. The potential (and desperate need) to leapfrog over industrialisation to an information rich but local and autonomous land-based post industrial culture is increasingly recognised in the Third world.

GARDEN AGRICULTURE

Meanwhile the affluent First world has so far managed to deflect and defer the more severe impacts of unsustainable industrial culture (often onto Third world people). However, the commitment of Australian and First world permaculturists to small scale (garden) agriculture producing most food needs at a local level and the growing of food being a part of the culture (rather than a segregated extractive industry) is still strong. The development of these garden agriculture systems appropriate to the suburbs and small rural allotments has been the main activity of permaculturists. Gradually, bioregionally-based design models, techniques and species are emerging and being more widely taken up. Sheet mulch garden establishment techniques, multi-tier mixed gardens and fire resistant landscape design are examples which have gained wider acceptance.

As establishment techniques using organic wastes have become more widely applied, the emphasis in permaculture has shifted to soil improvement through use of legumes and other species grown in situ. This expresses the general strategy of using non renewable resources to establish systems which can then sustain themselves. As in the application of sheet mulching, use of legumes has its limitations and in a country where organic and nutrient rich materials are still being wasted there remains little incentive to make efficient use of on-site and grown materials.

PERMANENT CULTURE

Implicit in the conception of permaculture was the notion of a permanent culture. The focus on agriculture was because it is primarily through agriculture that people's most basic needs are provided and that people without a healthy interdependence on their natural resource base have no hope of maintaining a durable culture and society.

More recent definitions of permaculture⁹ emphasise design as the central activity which brings together physical, social and conceptual components into a beneficial assembly of components in their proper relationships. The aim is productive and symbiotic relationships between elements and ameliorating or deflecting competitive relationships between elements rather than being particularly concerned with the elements themselves.

The consideration of social components such as legal, economic and cultural factors and further development of the philosophical and ethical basis of permaculture has been driven by the recognition that these factors are critical to any development of sustainable land use. Ethical investment, LETS, community credit and other formal and informal monetary systems have become associated with permaculture. Projects such as Crystal Waters have applied body corporate land tenure within a permaculture design framework.

9 Mollison, B. & Slay, R. *Introduction to Permaculture* Tagari 1991

PATTERN UNDERSTANDING

Mollison¹⁰ has expounded his ideas on pattern understanding. Drawing on indigenous cultures and new explorations in science and mathematics, particularly chaos theory, he shows some of the applications of pattern understanding to permaculture design. These abstract concepts were part of the foundation of permaculture (Permaculture Tree in *Permaculture One* page 96-97) but the integration and application of the concepts by permaculture practitioners remains fragmentary. My own work in “reading landscape” parallels Mollison’s at a more prosaic level and emphasises that direct observation of natural system models rather than book learning is central to permaculture design.

PERMACULTURE INFLUENCES

On one level, permaculture can be seen as a set of ethical, conceptual and technical ideas directing the practice of a world wide movement. Advocates of permaculture generally regard the movement as at the cutting edge of the push towards sustainable development and agriculture. Much of the work of the movement has focused on extension of the ideas, especially through two week intensive residential courses. There are now a large number of people including farmers and small holders who are using and adapting permaculture in their own ways as a result of doing courses, attending field days and workshops and reading the books. However, the number of publicly accessible and well documented projects specifically identified as good examples of permaculture are few and far between.

The television documentary series “The Global Gardener” showed Bill Mollison visiting various permaculture projects around the world. While some of these have been directly inspired by the permaculture concepts, others simply illustrate strategies and systems which permaculture has promoted. In this way permaculture has worked to bring important ideas and examples to a wider audience.

Keyline is the most obvious example while many indigenous and Third world systems, technologies and ideas have been incorporated into permaculture. While recognition of the value of these systems may be increasing anyway, permaculture has been at the forefront of integrating these old systems into a post industrial framework.

Permaculture has been an influence in more subtle ways also. There are many mainstream and high profile projects where permaculture has been an influence in the conception of the project or on the attitude and approach of those involved¹¹.

It can be argued that permaculture has been a catalyst contributing to creative new directions by thinkers and practitioners who are at the forefront of sustainable land use. These people are generally identified with much more mainstream concepts and

10 Mollison, B. *Permaculture: A Designers Manual* Tagari 1988
11 See story about Terry White and Project Branchout in *The Landcare Movement: Community Based Design and Action On A Scale To Match The Continent*

fields such as whole farm planning, land care, agroforestry, third world development, the planning, landscape design and architecture professions.

They may not identify what they are doing as permaculture for one or more of the following reasons:

- Lack of confidence that their work fits within permaculture or is a significant outcome of the application of permaculture.
- Fears of being marginalised within their field by association with such a “radical alternative”.
- Their own criticisms of the permaculture movement and its promotion as selling a simplistic message to the public and maintaining exclusive control over the concepts.

It is impossible to tease out cause and effect influencing projects and people, the historical significance of which is still unclear, given the rapidity of change. However, it does illustrate that the most far reaching effects of ideas can be through relatively invisible personal and social processes which only the perspective of history can assess.

What is certain is that we are now in the vortex of multiple paradigm shifts, environmental change and social upheaval which are transforming our world. During such periods of history¹² the actions of apparently insignificant individuals and small groups (rather than governments and institutions) tend to be central to the distillation of new cultural forms and processes appropriate to the, as yet, unclear new environment. In the permaculture movement, along with the faith that we are part of the solution, we need the strength and energy to lead by example, the humility to recognise our failings and the intelligence to acknowledge positive action from any quarter.

David Holmgren
Hepburn, December 1991.

12 Thompson, W.I. in *Journal of the New Alchemy Institute* Stephen Green Press



LAWNS, MOWING AND MULCH IN PERMACULTURE

This article was written for publication in the International Permaculture Journal in 1993. It was in part a response to what I saw as excessively negative attitudes to grass, pasture and lawns by permaculturists. It explores the role of pastures and lawns in small scale permaculture systems to show how design, management and even attitudes can make the difference between inappropriate and appropriate system elements. In permaculture, it is essential that we continually question our most self evident ideas if we are to avoid dogmatic beliefs and be successful in establishing sustainable systems.

Fresh from slashing the orchard during the peak of our spring pasture growth season, I am inspired to outline some of my thoughts on the role of pastures and lawns as mulch-producing systems in permaculture. These are ideas I explain with iconoclastic pleasure to tour and course participants at Hepburn Permaculture Gardens as a foil to any fixed prescriptions for permaculture.

Any sustainable system, unless very small and intensive, should generate the majority if not all its organic matter requirements (mulch and manure). In permaculture, we have emphasised the use of large quantities of imported mulches where these are available as waste products. Sheet mulching using such materials is a very successful garden establishment technique.

Once established, permaculture systems require much less mulch, but many gardeners find that what they generate is not sufficient. A chipper to convert excess shrub and tree biomass, especially fast growing legumes so enthusiastically planted by permaculturists, is often the answer. Weed and chemical free home grown mulch. What could be more sustainable? However, analysis of the embodied energy in the chipper and its running costs would show this is hardly sustainable. The price tag on a well engineered chipper is at least a partial reflection of these energy costs embodied in the chipper.

Now I don't want to give the impression that every decision must necessarily satisfy strict sustainability criteria. Many strategies can be seen as part of a progressive transition to sustainable systems. If some use of machinery is acceptable (at least in affluent countries) then what about the pastures and lawns which we are so enthusiastically mulching out? Maybe designing to retain some of these vegetation systems for mulch production is not such a bad idea.

Any experienced permaculturist knows that a good stand of grass and clover provides a fantastic base to a sheet mulched garden. At Hepburn Permaculture Gardens we have gone further in actually sowing pastures and lawns for later mulching out. Grass/clover mixtures plus volunteer weeds followed by seasonal cutting is one of the least cost ways to improve soil and provide surplus mulch. This is especially true in cool temperate climates where pastures grow almost year round.

ZONE I

The lawns immediately adjacent to the house at Hepburn Permaculture Gardens occupy excavated and filled areas which have less than 75mm of topsoil. (We reserved most of our topsoil salvaged during excavation for deep garden beds). A shaggy profusion of clover, grasses and weeds is not most people's idea of a lawn but it provides a low cost outdoor recreation space as well as being an element in the bushfire resistant design. In the late summer, the clover dies from lack of moisture but rye grass, dock, plantain and other weeds maintain a more or less green ground cover in our climate.



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Regular but infrequent cutting (at least 50mm above the soil level) allows the roots to grow deep and yields a large volume of fine mulch, free of weed seeds and ideal for mulching around seedlings in the adjacent raised timber vegetable beds. A reconditioned 1957 Victor lawn mower is getting close to a sustainable (if not the quietest) harvesting equipment available. A razor sharp scythe in the hands of a highly skilled and patient operator is the truly sustainable solution. A final value from the lawn is as a fresh green feed source for young chicks in an A-frame. On the lawn they can be monitored from the house, moved daily and kept separate from any possible disease contamination from the main poultry flock on range in the orchard pasture.

With the high clover content, nitrogen fertilisers are unnecessary. On the other hand, intensive harvesting of mulch from lawns and pastures over many years could eventually deplete mineral nutrients, but this can be compensated for by inclusion of deep rooted and mineral scavenging species and appropriate grazing. In our case, dock and dandelion are two weeds which perform these roles, while chickens and wild birds probably add adequate phosphate after the initial mineral phosphate applied at sowing 5 years ago.

On the Global Gardener television program, Bill Mollison described me as “a friend despite having a lawn”. Everything Mollison says about lawns as a “green cancer” of the western world is true. But the lawns at Hepburn Permaculture Gardens show that with the right species selection, siting and management, lawns are appropriate elements in zone one of a permaculture system.

ZONE II

Pastures at Hepburn Permaculture Gardens are a major soil improving and mulch yielding element of zone two. Starting from a base of poor rabbit overgrazed pasture, cape broom, gorse and blackberry, regular slashing and rabbit proof fencing have provided a simple recipe for soil improvement over most of the one hectare site. By cutting everything a slasher again gives a competitive advantage to palatable species over spiny and unpalatable ones.

An eight horsepower, walk-behind slasher has been an effective and relatively simple implement for returning woody leguminous shrubs, brambles and tall stands of volunteer and sown pastures to the soil. A skilled operator can work it around trees and on steep slopes while on rough ground it helps level the ground and even shatter soft shale rocks to make more soil.

As I move through waist high grass or mulch up gorse and blackberry I muse on the fact that my actions could be interpreted as a war against weed, shrub and grass growth waged regularly each spring. In fact, I experience the hard and tiring work as a bountiful harvest. Last season with heavy summer rains we got three years' worth of organic matter from three cuts.

Most of the cut material has been used to mulch the 100 plus fruit and nut trees but increasingly it is left to return to the inter-row space. The range of plant species is very diverse and includes flowering weeds which attract hover flies, wasps and other beneficial insects. Peter Harper, botanist and supervisor of gardens at the Centre for Alternative Technology in Wales, during a visit some years ago suggested the our weed pastures were some of the best European meadow systems he had seen anywhere.

Limited initial use of dolomite, rock phosphate and wood ash and more recent ranging of 30 plus poultry have led to increasing vigour of white and red clovers. Grass composition is gradually changing from low productivity bent, bromes and fog to winter and summer active high productivity grasses including rye, prairie and demeter fescue.

Lopping tagasaste and wattle inter plants through the orchard is now yielding between one and two tons of branch mulch each season. The branch mulch is ideal for the fruit trees because it prevents excess scratching by poultry and eventually provides our kindling supply for the slow combustion stove.

However, pastures will remain an important part of the system for many decades before tree shading leads to dominance of shade tolerant herbaceous ground covers. Rotational grazing with geese (and in the longer term sheep) should further accelerate nutrient cycling and improve pasture quality, but, of course, will reduce available mulch yields. I hope to see myself and the slasher gracefully retire from the heavy spring cutting as animals and deciduous tree canopy gradually take over the job of nutrient cycling within the orchard.

A chipper for converting the tagasaste to garden mulch is a tempting idea but the cost of equipment and effort required to generate mulch would be many times that of the slasher cutting pasture systems. Therefore it makes more sense to let the grazing animals consume more tree fodder which can be direct grazed and easily lopped with forestry shears while retaining some surplus pasture for mulch.

LAWNS AND CITIES

Sustainable retrofitting of cities requires a huge increase in space allocated to food production, but the total area under lawns and pastures may remain the same to provide low cost open space as pedestrians and cyclists replace cars. These lawns could be designed and managed to yield maximum lawn clippings which along with chipped tree tops from urban forestry will be the primary sources of local mulch for food gardening.

After all this rational application of permaculture principles, I have to admit that I also feel more at home in an open grassy woodland than a thick jungle. And after all “feeling at home” is just as important to productive permaculture as mulch.

*David Holmgren
Hepburn 1993.*



CREATING A HISTORY OF THE AUSTRALIAN SEARCH FOR SUSTAINABLE LAND USE

*This book review was written in June 1993 as a way of beginning to expound my own views about this subject and in frustration at what I saw as the agricultural establishment trying to reinvent itself in the face of massive contradictions in its beliefs. As such it grew well beyond the normal length of a book review and for this reason perhaps was turned down for publication by both **Habitat**, the magazine of the Australian Conservation Foundation and the **Journal of Soil and Water Conservation**. In hindsight perhaps my anger with Barr and Cary's version of history was more about the frustration I felt about the lack of awareness of historical context in the permaculture and wider environmental movements about the search for sustainable land use and the fact that in referring others to sources I would have to point people to Barr and Cary. A good radical history is yet to be written.*

My “uneducated” father taught me the adage that those with no knowledge of history are condemned to repeat it. For those involved in the search for sustainable land use in Australia, a history of that search is urgently needed so current and future action can avoid the mistakes of the past and build on genuine opportunities for progress, and avoid disasters.

Greening A Brown Land by Neil Barr and John Cary, [Macmillan 1992] is a timely contribution to illuminating that history and some of its lessons and will hopefully stimulate some vigorous debate on some of the issues raised. This critique is a contribution to that debate.

The book is divided into three parts dealing with pastoral farming, cropping and irrigation. It relies on extensive use of case study material, most of it from Victoria, reflecting the authors' local knowledge.

The book is subtitled “An Australian Search For Sustainable Land Use”. Perhaps the subtitle should read ‘...search for sustainable agriculture’ since the authors do not in any substantial way deal with forestry. A forester colleague of mine, commenting favourably on *Greening A Brown Land*, suggested a similar book is needed in relation to the history of forestry.

Unfortunately the failure to address forestry in this book reinforces two deeply seated myths about trees in Australia:

- that they are marginal to our economic well being, and
- that forestry is not a major factor in the search for sustainable land use.

Nothing could be further from the truth.

Some of the issues in the search for sustainable pastoral farming are well presented in the book. In the first part, the open and fire cultivated nature of the Aboriginal landscape is dramatically described with quotes and photos. The subsequent decline of the native pastures, creation of the modern dense forests and the recreation of the grasslands via the sub clover and superphosphate revolution are documented. The emergence of salinity and acidification as more recent threats are covered in some detail.

However one of the major themes of the book is attacking the past, present and future role of trees in sustainable farming. This is a useful antidote to simplistic prescriptions to “plant trees”, but is a very one-sided perspective. I see this as expressing the reactionary view of the agricultural establishment to the emerging focus on trees as environmental and economic solutions.



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IMPEDIMENTS TO FARM FORESTRY

I believe the failure to develop a culture of trees (‘silviculture’) in this country is one of the recurring themes of our land use history. The government requirements of selectors to clear their land and how such conditions arose is covered in *Greening A Brown Land*. However there is no substantial mention of another four important factors which account for the failure to develop tree based land uses and culture.

- 1 The anti-tree pastoral heritage which settled Australia had a long history of destroying forest economies (natural and human). Perhaps one of the most rapacious was “The Clearances” in the Scottish highlands which paved the way for wool production to feed the expanding English textile industry.
- 2 The aggressive monopolies developed by state forestry departments which consistently underpriced wood from public forests thus preventing by large measure the development of a healthy and diverse farm forestry sector.
- 3 The financing of rural enterprises based on a single seasonal cycle and the insidious effect of interest rates in undermining any long term land use involving trees.
- 4 Primitive tree establishment skills and technology available to landholders when compared with the technology of farming. (This is now being overcome by rural innovators.)

While the efforts to increase the use of trees have occurred continuously, I see three major periods of action. The first is focused in the 1890’s, the second during the 1930’s and early 40’s, and the most recent having its roots in the 1970’s and culminating in the current wave of interest and action. All three periods follow a general pattern of visionary thinkers and practical innovators followed by grass roots action and institutional response. Today the age of mature trees in our rural landscapes record these periods of tree planting. The interest in trees during these periods was part of a more general focus on sustainable land use issues and coincided with economic recession. This last fact provides an interesting case study on the relationship between recession and innovation.

Any analysis of our economic history will show that the harvesting of the native forest resource has been a major contributor, to Australia’s status as a wealthy nation. More important, the development of the plantation softwood resource has been one of the great milestones in the providing of a more sustainable resource base. The recent doubling of the value of well managed conifer plantations (due in part to environmental controls on logging of old growth softwood forests in North America) highlights a global trend towards recognition of the real value of timber resources.

THE PLANTATION PINE INDUSTRY

The success of the southern Australian plantation pine industry had its roots in the first period of tree planting and was consolidated in the second. By the 1950’s it was established enough to attract the government and corporate investment necessary to lay the foundation for the most economically valued forestry asset in Australia.

For all its faults, in common with other modern industrial monocultures, pine plantations stand up well as a sustainable land use in comparison with modern pastoral farming. The aerial patterns of these respective land uses are a dramatic visual symbol of that difference. Pine plantations are typically made up of land units defined by contour and ridge roads which highlight the natural landform. Pastoral farming on the other hand is still dominated by the grid pattern created by the antiquated technology of traditional heavy straight line fencing denying the biophysical potential of the land.

More importantly, I believe the processes necessary to shift from pioneer monoculture plantation to sustainable, high value forest are relatively simple. The technical and socioeconomic processes necessary to shift pastoral farming onto a sustainable footing are very complex.

Barr and Cary seek examples from the historical record showing the failure of farm forestry (the wattle tan bark plantations and particular pine plantations). I see examples of vision from the previous periods of action which were successful but led to no ongoing expansion of farm forestry.

THE SUGAR GUM STORY

Many examples come to mind but one will illustrate my point. Following the devastation of the forests by the gold rush and farm clearing, the early foresters husbanded the regrowth forests, enthusiastically planted arboreta and trial plantations and encouraged farm tree planting for shelter and wood production. One of the most widely planted and successful species was Sugar gum, a native of small areas of South Australia. Shelterbelts of Sugar gum were established on a massive scale across the open Western Victorian plains, much of it by direct seeding.

Despite being out of favour in the current fashion for planting local native species, these shelterbelts are the resource base for new farm forestry enterprises. In a climate of declining returns from pastoral farming, a new breed of farm saw millers have ignored the prejudice against the species and rediscovered the value of its timber using new portable mill technology to convert this perceived waste product into high value timber.

At Majorca in central Victoria, an original plantation of Sugar gum has evolved into a diverse native forest which continues to produce valuable timber despite the almost semi-arid nature of the climate. When the historic Maldon trestle railway bridge was restored there

were no Box or Ironbark trees large enough in the local native forests but the Majorca forest supplied Sugar gum suitable for the purpose.

These almost accidental returns from these plantations established by previous generations only highlight the general failure to develop any large scale and sophisticated farm forestry using Sugar gum or a range of other species with proven potential. This failure can be largely attributed to the factors mentioned previously and that peculiar human tendency to discount the value of anything common (a version of distant pastures always being greener).

FARM FORESTRY AND SALINITY

In the third part of *Greening A Brown Land* the authors reinforce their case against the use of trees as environmental solutions in what amounts to a misrepresentation of very recent history; that of the development of the Salinity Management Plan for the Shepparton Irrigation District during the 1980’s.

The Australian Conservation Foundation submission to the draft plan confounded everyone involved. Instead of advocating saving this or that wetland or remnant roadside vegetation, it laid out the vision, and provided the evidence to support the concept of the Shepparton timber industry providing jobs and generating profits. It suggested 20% of the irrigation district planted to integrated farm forestry could be a cheaper solution than the massive drainage and pumping systems proposed in the draft plan.

Barr and Cary dismiss the Australian Conservation Foundation submission as one more example of city-based environmentalist obsession with trees as the answer to everything. Jason Alexandra, the author of the Australian Conservation Foundation submission is in fact a rural tree farmer and saw miller. The government convened a panel of experts to investigate the technical basis of using trees to reduce water tables and provide a net economic return. That panel could find no fundamental errors in the proposal. As a result there has been a major increase in agroforestry research for irrigation areas and a quiet but substantial change in the ongoing development of salinity management plans towards a greater acceptance of the role of trees.

CRISIS OF CONFIDENCE

Throughout the book, Barr and Cary demonstrate an apparently genuine concern for the farmer at the front line of the environmental and economic crisis, providing some very good material to show why farmers act the way they do and the problems they face in change. They also expose some of the failures of scientific research and particularly government extension but the overall picture painted is one of progressive evolution by slow steps towards more sustainable methods.

Within the politics of the sustainable land use debate I would naturally see myself as a radical, and Barr and Cary (based on this book) as conservatives. My disagreements over the past and potential role of trees is only one example of how the same historical evidence can be interpreted in a number of ways. *Greening A Brown Land* tends to reinforce the agricultural science establishment and the agro-industrial corporations as the source of solutions rather than problems.

- In fact, the agricultural science establishment is suffering a severe crisis of confidence under the onslaught of:
- farmer and community distrust,
 - new scientific work which undermines cherished dogmas, and
 - the declining economic viability of agriculture due to relentless downward pressure on commodity prices in the global economy.

This crisis is never really laid out for the reader. It is not possible in this critique to deal with the range of issues behind this crisis but some points in relation to “alternative” agriculture and ecology can illustrate.

ALTERNATIVE AGRICULTURE

The authors make references, mainly in the second part of the book to the role of “alternative” agriculture, but so briefly that by implication, dismiss their importance in the search for sustainable agriculture. Several references are made to Yeomans’ Keyline farming perhaps because most of Yeomans’ ideas and developments have since been incorporated into mainstream agriculture. However, nowhere do they draw together any analysis of the Keyline system as a whole.

Alternative agriculture in Australia has developed since the 1940’s in an incredibly unfavourable social and economic environment. Barr and Cary, like many other mainstream commentators, point out the price premium which now accrues to Organic and Biodynamic produce but fail to analyse the myriad of economic, let alone other impediments which continue to stifle development of biological agriculture.

Organic and biodynamic farming involves building the biological wealth of the land. Inevitably much of this wealth remains internal to the natural economy of the farm, yielding no tax return to government or sales by agro-industrial corporations. Analysis by Ivan Illich¹, Vandana Shiva² and others show a characteristic pattern of industrial development where the invisible economies of indigenous people, peasants, women and rural communities are destroyed in the creation of centrally controlled visible economies. Similar powerful forces stifle redevelopment of these human and natural economies. However some economists have recognised that sustained contraction in the formal,

1 Illich, I. *Energy and Equity* 1974, *Vernacular Gender* 1985, and other books
2 Shiva, Vandana *Staying Alive: Women, Ecology and Development* Zed 1989.

visible economy leads to expansion of many informal and invisible economies which are inherently more efficient at using limited resources. Modern biological farming is one very important example of these efficient systems.

INNOVATORS

Practical farmers with vision and independent persistence both within and outside the biological farming movements are the real heroes of the search for sustainable agriculture in Australia. Bruce Milne (involved in the Potter Farmland Plan) and Bill Twigg (northern Victoria) are examples mentioned in this book. Despite the enormous credibility of these innovators, the agricultural establishment is deaf to their clear articulation of an underlying philosophy more radical than most environmentalists. Instead bits and pieces of their technical successes are highlighted for copying and enhancing the credibility of official recommendations. I see what Bill Twigg has achieved integrating perennial legumes with grain crops as an expression of permaculture principles while Bruce Milne has articulated the relevance of permaculture in the progressive evolution of “Helm View” toward sustainability.

VISIONARIES

The more well known thinkers and proponents of alternatives include Yeomans, Podolinsky, and Mollison. These men have led the fight against the agricultural establishment. I think the similarities of personality between these men is no accident. To survive in such a fight has taken enormous persistence, obsession, unwillingness to compromise and even arrogance. Marginalisation has been a consequence of the refusal to be co-opted by the establishment. Rather than seeking to lionise these people, I see personal stories revealing how the search for sustainable land use has been a struggle against systems and institutions which stand to lose power and influence. The personal tragedy for these leaders is that their very strength of character and genius makes it difficult for them to accept progressive evolution and incorporation of their ideas into the mainstream. Incorporation without acknowledgment is the only success that any dissidents have ever achieved.

Perhaps my greatest criticism of this book is the picture the authors progressively build up of many small steps towards sustainability. I agree with them that the concept of sustainability is a very slippery one, not easily defined. While the agriculture establishment has only just begun to grapple with this “new” concept, alternative agriculture generally and permaculture³ in particular have been founded on a conception of permanence or sustainability.

3 Mollison, B. & Holmgren, D. *Permaculture One* Corgi 1978 and Mollison, B. *Permaculture: A Designers’ Manual* Tagari 1988

ENERGY ACCOUNTING

Barr and Cary’s brief dismissal of the relevance of permaculture to broad acre agriculture does not particularly bother me. This is a subject which many persons very sympathetic to permaculture also find difficult. However their failure to make reference to one of the most powerful conceptual tools in testing for sustainability, viz energy accounting, does concern me. Energy accounting as developed by Odum⁴ and others formed a cornerstone for my development of the permaculture concept with Bill Mollison. It allows comparison of all of the human and natural inputs, processes and outputs of systems in terms of a universal scientifically accepted currency, energy⁵.

Barr and Cary repeatedly refer to innovations in agriculture which stabilised the land, improved fertility and/or increased yields while ignoring the constantly rising capital and energy base necessary to support those systems. Some of the apparently minor inputs which generated these advances are incredibly costly in energy terms. For example energy studies of Gippsland dairy farms in the 1970’s⁶ showed superphosphate use or the lack of it was the biggest factor in determining whether agriculture was a net loss in energy terms. Today phalaris and other perennial pastures are widely touted as the answer to dry land salinity on marginal grazing land ignoring the requirement for continual input of high energy fertilisers to maintain such systems. Thus the proposed solutions set up scenarios for total catchment collapse once the real energy costs of these input are inevitably passed on.

Barr and Cary make many references to the progressive incorporation of ecological principles into agriculture but nothing on the relevance of the most powerful tool to arise from ecology; total system energy accounting. If our food production and delivery system cannot provide primary human energy needs without energy subsidy, and we continue to “eat” fossil fuels then the localised improvements in other measures of sustainability are irrelevant to the future survival of this nation and humanity.

Despite these criticisms, this is an important book. It is particularly good at revealing through case studies the intricate technical and social factors involved in agriculture and the constant failure of simplistic solutions proposed from outside. From my point of view it provides a much needed antidote to the excesses of zeal concerning biological innovation such as exhortations to simply plant trees, so evident in the permaculture and environmental movements, and I commend it to all radicals both on the farm and in the town.

4 Odum, H.T *Power, Environment and Society* Wiley 1971 and Odum, H.T. & Odum, E. *Energy Basis For Man and Nature* McGraw Hill 1979.

5 Holmgren, D. Energy and Permaculture in *The Permaculture Edge* Vol. 3 Issue 3. October 1993

6 Dornom, H. & Tribe, D.E. Energetics of Dairying in Gippsland *ANZAAS Symposium: Energy and Agriculture*



THE PERMACULTURE MOVEMENT AND EDUCATION: SEARCHING FOR WAYS FORWARD

DECEMBER 1993

This extended discussion of issues surrounding permaculture education and more broadly the movement was written at a time when my own role in permaculture teaching and movement “politics” was expanding stimulated by the second wave of permaculture activism in Australia (roughly 1988-1993). It explains some of the social and educational context for the origin of permaculture as well as a more explicitly political analysis of permaculture as a radical change movement.

It critiques the spread of permaculture, and the Permaculture Design Course, while acknowledging its value and achievements. I suggested consolidation of the structures of diploma accreditation which Bill Mollison set up in the mid 1980's before venturing down the path of mainstream accreditation of permaculture education.

A decade later, the Permaculture Institute and Academy structures had failed to grow beyond the personal control of Bill Mollison and the diploma process was moribund. While commitment to the PDC in Australia has remained strong, national accreditation of Permaculture as a competency based “industry” training package owned and controlled by Permaculture International Ltd, the only body broadly representative of the Australian permaculture movement, has provided a new pathway for the development of permaculture education.



*See Article 39 - Accredited Permaculture Training: A Critique for my reasons for supporting the concept, my reservations about the initial package and some suggestions for its improvement. It is interesting to note that in 1993, the same year that **The Permaculture Movement and Education: Searching For Ways Forward** was written, Mollison handed control of permaculture education in Europe to the European Institute and that it has gradually developed the Mollison model into a genuine peer controlled process for assisting permaculturists in ongoing development and training.*

*Another interesting aspect of the 1993 article is the way it uses the systemic thinking of permaculture to understand the processes of the movement, an early articulation of ideas which were later to be consolidated in **Permaculture: Principles and Pathways Beyond Sustainability**.*



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I would like to address a number of issues concerning permaculture education, design and practice and how these relate to formal accreditation systems in the wider society. Both Lea Harrison and Robin Francis have addressed some of the problems and challenges facing the permaculture movement in dealing with aspects of these issues. Rather than directly responding to their proposals, I would like to expand on some of the ideas relevant to the future organizational structure of the movement which I only briefly touched on in *Development of the Permaculture Concept* (PIJ no. 44). Hopefully these ideas will also be of more general interest to people involved in permaculture at all levels.

In the process, as the co-originator of the permaculture concept, I will cover some of the story of my involvement with the permaculture movement, a subject which I am inclined to avoid, but that may help others clarify their own involvement and position on the issues which confront the movement.

There has been a lot of talk about permaculture as a discipline (as in 'academic'), a profession, trade, business and even as an industry. I have great difficulty with these constructions of permaculture for many reasons.

RADICAL ORIGINS

Permaculture arose from interaction between myself and Bill Mollison in the mid 1970's. We were two (very different) social radicals on the fringes of (different) education institutions at the global fringes of western industrial society in Tasmania.

Bill Mollison as bushman turned senior tutor, in the Psychology Dept. of the Tasmanian University, attracted large student audiences to hear his radical and original (pre-permaculture) ideas while outraging the academic establishment.

I was a student in the Environmental Design School, a revolutionary "experiment" in tertiary education at the Tasmanian College of Advanced Education. This design school ran for ten years under the inspired leadership of Barry McNeil, a Hobart architect and education theorist. Visiting and local professionals accounted for a substantial part of the staff budget. There was no fixed curriculum but a strong emphasis on decision making processes and problem solving. Self assessment, democratic organization and many other elements which radicals within tertiary institutions only dream about, were reality within the school.

Even within the intellectual freedom and stimulation of Environmental Design I was on the fringes, with my all consuming permaculture work and my student-mentor relationship with Bill Mollison. My work was largely ignored within E.D. although Barry McNeil has since acknowledged it was probably the most important concept to emerge from the school. I never went on to do the post graduate degree which would have led to a professional qualification (in Landscape Architecture) because of my disgust with the design professions, my strong desire to build my practical skills, and to practice what I preached.

For me, growing up in a family of radical political activists I found ecological principles reinforced the political notion that radical change is always a bottom up process. Marx suggested that happened by an uprising of the oppressed masses. But in modern industrial society, the environmental dilemma highlighted the material addictions of the comfortable masses as the seed of their (our) own destruction. The problem lay with ourselves rather than simply with exploiting multi-nationals, etc.

The old spiritual notion of changing the world by changing oneself was a powerful idea for this atheist. This means starting with the individual and the family or household within which we live. In the outward extending ripples of change it becomes easier for succeeding people to see the need for change from consuming resources, to conserving and creating permacultural abundance.

In addition, I do not believe it is necessary for a majority to undergo a radical change for a flip to occur in society. Chaos theory and especially the concept of punctuated equilibrium, confirmed by observation in all the natural sciences suggest gradual evolution is the exception rather than the rule. In society, long periods of stability dominated by tradition, law and institutional forms are punctuated by rapid and apparently chaotic change where individuals and small groups create new cultural forms¹. These cycles occur on large time scales throughout history. However they also repeat themselves within the lives of individuals, communities and organizations not as a series of closed loops but as open ended and intertwined spirals.

We can see many examples of the fragility and collapse of established systems and whole societies, with the Soviet Union being the most dramatic. Perhaps an even more pertinent example might be the faith that binds the financial value systems of global industrial society.

The whole global economic edifice which is rapidly consuming the planet and its people, is in fact a very fragile monster, dependant on the faith and complicity of relatively small populations of middle class people in affluent countries, and most particularly the continued faith of that parochial clan of McLuhan global village, the money and commodity market people. Ronald Reagan (as the most powerful man on earth) after the '87 stock market crash, said with unconscious truth, that the system would not collapse so long as people continued to have faith. Has there even been an emperor, king or president to admit to his people that they had the power to bring the whole system down? My point here is not to dwell too much on apocalyptic scenarios but to refute the concept that is necessary to get "every man and his dog" to change before society will change.

One of the problems of personal and societal change is that the old patterns die hard and as we reach for the solution we keep re-inventing the problem in a new form. This is quite natural and can be observed in nature where deeply embedded proven systems keep reasserting themselves (Nature is conservative).

1. Thompson, W.I. In *Jnl. of the New Alchemy Institute* Stephen Green Press

In the early promotion of permaculture the tools of mass media were effectively used to spread the word quickly and widely but the efficiency of these tools at producing effective change is very low. So often, fertile social ground was (and still is) plowed, seeds sowed, but only a few germinated; some producing a bitter harvest. Frequently, as enthusiasm wanes in one locality, city, region or country, new ground is plowed in a shifting cultivation. This may be a particularly dismal image (which is hardly the whole picture) but my point is that modern mass media can be very effectively used to stimulate people beyond the capacity of a movement to follow up with the painstaking local, personal efforts, needed to assist and facilitate productive action. We are in fact dealing with very dangerous tools in mass media which carry with them many of the inherent destructive characteristics of the defunct paradigms. Jerry Mander² has outlined the problems inherent in television. To some extent these problems even apply to books.

The use of mass media including books has been a major factor in the spread of the permaculture concept and although I would be the last to say these approaches should be totally rejected, they must be acknowledged as classic top down methods of change, the same tools used by governments and corporations to mould society. To believe these are value free tools which can be easily used for good or ill is very naive.

The Biodynamic movement began from very small beginnings in this country, largely under the leadership of Alex Podolinsky. It has been remarkably effective in changing land use on large areas of farm land and building the numbers of competent home food gardeners in this country. This was done initially by avoiding all mass media and working directly in small self-help groups. It was only with an established network of solid practitioners that Podolinsky finally agreed to let ABC Countrywide do the program on BD which produced more inquiries from farmers than any other issue.

The permaculture movement has a lot to learn in this regard. On the other hand the BD movement has some similarities with Permaculture, perhaps the most striking being the role of the charismatic genius of its leader. Elsewhere³ I have referred to Yeomans Podolinsky and Mollison as men with much in common in leading the fight against the agricultural establishment. The role of these men in bringing about change is a complex and a very pertinent subject to the future of the permaculture movement but is not something I wish to enlarge on here.

PERSONAL CREDIBILITY

Much of the focus for promotion of permaculture has been around the idea that we can grow much of our own food where we live and that this is one of the most powerful actions we can take in bringing about societal change. There is nothing wrong with this simple idea and large numbers of people have been influenced and assisted by permaculture in doing

2. Mander, J. *Four Arguments For The Elimination of Television* Quill 1977.

3. Holmgren, D. *Creating a History of the Search for Sustainable Landuse in Australia*, Article Thirteen 1993

this. Although in any sustainable society we can “design”, it is not necessary for everyone to grow their own fresh food, it is undisputed (in permaculture) that we need an explosion of competent food gardeners in this country. Why is it then that the majority of people who have recasted their work and careers around permaculture do not grow food either as a living or even for themselves and their families to any significant degree? Largely because they are too busy organizing, designing and teaching and selling.

The way we earn our living is obviously a major part of practising permaculture and in the current economic climate few of us have the resources and skills necessary to make a living producing food in a sustainable manner. The realization of this fact should engender sympathy and respect for farmers. Instead we are just as likely to hear arrogant prejudice about farmers destroying the land from permaculturists as from other food consumers. I believe many permaculturists don't produce their own food because they have tried, found it difficult and not particularly exciting. This is especially true for the generations raised on the instant gratification of television and modern education.

When 'Mrs Jones' buys Thai tuna or Californian oranges just because they are cheap, I find it hard to be outraged if she is only claiming to be following short term financial self interest. However I am disappointed, to say the least, when those in the forefront of permaculture promotion privately suggest it's cheaper or easier to buy good quality food from the supermarket, ignoring the huge compromises which even organic growers make with sustainability principles to survive commercially. Proverbs about throwing stones and glass houses come to mind. My natural inclination is to turn my disappointment back on myself and consider the ethical contradictions in my own behaviour. Despite its bad reputation by association with the Chinese cultural revolution, I believe self criticism is essential, so long as it is balanced by affirmation and recognition of self worth.

PERMACULTURE IS NOT A PROFESSION

We can take a permaculture approach in any (reasonable) job or profession but to jump to the conclusion that permaculture **IS** a job, career or profession is false. There is nothing wrong with people using permaculture design as a short hand way of saying they are garden or farm designers who use permaculture principles in their work. But when people suggest we need to make permaculture a design profession which can sit alongside other design professions and so achieve credibility in the wider society they are making several mistakes:

1. the search for credibility by belonging to some group is illusory in today's society where we see the progressive breakdown of all forms of established credibility. New secure structures of credibility cannot be established in this social environment.

2. to effectively operate the organizational structures necessary to make a profession able to function at a national level requires financial and other resources which drains off limited activist and practitioner resources. This has been a recurring mistake in the permaculture movement where structures appropriate to large organizations are used in the hope that growth of the movement will generate the resources necessary to support these systems. Permaculture principles suggest we should network and organize at the smallest most local level for each particular function and only move to larger levels when the local ones are effective and generating surplus resources adequate to support these inherently more expensive but less essential systems.
3. permaculture is only one of thousands of groups from nurses through to sellers of travel packages seeking the hallowed status of being a profession. When the mob is running in one direction, quietly walk off in the opposite is my motto, which I learnt from my parents, clarified for me by Bill Mollison.
4. there is a problem of logic when we define permaculture as a separate design profession because it implies there is a particular set of skills or competencies distinct from other professionals. In fact as Bill Mollison said in *Grave Danger of Falling Food*, “permaculture always did lie between the disciplines.” It is a wholistic system which can integrate and recaste the work of the existing design professions. If it is to become its own profession then it foregoes the valid concern with what all design professionals do. And as more and more sustainable approaches are taken up by trades and professions any separate permaculture profession would be left with a baggage of idiosyncratic ideas which didn’t quite work.

A generalist permaculture designer may be a good person to advise on general aspects of house siting and design but an architect or a builder with a permaculture perspective is the person to help with the details. If someone is setting up a commercial orchard, a generalist permaculture designer such as myself may be able to help a little but what is really needed is a competent tree crop horticulturalist with a permaculture perspective. These people will continue to call themselves architects, builders and horticulturalists. They have the training, accreditation and industry networks which provide most of the benefits (and problems) which some people hope to set up for permaculture. We should use these systems, parasitically if necessary, working around the restrictions they may involve.

However, there is clearly an important role for the independent permaculture generalist to fill in the gaps in established systems, self taught and informally apprenticed, constantly

innovating and experimenting with their own systems and passing on the hard won lessons, gaining credibility by the results of their work.

This is a tough role, and a professional structure will not help those who are not up to it, to do anything more than paper over their inadequacies. This brings me to the issue of permaculture education.

PERMACULTURE EDUCATION

The “72hr” permaculture design course has been the basis of permaculture education since the first courses run by Bill Mollison at Stanley in the early 1980’s. From the very beginning I was critical of many of the assumptions behind the PDC. Despite, and maybe partly because of, those criticisms, the PDC has evolved into an effective method for extending the ideas which I believe the movement should focus on consolidating rather than venturing into the minefield of TAFE or any other accreditation. While acknowledging the positives it may be useful to outline my original criticisms.

For me, coming from the radical, process-based education of Environmental Design, the concept of a fixed curriculum of subject material which was based on the particular (admittedly very broad) knowledge of Bill Mollison was a mistake. It has led to permaculture teachers with little knowledge of keyline, for example, teaching a group of mostly ex-urban small property holders in the wrong climate zone about broadacre irrigation for pastoral farming.

The early courses by Bill Mollison appeared to rely on his encyclopedic knowledge, incredible story telling skills, and challenging charismatic ability to hold the attention of a group of students through a series of lectures with few educational aids or relief. Other teachers attempted to do the same with less than satisfactory results. Some consider that I have an encyclopedic grasp of technical issues and “gift of the gab”, but I still will not teach more than 50% of a course, and I make extensive use of slides, charts, provided notes and other materials. I also tend to work with teachers who use more interactive and participatory teaching methods than I do.

The third and greatest problem with the original PDC’s was the explicit notion that the two week intensive residential course was a training program for design consultants who would operate as anarchistic generalists in the way I mentioned before. I and many others found this a ridiculous proposition and said so (diplomatically) at the first convergence in 1984. To my (and other’s) amazement Bill Mollison immediately outlined a structure of two years practical work following the certificate which was necessary to complete, with documentation submitted to the Institute for approval, to obtain the diploma and become a graduate member of the Institute. Further he suggested that work could be in one or more areas including architecture, site development, media etc. This passed into history as a decision of the convergence⁴ and represented a substantial improvement in the situation.

4. Permaculture Institute News in *Permaculture Journal* no. 19, Feb. ’85.

I was issued with an honorary diploma which I graciously accepted but continued to pursue my own path consulting and doing some teaching via lectures, seminars and workshops, many of them without the permaculture label.

In fact, the laissez faire system initiated by Mollison has not resulted in huge numbers of charlatans doing incompetent design for unsuspecting clients. Although many enthusiasts rushed off from PDC's to consult, most ethically selected themselves out because they recognised they didn't have the skills, or proceeded with an on-going self training process where they were notionally in business but really they were subsidizing their own training with very low charges, the dole or other income.

This accounts for the limited number of people earning any sort of a living as consultants who do not also have other design training and accreditation. When I set up Holmgren Design Services in 1983, I had already been going through this process myself (unconsciously) virtually since 1976. I have never had an income (since College) which was not permaculture related but 92/93 was the first year that I have paid tax. The constraints of practicing what you preach, on-going self training and research and the limits of the market place didn't allow the generation of incomes much above the poverty line, which I find more than adequate to live on.

EXISTING INSTITUTE ACCREDITATION OF GRADUATES

The system for issuing of diplomas has never really worked in Australia for a number of reasons:

1. Failure of teachers to give to students consistent information about the requirement for "professional" use of permaculture, and a lack of commitment to the system.
2. Few apprenticeship opportunities for trainees.
3. Poor bioregional networking between teachers and virtually no opportunities for peer review or working together. Vries Gravestain's organization of a design exercise for participants at the 1990 convergence was the best effort I know of in this regard.
4. Perceived low value of the diploma in obtaining work compared with institutional qualifications.

RAPID GROWTH OF PERMACULTURE TEACHING

There was a rapid expansion of the movement and PDC's in the late 1980's on the back of the a new wave of environmental consciousness, the TV release of *In Grave Danger of Falling Food* and publication of *The Designers Manual*. (The publication of *Permaculture One* and *Two* coincided with a previous wave.)

In Victoria the numbers of PDC's remained low until 1992. Increasingly I was approached by teachers and others soliciting more active involvement. In 1991 I co-taught my first design course with Hugh Gravestain and Andrew Sheridan on the Far South Coast of NSW, in the following year a second with Colin Endean and Ric Allen in Adelaide, and a third with Lea Harrison at Kangaroo Valley in NSW. After this I felt in a position to design my own courses which built on the substantial experience gained in ten years of PDC's but incorporated some of my own material which I saw as central to permaculture as well as addressing the problems outlined above.

Elsewhere, especially overseas, experienced and knowledgeable teachers were also developing the course content and methods in quite divergent directions but perhaps without the intellectual confidence and freedom which I feel in dealing with the subject.

Over those ten years it was clear that two things had happened. Some of the inspired brilliance of Mollison's original teachings has become lost in translation and reduced to sets of prescriptions and fixed examples. On the other hand teachers had become more experienced in teaching methods and accessed more materials while people with established design, horticulture and other skills were becoming teachers. The laissez-faire system challenged serious permaculture teachers to work out their own explanations of permaculture rather than simply relying on Bill Mollison for all the answers.

The trouble with the improvements in PDC's is the knowledge and experience of course participants is improving even faster. One of the great strengths of the PDC has been the open entry requirements and the mix of persons from school leavers to practicing professionals, from farmers to grandmothers who come together for two weeks to learn from the teachers and each other.

The lack of follow-on structured learning situations for permaculture has led to some teachers developing advanced design courses which mostly appear to be either teacher or consultant training focused, or specialist courses (eg architecture, horticulture, village design etc) with very little advance in the depth of treatment of general principles, issues and methods.

It was suggested to me (by Ric Allen and others) that the material I was teaching was more appropriate to an advanced design course but I have decided against that move because it automatically restricts courses to people who have completed a PDC. Instead I have worked at improving my teaching methods to make the material more digestible. I have also aimed at getting more experienced practitioners in a range of fields into courses so they are in a position to immediately apply the permaculture framework to their own work, a far faster way of getting effective and competent action than advanced courses.

At the same time I don't want to set up courses for professionals which can so easily bypass the personal and domestic change at the heart of permaculture. A mix of people, including younger ones with little experience but the energy and enthusiasm of youth,

and older sometimes not highly educated people with experience, act as a foil and balance to the high powered professionals wrapped up in their work. In this way the PDC has the potential to span the spectrum of education from school to post graduate and experience from the kitchen sink to the back paddock.

Much of the value in the PDC comes from the generally residential format which gives the opportunity to design a course environment which will challenge and influence people's personal living and (most importantly) eating habits so central to permaculture. Cynics would describe it as "brain-washing" and certainly many course participants find the experience very personally challenging. If you put 20 fairly environmentally and socially aware, but very different adults together in a new and isolated environment they will generate some interesting interactions themselves. Consequently I have a strong commitment to the residential format, although I recognise the difficulties for many people in allocating two weeks to the course.

TEACHING INSTITUTION ADOPTION OF PERMACULTURE

In recent years permaculture has been increasingly incorporated in vocational training and other institutional education in a number of ways. Some institutions have provided venues, organization and sometimes funding for PDC's (generally non-residential). Permaculture teachers have developed units within existing (generally horticulture) courses and many teachers in institutions have incorporated elements of permaculture. At the post graduate tertiary level I have written material for an external studies Graduate Diploma in Sustainable Agriculture through Orange Agricultural College NSW.

These developments are substantial opportunities of the movement while at the same time threaten to emasculate the radical and independent nature of permaculture teaching. To some extent these developments are inevitable but they can be managed for better or worse.

Some explanation of the approach I took with Orange may help other permaculture teachers deal with these situations and even contribute to the movement making a co-ordinated approach to the prospect/problem.

In the Orange course I did not have to deal with "who would teach the material" because it was an external studies course. The college did agree that liaison with students and marking would be by a graduate of the Permaculture Institute, in this case myself. The course included a strong process and human change focus as well as contract learning assessment which allows students to design their own course to a fair degree.

The biggest conflict was having to accept permaculture being one of three modules within the Alternative Agriculture unit along with Organics and Biodynamics. In reluctantly accepting this, the introduction to the material included a critique of the course structure and underlying politics pointing out that permaculture was in fact a wholistic conceptual

framework within which sustainable agriculture could be constructed. I went on to point out this module was complementary to and more specialised than a PDC not a post graduate substitute for the PDC. I suggested organics and biodynamics could be thought of as sustainable production systems within a permaculture framework and made linkages to other units but also invited the students to use the permaculture perspective in analysing and critiquing the course as a whole. In this way I hoped to provide the more perceptive and radical students with the tools to challenge the assumptions behind the course (including permaculture).

I believe this approach of a radical unit within a course can be used as a test for whether the institutions are serious about wanting to include permaculture in their courses. It also can alert people that permaculture is much more than the particular field which they are studying. We need to remember that most people approach permaculture via a particular field of interest. For students of horticulture it is natural that they will initially see permaculture as a radical form of horticulture which over time can change into a conceptual framework through which they can organize and develop their horticultural vocation and their personal life.

Recently, Troy, a student on a six month TAFE horticultural training program, stayed at Hepburn Permaculture Gardens for work experience. He was a keen worker, diligent student and obviously an uncomfortable radical within a fairly conservative course with conservative students. At the end of the course the whole group did a tour of Hepburn Permaculture Gardens as an extra-curricular activity. I believe the work experience and tour opened the eyes of the students (and teacher) to what "mad" Troy was on about and allowed Troy a way to express his values and knowledge while battling it out in the system.

PDC AND MOVEMENT ACCREDITATION

I want to return to consideration of our own structures because following permaculture principles I think we need to get our own house in order before we can in any way deal with control of how permaculture is incorporated into mainstream education.

I have indicated that much has been achieved through the laissez-faire approach to permaculture education but there is a need to make some of the systems and structures we already have work better.

We need to improve the quality of the course to do justice to the quality and experience of course participants. On going training workshops in teaching methods are one way but these should be for people with demonstrable skill and knowledge with natural systems who need help in communicating their knowledge. As we draw more people into teaching permaculture who already have teaching skills, what is more important is more informal residential programs, work experience and apprenticeships under experienced practitioners so that teachers are talking about things they do understand. In this regard I believe the WWOOFing network has been one of the most successful ways at providing

people with more day-to-day experience of living and working in more sustainable ways. We need to look at how we might build on and support that network rather than replicating it.

We need better documentation of good working systems, a job which innovative practitioners frequently neither have the time nor skills to do. Trainee teachers could use their documentation skills (plans, photographs, notes etc) to record these projects during WWOOFing or other work experience visits to develop their own portfolios of teaching materials. Practitioners should always have the opportunity to vet materials and be provided with copies for their own use and retain copyright control over the use of their work.

Copying of notes, slides and other materials from teachers should only occur through an apprenticeship process where the trainee has a very good grasp of the subject.

Teachers should avoid taking offers to teach courses outside their bioregional experience unless there are very good complementary local resources and expertise involved. This may slow the expansion of the movement but will ensure that more of the sown seeds germinate. Teaching permaculture to a higher standard requires a rooted connection to local venues, resources and practitioners which makes globally mobile teaching an extremely difficult job which will never produce the quality of courses possible once a network of local expertise and resources is established.

Recently, my own criteria for agreeing to teach a course in Israel included that it would be in a similar bioregion (not arid where I have limited expertise), that I would be co-teaching with permaculture activists with some teaching experience, knowledge of my approach and long term commitment to the region, and time (weeks) to familiarize with the local situation, people and resources. I don't want to criticise the valuable pioneering work which many Australian teachers have done overseas and do not wish to address the complex issue of permaculture education as overseas aid. I am simply pointing out the criteria I have used as I venture into a new area of practice.

We do need a national body as a central register of graduates and some general guidelines like those set up following the '84 convergence. I would like to see the implication that the PDC is a training system for consultant designers or teachers completely removed. (I do not use the Institute certificates because they refer to "Permaculture Design Consultants Course"). I would also like to see the categories revised and preferably reduced in number.

I think it is essential that the details of any peer review and regulation of persons admitted as graduates (and therefore independent teachers) be done at the bioregional level. If there is not the networking and resources at this level then any attempt to do so at a national level is likely to fail. We should accept that different bioregional networks may apply the rules differently but that can reflect real differences in needs and capacities to regulate. (This already happens at an international level).

There has been much angst about the proliferation of courses, cut throat competition and poor standards. A severe analysis could liken permaculture education to a form of pyramid selling where the main economic outcome of courses is more courses. These issues have certainly troubled me but we need to keep several things in mind:

1. Natural systems undergoing rapid growth based on available energy tend to be characterised by a lot of competition, crude systems and poor development of symbiotic or networked structures. As available resources restrict growth, selection pressures result in a culling of poorer systems and models, while development of co-operation and networks increase. With permaculture courses at the moment it is very much a case of buyer beware and to a fair degree you get what you pay for.
2. On the issue of cost, I think we need to get away from the idea that courses should be run at rock bottom prices so everyone can have access to courses. My considerations on cost include:

Firstly, in our society, for better or worse, the vast majority of people do not value what they do not pay for. Improving the quality of courses is pointless if participants come along because someone else paid for it or the course represented a cheap holiday. Commercially driven residential courses in other fields comparable with our \$800 Hepburn Design course (limited to 20 people) would cost \$2000.

Cross subsidisation is a better way to provide access for lower income persons (we provide 4 places at \$600) while government or business funded participation is a two edged sword which should be handled carefully. For subsidised participants we vet people and require up front payment of deposits by the individual and would restrict numbers of funded participants.

I think that the private enterprise context of permaculture education has been one of its strengths and we should avoid the traps of the social welfare mentality that it is everybody's right to be able to do a PDC without sacrifices. Learning by doing, WWOOFing, subsidised introductory courses and institutional courses which will progressively include permaculture material are open to everyone, and increasingly training programs specifically set up for disadvantaged groups can include permaculture material.

3. I think it is important that experienced teachers do get some remuneration commensurate with the enormous effort in presenting a well organized and taught course. However, I think there are also substantial dangers in establishing a career structure for teachers which rewards teachers for just teaching. Having to do other things to stay sane, earn income, maintain humility, connection to the earth and continually learn are essential. “Professional teachers” who do not garden or in other ways face the enlightening and frustrating realities of living and working with nature are in grave danger of re-inventing all the problems we seek to overturn.

Barry McNeill said that no one should teach design in an institution for more than 7 years without going back to professional practice. In permaculture we need to be much stricter in our guidelines if we are to retain the integrated perspective which the wider society is constantly subverting with its rewards for specialisation, chopping our lives up into separate compartments.

PERMACULTURE ACADEMY

The announcement of the creation of a Permaculture Academy by Bill Mollison⁵ earlier this year has further complicated an already unclear situation regarding permaculture movement accreditation. Although many of the intentions behind the academy are commendable and in fact reflect some of the perspectives discussed above, I see grave problems with a new structure when the foundation on which it is based (the PDC and Institute accreditation of graduates) is so much in need of consolidation.

Unless students are already in close working contact with supervisors, it is very hard to assess the real practical value of any work and there will be the tendency to fall back into the academic mould totally dependent on documentation within a particular discipline. Surely we should be trying to achieve effective interdisciplinary assessment of the permaculture trainees for becoming graduates of the Institute before setting up higher level assessment processes requiring greater skill and commitment.

Clearly, the academy will not provide any resources to assist struggling practitioners and researchers. The main value which will accrue is an academic qualification which may provide some credibility within mainstream systems for worthy permaculture practitioners. However, we need to consider the status, or lack of, conferred by being a graduate of the Institute, before we escalate the stakes with investing effort into higher academic structures.

A mature sustainable community or society can easily deal with its most capable members having the responsibility and privilege to specialize but for us in the vortex of the paradigm

5. The Creation of a Permaculture Academy in *Permaculture International Journal* no. 47, June '93.

shifts, we need to work a lot harder at developing the wholistic, generalist base from which specialization is possible. After all we are talking about overcoming a four hundred year cultural heritage of increasing specialisation to the point of collective and individual schizophrenia. Study of natural and human systems teach us that the types of changes needed come about through a radical reintegration at the bottom within the life of each individual, not through some moderation of excesses back to some supposed balance.

RELATIVISM AND DOGMA

Through my constant reference to the need for a radical approach, it is essential that this not be interpreted as an adherence to a set of rigid principles which very quickly become dogma. To the degree to which permaculture might be seen as a “faith” it is a highly relativistic one, there being few if any absolutes. Everything is context dependent.

For example, some might say that use of herbicides is unacceptable in any situation and regard such rules as reflecting a radical approach. I see the one off use of a herbicide (depending on which one) for the establishment of direct seeded or planted trees in their thousands essential to the stabilisation of broad acre cropping and pastoral lands and is very different from annual spraying of roadsides by councils or annual spraying under orchard trees. Energy analysis and other forms of accounting suggest a great difference between these two.

Where we are uncertain about when and how to compromise on a particular rule or principle we should test the rule ourselves to see if we can achieve the ideal and carefully suggest criteria others might consider in making their own decisions.

There is a paradox behind many of the ideas and challenges presented in this article. I have been suggesting that permaculturists need to go further in applying permaculture principles and be more aware of how we fall back on conventional more deeply embedded learning. This old learning makes us susceptible to the subtle reward systems within society. It is these rewards which result in the solutions being recast as new forms of old problems.

On the other hand we should never forget that in nature things are relative and context dependent so we have to forego the certainty of a neat set of absolute rules. My greatest fears about the movement are the development of dogma and sacred cows. Some might say I am obsessed by attacking sacred cows (no offence to my Hare friends) especially those born of my own work.

We walk on a knife edge between the seduction of a defunct cultural heritage and the stifling bonds of dogma and even fascism. Constant self critical appraisal and the grounding of working with nature are the only ways I know to maintain the internal balance.

David Holmgren

Hepburn, Victoria, December 1993.



DEVELOPMENT AID FOR THE INDUSTRIALISED NORTH TURNING AN IDEA ON ITS HEAD OR "THE PROBLEM IS THE SOLUTION"

This is the conference paper prepared for presentation to the 3rd European Permaculture Convergence at Prinzhofte in northern Germany in August 1994. It explores the theme of the convergence and the idea that drug addiction is a metaphor for our situation and society. The conference happened to coincide with a low cost six month study and teaching tour in Europe and the process behind my attendance was an attempt to personally resolve some of the contradictions I referred to between networking for and living a sustainable lifestyle.



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Development aid is generally conceived of as assistance to communities and nations who do not have adequate resources to provide for their own basic needs. In this context the theme may appear silly or at worst obscene since the industrialised northern countries by any measure are the most materially rich nations which have ever existed on earth.

Why then is the concept of development aid relevant to the future well-being of industrialised nations?

Evidence of the unsustainability of modern industrialised society's dependence on an ever expanding economy has been strong for at least two decades and continues to mount. In 1994 I don't see any need to enumerate any of this evidence.

Attempts at adaptive response (as opposed to action which increases dependence) to both specific symptoms and the general condition have, and continue to, occur at all levels in the industrialised societies from governmental to the individual.

However much of this activity continues to "reinvent" the problems in new forms.

Examples of this include:

- introduction of pollution control technology which may push the problem elsewhere,
- green consumerism which has inherent contradictions,
- teaching and networking about sustainability may inhibit practising it.

THE DRUG ADDICTION ANALOGY

Detached observation (possibly with the hindsight of history) of late 20th century society might suggest addiction (as with drugs) is the best description of behaviour, both personal and institutional.

In the case of drug addiction it is well recognised that while the addict must want to change, aid from other persons is also important. This is particularly important where the addict lives within a community and culture of addiction which tends to be self reinforcing. The power of ex-addicts to help addicts is well recognised. The ability of the helper to identify with the addict increases the value of their help and its credibility with the person needing help.

Once we understand ourselves and our society as addicted it becomes more reasonable to consider the notion of "aid" for the industrialised north. Reflections on the psychology of addiction may help us to develop solutions even if the scale and depth of the addictive forces and processes are far greater than those involved in any pharmacological addiction.

This may appear to ignore the plight of the majority in the undeveloped world. However we need to understand the processes which lock our over- and under-developed worlds into a destructive relationship. The majority of the adverse consequences of our addiction are externalised via the global economy in the same way that the "junkie" will do anything to

anybody to get a “fix”. The phrase “live simply so that others may simply live” is a clear and powerful imperative but it describes an enormously complex process.

THE LIMITS TO DEVELOPMENT

The very idea of development also presents grave problems. Most notions of development are based on growth in material consumption. Even the more radical notions suggest growth in organisational structures and processes. It is inevitable that any progressive or positivistic response to the problems will involve development of some sort. Even expansion in resource consumption will be needed in some areas. But no amount of appropriate development can get around the point that there needs to be a massive net reduction in material resource consumption.

Beyond this I suggest that there is also a need for major net reduction in formal organisational structures (be they economic, legal, social and cultural) as their functions are taken over by more efficient and largely invisible informal processes at the personal, family, neighbourhood and bioregional level (eg less international travel and conferences, more local action).

PERMACULTURE AS A MODEL FOR TRANSITION TO SUSTAINABLE LOW ENERGY SYSTEMS

Permaculture, in its basic principles and its various forms of practical expression, has much to offer in personal and societal transcendence of addictive consumerism and its replacement with a creative abundance. The original conception of permaculture in Tasmania saw the transition from fossil fuel based affluence to a renewable resource base as driven by personal change and action which reversed many of our assumptions derived from industrial culture.

One of these reversals was to regard the persons and societal recipients of fossil fuel affluence as impoverished and immature and in need of some form of help to make the transition to a sustainable low energy world. Without some hopeful strategy for transition the future may appear entirely alien and dismal to the generations raised in post World War Two affluence.

In this context permaculture is development aid for the industrialised north. In response to a recent request for a definition of permaculture I suggested, only slightly facetiously: “remedial holistics for post industrial survivors”.

In all of this there is no room for condescending arrogance, especially from those of us from affluent but sparsely populated countries like Australia. My 6 months in Europe is as much to learn as to teach. But it is another reflection of the cultural inversions of permaculture that much of what I find interesting are traditional systems either taken for granted or in decline in the on-going rush everywhere to be modern. It is very revealing

that the English word “peasant” has very derogatory connotations. For me a peasant is a person who is connected to place and close to the earth in body, mind and spirit. I have worked towards this goal all my life but becoming a post-industrial peasant is no easy task.

By changing ourselves and providing living examples of the new sustainable culture we provide the vision and some of the technical basis for living without destroying the planet. This is probably the most powerful action we can take to bring the sustainable culture to life, out of the conceptual ashes of industrial society, before our grandchildren are forced to build it out of the physical ashes.

*Hepburn, Victoria
Autumn equinox, March 1994.*



IMPRESSIONS OF ISRAEL: A PERMACULTURE PERSPECTIVE

This article was written in May 1994 while travelling in Europe following my time teaching and researching sustainable alternatives in Israel, and was published in the newsletter of the new local permaculture association.

Trying to arrive at some overview of such a complex country is not easy after a six week visit. On top of seeing the country for the first time, it was also my first experience of the Mediterranean. The following comments cannot address any issue in depth but are intended to give those interested in sustainable alternatives, both in Israel and elsewhere, some permaculture perspectives of this unique country. Many of my points could be the subject of whole articles and inevitably my critical comments run the risk of arousing defensive reactions from Israelis, but hopefully they will be taken as constructive.

Israel is the biblical “land of milk and honey”; milk from the abundance of its herbaceous and arboraceous forages which supported the goats of the forefathers, and honey from the abundance of its Mediterranean flora. Maybe I should say WAS the land of milk and honey, because the course of history has taken an incredible toll on the soil, water, flora and fauna resources of the land. It was inspiring to see what the commitment to the restoration of nature from the beginning of the nation state had achieved in a few decades. Reafforestation and restoration of wildlife populations has now reached a level in many parts of the country where natural processes are building on the efforts of people. Much of this work is still funded from outside Israel via the Karem Kayemet (Jewish National Fund). Perhaps as a consequence of overseas aid, the pioneering and innovative work in nature restoration seems to have been reduced to established and bureaucratic ways. This is in stark contrast with the dynamic innovation emerging from the more “grass roots” Landcare Movement in Australia. For example, I was surprised at the relatively limited range of species used in revegetation, and the apparent lack of direct seeding or planting machines for broad scale establishment of trees and shrubs.

WATER RESOURCES

Development of water resources and irrigation agriculture are well known achievements of Israel. Although the country is very dry, I was impressed by the quantity and quality of water resources nature has provided, when compared with much of Australia. The Kinneret (Sea of Galilee), a massive freshwater reservoir over 300m below sea level in a semi-arid region is a wondrous ecological anomaly which is supposed to be no more than 16,000 years old. With this and extensive ground water aquifers, Israel has made the desert bloom. But as in Australia, the provision of cheap water for settlements and agriculture has resulted in excessive use and waste. In Australia over-irrigation has mobilised massive quantities of salt which is destroying the land. The geologic youth of Israel makes it less susceptible to large scale salinity but overuse of water, in combination with highly chemicalised agriculture and industry, is creating severe ground water pollution hazards.

Israel is famous for its development of drip irrigation, an appropriate use of plastics technology which can efficiently use limited water resources. In Australia, the progressive adoption of this technology has gone hand-in-hand with mulching with organic materials for moisture conservation and soil improvement. In Israel, drip irrigation is almost universal in horticulture and landscaping but mulching, except with plastic sheeting,



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is conspicuous by its absence. Huge surpluses of agricultural and forestry wastes offer great potential for beginning the “organic revolution” in Israeli horticulture. This is particularly important in the rapidly expanding amenity and ornamental horticulture sectors which are already consuming a significant proportion of precious water resources. Amenity planting without irrigation seems rare, even in the relatively well watered north of the country. There is a widespread belief that only a few slow growing native species can be grown without irrigation. For me it was exciting to see species originating from semi-arid and even sub humid regions of southern Australia growing successfully without irrigation in much hotter and drier arid areas of Israel. Drooping Sheoak (*Allocasuarina verticillata*), Acacia saligna and Grey Box (*E. microcarpa*) are examples which come to mind. I saw very few truly arid zone Australian trees and shrubs planted and wondered whether they would push the boundaries of where unirrigated revegetation was possible. Areas around Beer Sheva receiving 200mm of rain annually have similar weeds, crops and trees thriving to those found in the Wimmera region of Victoria which receives 350-450mm annually. It appears that high incidence of dew and humidity in summer more than compensate for the very low measured precipitation and higher summer temperatures in Israel. Higher levels of mineral fertility in Israel may also be a factor. Consequently the range of plant materials suitable for landscaping, forestry and unirrigated agriculture is much greater in Israel than in most of dry land Australia.

DRY LAND FORESTRY

A particular interest for me in Israel was to see if production of fuel and timber products from dry land hill country could be improved to lessen future dependence on imported wood, or more energy intensive materials, such as concrete and steel, as well as fossil fuels. Conventional analysis suggests Israel is too dry for reasonable growth rates from unirrigated timber trees, but my observations noted above suggested more hope. Some species of eucalypts have already proven very productive and plantations are currently managed on a short rotation for fuel wood and low value sawn timber. Management of this substantial resource (mostly *E.camaldulensis*) seems to be improving but this species does best along moist waddi and low arable land. Allocation of these very biologically productive sites to high water using timber and fuel species is poor use of land capable of producing food. Marginal limestone hills in the Galilee are the places for extensive forestry but so far native pines and cypresses have been the main species planted. While considerable production is now coming from these forests, slow growth rates, disease, vulnerability to fire and poor form (*Pinus halapensis*) are major problems. Thinking about eucalyptus species which would grow better than *E.camaldulensis* on dry limestone hills and produce better timber, I came up with Sugar Gum (*E.cladocalyx*) amongst others. It was refreshing to meet with Dr Yehuda Reve, a forester with the Karem Kayemet who has been promoting Sugar Gum for some years based on the results of a few early plantings.

Mixed forest is always preferable to monoculture, a lesson being learnt in Israel following the problems with conifers. A permaculture approach to plantation design suggests a

fast, growing nitrogen fixing species should be used with any timber conifer or eucalypt. Tall acacias such as *Acacia decurrens*, for short rotation firewood or bushy *Tagasaste* (*Chamaecytisus palmensis*) for animal fodder would be good prospects for planting with Sugar Gum. Slower growing species, such as Californian evergreen oaks, could be under planted for timber, and other uses.

Despite the extensive nature of revegetation over several decades, the range of species which has been used is surprisingly small. Following the permaculture principle of diversity provides the next generation with the genetic and information base for more informed choices in the future.

ANCIENT SYSTEMS, MODERN EXPERIMENTATION

The development of modern dry land agriculture and forestry based on the adaption of ancient and traditional systems is the challenge for those concerned with sustainable systems, to make productive use of the land in the 21st century. While in Israel I saw the results of two related endeavours which represent major contributions to sustainable dry land agriculture. The first was the research work of Michaeli Evenari and his colleagues in farming the arid Negev (approx. 100mm rainfall) using natural runoff from the stony desert hills. This work, from the 1960's to the 1980's is documented in *The Negev: The Challenge Of A Desert* (Harvard Uni. Press 1986), an excellent example of interdisciplinary science which proved that the ancient Nabbatean systems were capable of producing good yields from tree and field crops, and that even simpler systems of micro catchments could support tree crops such as Pistachio, Carob, Olive, Pomegranate and even deciduous fruit trees. I think it is a tragedy of the first order that this work at Avdat and other research stations, lies virtually abandoned. Weak statements and promotion emerge from the academic and government establishments about runoff systems being suited to Africa and other third world countries, but not being viable in Israel, a pragmatic but shortsighted conclusion, based on the continued availability of cheap reticulated supply from the Kinneret and ground water reservoirs.

On Kibbutz Hazorea I met John Maurice and saw his work developing very small fibrous rooted grafted plant stock of tree crop species such as Carob, Pistachio, Pecan and others which are similarly difficult to propagate and transplant. Despite John Maurice's lifetime experience in tree crop horticulture and nursery production (including some time at Avdat with Evenari) his current work appears to have the status of a personal retirement hobby ignored by the academic and industry establishment. There is great potential to apply this work in combination with drip and runoff irrigation in the Negev. In the moister parts of the Galilee and Samarian hills (Israel and the West Bank) the productivity of traditional arab grazing could be improved by planting traditional fodder trees (Carob). The application of these simple propagation methods to the third world (as well as parts of Australia) is of much greater relevance than the much promoted high tech tissue culture.

THE BEDOUIN

Although I didn't have the opportunity to visit permaculture projects on the West Bank, I did meet with people working for a less well known self determination movement, that of land and other rights for the Bedouin people of the Negev. 80% of the Negev is closed military areas and in the remainder Bedouin people are in dispute with the government, that wants to resettle these people. The modern towns built especially for them are not suitable for traditional extended family life and have no provision for agriculture and animal grazing.

The "illegal" dwellings, gardens and runoff agriculture on traditional land had no roads, electricity, sewerage or water supply other than one 20mm outlet for a whole settlement. It could be argued that the dispersed nature of the Bedouin settlements make them too expensive for conventional services. But it is clear that if the government was prepared to negotiate on the issue of land rights and recognise that a self reliant lifestyle for the Bedouin will result in less social and political problems than forced resettlement, then technical solutions which are compatible with financial, environmental and traditional requirements could be found. Passive solar design combined with traditional wood cooking, solar electric systems, roof water collection to tanks and cisterns, better design of earth roads integrated with runoff collection systems, appropriate tree and shrub animal fodder, fuel and timber systems and mulch gardens around extended family housing clusters are examples which were discussed during and after my visits to the settlements around Beer Sheva. Like all traditional peoples in transition, the danger of being seduced by the pervasive consumer television culture and conventional development models is high, even if the Israeli state was more willing to consider Bedouin aspirations. The story of the Bedouin has its own unique complexity but is also one more case of tragic transition from traditional to industrial systems when the elements from which to build more sustainable systems are available.

The recreation of the land of milk and honey will take some generations, even assuming Israelis can learn from their brief history, reverse the destructive consumerism of recent decades and come to terms with their arab neighbours. One contribution to that enormously complex last problem would be to recognise the value and wisdom inherent in some aspects of traditional arab and Bedouin land use (as was suggested by some early kibbutz pioneers) and at the same time help avert the disastrous headlong rush of the Arabs to copy all unsustainable high energy Israeli systems of land use.



WOMBAT FOREST SUBMISSION

**TO VICTORIAN GOVERNMENT
MINISTER COLMAN 9TH JANUARY 1995
FROM LOCAL COMMUNITY DELEGATION
NOTES FOR POINTS PRESENTED BY DAVID HOLMGREN**

These notes cover a brief presentation I made in early 1995, to the State government minister responsible for the management of the Wombat Forest (64,000 ha) in our region which is primarily used for timber production. I was one of 5 presenters from a local community delegation representing concerns about over cutting and poor management of our public forests. My presentation drew on my then recent study tour which included European forestry as well as my experience in Landcare and farm forestry extension work.

The follow up letter to the minister's secretary was never sent because of concerns that it would not be useful in the strategy of co-operative liaison, which was being pursued by the local community. It reflects my views about forestry which were to be more practically applied at Fryers Forest in the following years.

In 1998 local conservation and saw milling groups signed an historic joint letter to the minister calling for reform of Wombat forest management. Since then, local Wombat Forest Society activist-researchers, Tim Anderson and Loris Duclos, have done ground breaking work exposing the massive over exploitation of our local forests as the pattern for the whole of Victoria during the 1990's.



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Having recently returned from a six month teaching and study tour in Europe, I want to address two questions which should provide you with an outside perspective and context for considering the detailed and first hand knowledge of the Wombat Forest presented by Gary Mackintosh and other members of our delegation.

Those questions are;

Firstly,

- can the current forest management system in the Wombat be regarded as "world class" forestry?

and secondly,

- does the department's management of the Wombat Forest have any credibility in the context of the very strong landcare ethic and movement within the Loddon Campaspe catchments?

I will present evidence based on my own experience and knowledge which shows the answer to both questions must be no.

My evidence will reinforce the importance of the Minister securing access to alternative sources of expertise in the field of forest management.

More specifically, my evidence will reinforce the urgency of addressing our community's concerns, expressed at many public meetings and forest tours over recent years.

Dealing with the first question of management of the Wombat being world class forestry.

The current Shelterwood system of management achieves the first requirement of competent and sustainable forestry in generally achieving regeneration of primary timber species following logging.

This is commendable, but hardly a great achievement, given the relative ease of eucalypt regeneration when compared with other important managed hardwoods overseas such as oak and beech.

Following the successive logging phases of the Shelterwood system no silvicultural intervention (thinning) is done.

This is contrary to the most basic precepts of the forestry profession.

Thinning is fundamental to ensuring a high proportion of future wood volume is sawlog rather than low value products such as pulp and fuel wood.

In Europe, it is not uncommon for more labour and resource to be allocated to early intervention thinning than is used in ensuring regeneration or planting (in the case of failed regeneration).

The timber resource that is currently being harvested in the Wombat is a direct result of management systems during the first half of the century which did involve thinning.

You will be shown compelling evidence by Gary Mackintosh that the current harvesting system is actively destroying future sawlog values and that the best use is not being made of harvested wood.

What I want to emphasise is that the present system of harvesting is also producing new forests with less sawlog potential and more low value wood (ie. pulp and fuel wood).

The official position that forestry management is sawlog-driven has no credibility while there is no management to specifically grow sawlogs.

I acknowledge that ultimately conservation values will and must provide some brake on production levels from native forests. However, the Departmental position that current management represents the best balance between conservation and production values is absurd to anyone who has studied European hardwood forestry which generates massively higher returns while better protecting other forest values.

All of this is achieved with species which have lower growth rates requiring longer rotations, and greater complexity of regeneration and silviculture than our eucalypts.

Minister, I would like to present you with some data on hardwood forestry in Alsace in eastern France, supplied to me by a forest management contractor colleague who I stayed with on my recent study and teaching tour as an example of world class forestry.

Alsace mixed hardwood forests are managed on a 120-150 year rotation yielding 6-8m³/ha/annum of sawlog, pulp and firewood. 80 ha can provide a modest income for a family with 3-4% return on capital.

The cost of land with good existing forest is the greatest problem for any prospective forest owner (\$10,000-\$18,000/ha.) but community and state owned forests return a high dividend. Royalty returns on good forest are around \$300/m³ average (pulp and firewood included). It is the very high returns from good quality sawlogs which give this high average price.

Total costs of management and harvesting are 25% of returns. Unmanaged forest (mostly very small private lots) will yield less than 3m³/ha/annum of total product.

From the experience of some of my colleagues, your department seems very reluctant to provide figures on costs and returns from the Wombat forest.

Based on the limited data which is made available, yields appear to be somewhere between 3-4m³/ha/annum returning an average of about \$12/m³.

This is not world class forestry!

The very strong feeling in our community that it is possible to achieve major improvements in conservation and production values through changes in the forest management system is strongly supported by the diverse examples of European hardwood forestry.

The next question I want to address concerns the credibility of the Department within the Landcare community.

As an educator and consultant I have enthusiastically promoted farm forestry as an environmentally and economically sound land use within the Loddon Campaspe catchments for 10 years.

Your Department has put increasing resources into farm forestry and agroforestry research and extension in recent years in line with the Timber Industry Strategy.

The Loddon Catchment Salinity Management Plan and the more recent Avoca-Loddon-Campaspe Regional Landcare Plan include recognition of the great potential for forestry and agroforestry to address salinity and other land degradation issues. (Recomm. 8.1-8.7 & 9.1-9.4).

Information provided to farmers by the government suggest yields of 15m³/ha/annum of pulp wood can be expected from hardwood plantations.

In our catchments, there have been spectacular increases in landcare tree planting by land holders in the northern low rainfall areas. But in the upland high rainfall parts near the Wombat forest, managed hardwood forests, planted or native, are conspicuous by their absence.

I believe that the greatest impediment to the development of a healthy private hardwood forestry sector in our region is the poor example of “managed forestry” provided by the Department and the apparent low returns the public of Victoria receive from production forests.

What astute farmer would consider hardwood forestry as a land use when the Department with its vast existing forest resources and “expertise” gets such a poor return per hectare and when there are serious doubts about whether forestry is environmentally sound?

Despite the example provided by the Department, a small but increasing number of land holders are becoming more knowledgeable and experienced about silviculture through managing their own diverse tree plantings.

These innovative farmers are natural leaders within rural communities. Their disgust at management of public forests is openly expressed within the landcare network.

The almost schizophrenic fronts presented by the Department on forestry is astonishing when viewed from outside. It seems that the revegetation and farm forestry sections of your Department exist in almost complete isolation from native forest management.

The greatest contribution you could make to Landcare in Victoria would be the reform of the public forest management. Our community would be united in support if you made a start in the Wombat.

The question I would like you to consider Minister, is if the department had to apply for Landcare funding for its management of the Wombat Forest, would you, or your Landcare advisors think it worthy?

Ray Page
Office of Minister for Natural Resources
232 Victoria Parade
East Melbourne. 3002

15th January 1995

Dear Mr Page,

Thank you for the papers by Dr Attiwill which I have read with interest. As it happens I have a long standing (20 years) interest in the ecology of ash forests of South Eastern Australia and as long ago as 1980 was involved in leading forest walks with foresters and ecologists discussing origin, regeneration and management of these forests.

Although I disagree with Dr Attiwill on some critical points about origins and ecology of these forest, I am in broad agreement with his basic thesis that the ash forests are amenable to ecologically sustainable harvesting. Further I agree that some version of clear falling followed by fire may be the most appropriate system of harvesting and regenerating these forests.

I do not think it follows that such systems or their politically inspired adaptations (Shelterwood) are appropriate to the harvesting or regeneration of mixed species and age forests such as the Wombat. But even this point is not critical for me to discuss with you or the Minister.

What amazes me is that you have sent this paper at all, given my and our delegation's support for continued management of the Wombat forest for timber production. It disturbs me greatly to think that after all our efforts at clarity and precision with the Minister and yourself over two hours, that we may still have to be pigeon holed into one of two intellectually and morally bankrupt political camps of this 25 year debate.

The points which I presented to the Minister (enclosed) were intended to show that Victorian forest management is appalling when compared with European forestry from a production perspective.

The issue you and the Minister must deal with is this: The timber industry has the use of 1.3 million ha of public forest "available and suitable for sawlogs" (Timber Industry Strategy) which Attiwill shows is highly amenable to management and biologically productive (Ash forest has the highest measured volume increment for any natural forest in the world). It pays the lowest royalty rates for hardwood of anywhere in the developed world, uses the cheapest methods of harvesting known and yet its contribution to the Victorian economy as measured by value added wood use per capita is lower than comparable countries.

There are only a few factors which could account for this extraordinary situation:

1. Our hardwoods may be inferior as sawlogs compared with other major hardwood species used globally.
2. Our management of the forests is so incompetent that yield of sawlog is actually very low.
3. Collusion between a monopoly public producer and a collective monopoly of wood processors, to not pay Victorians a fair return for use of their forests, instead of effectively competing for market share with alternative materials.

Although a combination of 'cultural cringe' and lack of high quality value-adding in the past has led to a perception of inferiority of our hardwoods this is rapidly being replaced by an understanding that they are at least equal to hardwoods from other managed forests in Europe and N. America. The size and volume of sawlogs available to the local industry are larger than elsewhere in the developed world so it should be better able to compete than overseas processors of hardwood.

It is the second and third factors which are the main problems.

The lies and duplicity by state forestry departments in Tasmania, N.S.W. Victoria and W.A. over the last 25 years concerning the introduction and management of pulpwood harvesting in native forest makes it almost impossible to discuss the appropriate harvesting of pulpwood to improve standing forests without being associated with this discredited position.

The Minister's admission to us that he would not be changing the logging system because "there were [pulpwood] contracts to meet" was tacit admission that the forest management is pulpwood driven. Unfortunately, we all know it would be political suicide to admit this publicly so the lies must continue.

Twelve years ago, I made a decision that I was not going to waste my time on the reform of public forest management in this country which I felt was doomed to a downward spiral of short sighted utilisation and 'hands off' abandonment. I came to the conclusion that a sustainable forest culture in Australia would emerge from the private sector, especially from a hybridisation from elements of the old bush and new farm forestry interests. Through my teaching and design work I have attempted to assist the process and with limited personal resources invest in sustainable forest projects. Our community is one of the many places around Australia where this dynamic new culture is being born.

In the mid 1980's I used to say to people (especially environmentalists) that the management of the Wombat in the recent past (until the 1970's) was probably the closest we had in this country to good public sector forestry but that the current methods were

more dubious. However, it is only the growing concern from the people in our community who know the forest best (the men who have worked in it most of their lives) and the fragmentary data squeezed out of the department which has made me realise we are looking at a rape similar in magnitude and speed to that late last century. The conservators of one hundred years ago have become the cynical agents of private exploitation today.

Reluctantly, I have decided I have to add my efforts to saving what has also become my forest. But how we achieve that where other communities have failed, without succumbing to the divide and conquer methods of the departmental/industry hierarchy or the misguided energies of urban media-focussed mainstream conservation organisations is difficult, to say the least. It might not be politically astute to be as frank as this with a Minister's advisor but I want to see if you can really offer us anything useful and make it clear that we intend to learn from the mistakes of other communities.

The Minister's suggestion that our community should be more persistent in dealing with the foresters is actually offensive given:

- The persistent use of PR methods designed to manage the "ignorant public" by senior Department officers when dealing with people in our community who have forestry knowledge and expertise.
- The salaries senior foresters receive to do a job (provide leadership) which they are not doing and that community members (all earning their own livings, mostly less than our senior foresters) cannot put the time or resources in on a continuous basis.
- That foresters come and go with such rapidity that developing a working relationship with one can be a waste of time when they are moved to East Gippsland or head office.

I am not looking for a position on the FMA because I have seen very clearly the pattern (across many sectors and issues) of effective community activists being snowed under by professionals who run these committees. However, if the Minister can instruct your Department officers to change their methods and engage us in genuine dialogue then I would see that as at least constructive.

I await the Minister's reply to our submissions and look forward to constructive feedback from you.

Your faithfully,

David Holmgren



THE LANDCARE MOVEMENT - COMMUNITY BASED DESIGN AND ACTION ON A SCALE TO MATCH THE CONTINENT

*This essay was written in early 1995 for a planned book by award winning architect Greg Burgess called **Building Community** which was dealing with the general subject of design for and by the community and included contributions from many design professionals and community facilitators. I had worked previously with Greg and he wanted me to write on this subject despite my suggestions of others who may be better qualified. For various reasons the book was never published but it provided me with an opportunity to further consolidate some of the issues referred to in the book review of **Greening A Brown Land** and clarify the link between Landcare and Permaculture. In the absence of publication I used the essay as a basis for my own lectures and other presentations of my ideas about Landcare including at the Australian Permaculture Convergence in Adelaide in early 1995 and the Landcare For Educators courses run by the Creswick Landcare Centre.*



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To attempt to overview the Landcare movement of rural Australia is a great challenge due to its diversity and geographic breadth. To explain its connection to the design professions and the field of community design in a brief essay may be impossible. In attempting this, my perspective is inevitably a more idiosyncratic one than that provided by more mainstream perspectives¹.

Landcare is concerned with the repair and restoration of the productive land resource base of Australia. Its origins were from diverse local groups which emerged simultaneously in the early 1980's in several regions affected by land degradation, most notably salinity and tree decline. In 1986 the Victorian government used the name Landcare for its program to assist these voluntary groups and two years later the federal government initiated the National Landcare Program as the community-based vehicle for funding of rural land restoration and sustainable landuse. By 1994, Landcare has been estimated to involve one third of the Australian farming community in more than 2,000 groups².

The scale and long term nature of land degradation problems has been a force for bringing rural communities together. Local schools, churches and service organisations, businesses and councils have all been active in Landcare. The effect of land degradation on rural communities must be seen in the context of the crippling effects of long term decline in commodity prices which have severely eroded the economic and social base of rural Australia. Government service cutbacks and progressive elimination of remaining agricultural subsidies have added to the pain. The global economic forces involved seem unaffected by the plight or action of local communities. In comparison, land degradation has seemed amenable to community action. By the process, social interaction and community cohesion have been strengthened, also providing a better base for dealing with the economic crisis. At the government policy level, Landcare is now one of the few politically acceptable vehicles for returning some of the national wealth to rural communities.

The solutions to salinity, erosion, acidification, tree decline and other symptoms of ecosystem breakdown demanded fundamental changes to agriculture. The integration of design and planning skills into farm management is one of those fundamental changes. For example, it is impossible to contemplate large scale tree plantings without considering fencing, stock water supply, access, etc. and thus the existing, if unconscious, "design" of the farm. On a larger scale, changing how the farm interacts with its watershed or catchment landscape demands an understanding of the catchment system.

Within the Landcare movement, the **whole farm planning** concept and **integrated catchment** management have been the main expressions of this change, empowering farmers and rural communities to develop and apply design skills relevant to agriculture. Whole farm planning although simple and perhaps obvious to design professionals, was a

¹ Campbell, A. **Landcare: communities shaping their land, their future** Allen and Unwin 1994

² Smith, D. Landcare: Who owns the revolution? in **Ecos** no.82 1994

radical change in thinking for farm managers. It has generally been a kitchen table design process where the farm family is the design team with some input from technical advisors. The emergence of women and the next generation as important contributors has been a characteristic of Landcare which has challenged the generally patriarchial decision making processes within farming families and rural communities.

Although design professionals have contributed to whole farm planning, they have been more conspicuous by their absence, partially a reflection of the small number of landscape architects with expertise relevant to agriculture. Today, some landscape architects are working in this field drawing together the new technology of revegetation, design thinking and farming systems. However the cutting edge of land design remains with creative farmer innovators. The design professionals, like the agricultural researchers, have been the followers.

My own development of the Permaculture concept with Bill Mollison in the mid 1970's³ involved the application of design principles inherent in nature to the creation and management of productive landuse systems (particularly agriculture). More broadly, we saw that design was the critical skill in the fragile and uncertain transition to a sustainable post industrial society.

These design principles were derived from study of both the science of 'systems ecology' and pre-industrial examples of sustainable landuse. They suggested agricultural systems needed fundamental redesign rather than fine tuning. A much greater role for trees and other perennial plants to stabilise the landscape and provide for human needs was one of the cornerstones of the permaculture concept.

At the same time hydrologists working on the causes of dry land salinity in central Victoria were developing the theory (now widely accepted) that replacement of the perennial native vegetation system of trees, shrubs and perennial grasses with annual crops and grasses had generated a saline water table which had the potential to destroy much of the agricultural productivity of the region within the next 60 years.

Development of a healthy framework of perennial vegetation is now widely accepted as the most universal strategy for sustainable farming and has become the primary focus for many Landcare activities and programs.

Permaculture has itself grown into a world wide movement⁴ for the practical development of environmental solutions, initially as a result of the tireless work of Bill Mollison. However, it continues to be widely perceived as a radical and alternative response to the environmental crisis on the fringes of both the environmental and organic farming movements.

3 Mollison, B. and Holmgren, D. *Permaculture One* Corgi 1978

4 Holmgren, D. Uncommon Sense in *Permaculture International Journal* no. 44 1992

Landcare, on the other hand, is now widely perceived as a mainstream, even conservative response to environmental crisis. From the permaculture perspective some of the activities and approaches which come under the Landcare umbrella hardly represent sustainable landuse. For example, the large resources devoted to destroying self-established non-indigenous trees and shrubs especially in urban and urban fringe Landcare groups is more an expression of a refocused war against nature rather than a transformation to a working with nature.

However, the image of Landcare as mainstream and Permaculture as alternative or radical disguises how radical ideas via empowered individuals and small groups have created what is now accepted as the mainstream. Today, many of the key figures involved in Landcare, from local groups through to top decision makers, have been influenced by permaculture and see their work in Landcare as a expression of that influence. The story of the development of Landcare in central Victoria provides important examples.

In 1978, Terry White convened the Salt Action Liaison Team, a small group of local farmers around Maryborough. Terry was very active in the local community on many fronts and was a pivotal figure in the fledgling permaculture movement as founding editor of the (then) *Permaculture Journal*.

In 1983, S.A.L.T. published a revegetation strategy⁵ which outlined the issues and the solutions. This led to state and federal funding of a community-controlled revegetation project. Project Branchout provided work for unemployed people planting trees and shrubs in demonstration sites across the Loddon, Campaspe and Avoca river catchments. These plantings were specifically designed to address salinity and other land degradation issues as well as explore options for new tree based land uses. Through the hands-on and often informal decisions of Rod May, Wayne Irving and others⁶, the permaculture agenda was being implemented with support from government departments, local councils, farmer and community organisations and schools. In retrospect, this work can be seen as having catalysed the explosion of farm and community Landcare action in the region. There are now dozens of local Landcare and related groups leading direct action on farms to repair and restore the land.

Project Branchout went on to initiate and sponsor a range of research, education and extension projects including my own research for more specific and refined design guidelines for revegetation of one of the most treeless land types within the catchments, the volcanic plains⁷. This work directly addressed revegetation designed to stabilise existing broad acre land uses, central to the Landcare agenda. But it also shows how revegetation could provide the essential foundation for a long term transition to more integrated and intensive sustainable land uses envisaged in permaculture.

5 Oates, N. *A Revegetation Strategy for the Loddon-Campaspe Region* Dept of Conservation Forests and Lands 1983

6 May, Rod personal communication

7 Holmgren, D. *Trees On the Treeless Plains Revegetation Manual For the Volcanic Landscapes of Central Victoria* Holmgren Design Services 1994

At the national policy level, Landcare is the practical expression of the accord between the Federal government, National Farmers Federation and the Australian Conservation Foundation. This relatively quiet consensus has received very little media attention compared with the deadening stalemate over management of public native forests. The Landcare accord has allowed radical ecological ideas to be given a forum at the highest levels.

For example, Jason Alexandra, another permaculture pioneer now representing Australian Conservation Foundation in the Landcare accord, has been a strong advocate of farm forestry as a sustainable land use⁸. The current rush of creative energy in the farm forestry side of Landcare is overturning many of the assumptions of the forestry profession and industry about where and how forests can be grown in ways which are both ecologically sustainable and economically viable. In the process, a new culture of forestry is being born within farming communities and may even lay the foundations for the eventual reform and redirection of public forestry in Australia.

Landcare has been an effective vehicle for the spread, adoption and ownership of better land management techniques. It has also fostered a conservation ethic which in many ways reverses the development ethic which helped found Australia's rural communities and industries. Given the conservative reputation of farming and rural communities, this extensive and practical expression of environmental awareness is a major achievement of a process which no one owns or controls.

However, the examples given show that beyond adoption of well proven methods, more radical ideas and creative innovation from the fringe of society can rapidly influence the mainstream through community based voluntary action. Some of the pioneer innovators⁹ have suggested Landcare has become dominated by bureaucracy and has lost its radical vision. However, at least part of this loss of vision is the inevitable consequence of the now very broad community support and popularisation of Landcare. Any true community process can only reflect the consensus of values and understandings of that community. For the pioneers, some disillusionment with the process of adoption of their innovations is inevitable as they and others struggle to articulate and bring to life the models for the next step towards sustainable land use.

8 Alexandra, J. Realising the potential of a farm-based forestry sector in *Catchments of Green conference proceedings* Greening Australia 1992

9 Smith, D. op. cit.



HEMP AS A WOOD PAPER PULP SUBSTITUTE: ENVIRONMENTAL SOLUTION OR DIVERSION FROM SUSTAINABLE FORESTRY?

*The original version of this article was written in April 1996 as an annual contribution to the newsletter of Permaculture North, a local permaculture group covering the north shore suburbs of Sydney. It was, in part, a reply to an article in the previous issue advocating hemp as an environmentally sound alternative fibre crop. The reality and potential of forestry as a sustainable land use expressed in *Creating A History Of The Australian Search For Sustainable Land Use* (Article 13) and in the *Wombat Forest Submission* (Article 17) also comes through in this article written around the same time but expressing long held views.*



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For several years now many environmentalists have advocated the growing of hemp as an alternative to trees for both paper production and as a substitute for cotton. A small market for hemp products is developing gradually around its “green” credentials. Hemp is a very useful fibre crop with great potential which has been ignored because of the legal prohibition on *Cannabis sativa* growing¹. I believe the argument for using hemp as a substitute for cotton is environmentally sound but that the idea that it should replace trees as a major source of paper pulp would be a retrograde step. In any discussion about the potential of new crops I think it is important to avoid the “miracle crop syndrome” when looking for answers to fundamental land use problems.

The author did point out hemp’s high nitrogen requirement as one of the limitations to hemp’s environmental status but repeated the often-claimed potential of hemp to replace wood fibre for paper pulp. I’m sure this is technically possible. But I believe it would be environmentally and economically unsound.

In *Permaculture One*² Mollison and I emphasised the problems with annual cropping especially on a broad acre scale where soil cultivation is generally necessary to create a seed bed and control weeds. Land which is in any way suited to broad acre cropping (arable) on a sustainable basis is a limited resource, especially in Australia. Broad acre hemp production would have to be done on these limited and fragile arable soils. If hemp was grown as a fibre to replace cotton (which requires first class arable soil) then the environmental benefits would be considerable. Cotton not only requires very fertile soil but also needs abundant irrigation and heavy use of pesticides. Hemp on the other hand can be grown unirrigated and has little need for pesticides even though its nitrogen requirement is higher than most grain crops.

As a source of high quality fibre for clothing, ropes and other durable products (including some special purpose papers) broad acre hemp production makes sense. As a weed suppressing and disease breaking rotational crop with grains and other food crops it would help shift existing broad acre cropping systems towards sustainability and provide more economic options for grain farmers.

Using hemp to replace trees for bulk paper production is another matter. Eucalypts, pines, wattles or most other prospective tree species can be grown for pulp on very poor quality land (steep, stony, infertile). To use arable land to grow a fertilised annual crop as an alternative to wood pulp plantations would be poor allocation of resources and increase overall environmental impact. This is especially so when we realise that the average useful life of paper products is very low.

So what about replacing the dreaded wood chipping of native forests? Most environmental groups have for years advocated establishment of plantations on marginal farm land

¹ The recreational drug marijuana is made from the resinous head of *Cannabis sativa* while the stem fibre is the source of hemp. However varieties producing good quality hemp yield very poor quality marijuana

² Mollison, B & Holmgren, D. *Permaculture One* Corgi 1978

to supply wood pulp. A small but rapidly expanding plantation eucalypt industry is developing. Some plantings on farms needing reforestation to address salinity and other Landcare issues are showing an environmentally progressive lead and in some notable examples the plantations have been established in ways which reflect whole farm planning principles. However we are yet to see many examples of mixed species plantations reflecting permaculture principles³. We need to see plantation forestry as a pioneering process for developing productive **mixed** forests rather than short rotation monocultural crop, dependent on fertilisers and herbicides.

Perhaps the most fundamental point about more sustainable wood fibre production is that it should be harvested as a **byproduct** from thinnings and heads of trees in forests and plantations grown for higher value wood products (eg sawlogs). The idea of growing a whole forest for one product yield is a contradiction of the most basic principles of forestry and reflects a misunderstanding of how trees and forests grow.

In trying to explain this point to wood producers at a farm forestry conference Neil Barr, one of New Zealand's foremost farm foresters put it this way "*aiming to produce pulp from trees is like a wool grower aiming to produce dags from sheep*". Pulpwood and firewood are the inevitable byproducts of any forestry system designed to produce high value wood products from poles, sawlogs and veneer logs.

If this is true for plantations it is even more true for native forest, where the greater diversity of trees and growing conditions means only a limited number and parts of trees are suitable for sawlogs. Unfortunately, the very valid point that sustainable native forestry needs markets for low grade waste wood has been discredited in Australia because of the way waste utilisation (wood chipping) has become the tail wagging the dog in public forests.

The irony is that as the calls for excluding wood chipping from native forests become stronger, there are huge volumes of wood which need to be removed by thinning from our vast regrowth forest areas. There is no major use for this wood other than paper pulp. CSIRO has done the research⁴ to prove the benefits for future sawlog production, while the environmental benefits of thinning are also substantial. The thinning job has the potential to create enormous employment in rural areas. Unfortunately, the heritage of mismanagement and greed which has characterised public forestry in Australia will probably mean these forests are abandoned to return to "wilderness" (in the old sense of the word) racked by frequent fire and regeneration cycles, without ever developing into the great park like forests of pre-european Australia.

While we need to see a massive increase in plantation forestry on marginal farmland to produce timber, to abandon management of native forests would be as tragic as the

3 Holmgren, D. *Trees On The Treeless Plains* Holmgren Design Services 1994

4 CSIRO Young Eucalypt Research Project

current mismanagement. Fifteen years ago, I became convinced that the public forest debate would have no productive resolution and that new models for Australian forestry would emerge from small scale private forestry which in the future might be reapplied to abandoned public forests.

Today, we see in innovative Landcare farm forestry and the portable sawmill and wood craft revolutions, some of the elements of the new forestry. My own contributions to the new forestry are now focused on the management of Fryers Forest, a rural residential community where management of the regrowth box forest for amenity, conservation and timber production will be a primary focus. Hopefully history will show that out of the ashes of the public forest debate, forestry was reborn as the sustainable land use against which all others are compared.



THE ROLE OF NATIVE VEGETATION IN BACK YARD PERMACULTURE

*This article published in **Green Connections**, June 1996, is the third version of an article originally published in the newsletter of **Permaculture North** in 1995. It provides some guidelines for how native vegetation can be used as an integral if small element in garden agriculture without succumbing to the fashion to plant indigenous species everywhere.*

Over the last decade the commitment to preserving areas of remnant native vegetation and planting locally indigenous species has grown from a few conservationists to a very strong movement backed by government funding. In fact, the native revegetation movement has been more effective in getting the public to implement its agenda than the permaculture movement has in achieving community and local self reliance, particularly in food production. Very often people interested in permaculture are also committed to revegetation and the relationship between the two is a very interesting one. This is a very broad subject which I cannot deal with here but I thought some practical guidelines on how we might address the issue at the backyard level may help.

The competition for space between uses in urban gardens can be quite intense. Using permaculture principles we should:

- place the highest priority on producing as much of the household's perishable food needs as practicable.
- design to minimise use of fossil fuels and non-renewable resources. (eg use of clothes lines for drying)
- allow for outdoor living space which provides for some of the personal needs of the household (eg reduce travelling for recreation)
- have facilities for property maintenance and repair.
- maintain a low fire hazard environment.

In any home garden, sunlight eventually becomes the limiting factor to productivity and energy efficiency. Designing to maximise use of sunlight is the most important principle in sustainable garden design.

Native plants can be useful in the following ways:

- Providing quick growing, minimum care shelter, screening and shade.
- Attracting useful native birds and predatory insects.
- Some food and other products.
- Providing mulch from leaf fall and prunings.

However, if we give a priority to native plants we will dramatically reduce our space, sunlight, water and nutrients to produce really useful food and if we include too many large evergreen trees we can dramatically reduce our (or our neighbour's) ability to use the sun to heat our houses, grow food or dry clothes and thus save fossil fuels.

Even on our 2.25 acres (1 hectare) at Hepburn Permaculture Gardens¹ we have made minimal use of large space, light and water consuming eucalypts. More moderate sized Acacias and Casuarinas have been used for their shelter and soil improving qualities.

Even the emphasis on native plants for pest control is a bit overstated at times. Carrots (or any other umbelliferous species) going to seed for your next crop are as good at attracting

¹ Holmgren, D. *Hepburn Permaculture Gardens: 10 years of sustainable living* Holmgren Design Services 1995



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hover flies, parasitic wasps and other beneficial native insects as Bursaria spinosa or other renowned native species. On the other hand Bursaria maybe the choice if you need a tough long lived shade tolerant shrub to in fill between fast growing bushy wattles on the dry shale and clay bank of an excavated house site.

Where the local vegetation is dry sclerophyll forest (most of densely settled Victoria) or heath land, then the problems of use of local natives in home gardens can be substantial. Permaculture gardens, by their very nature, are high density vegetation systems, generally dependent on some irrigation, growing on a nutrient rich, organic soil. Sclerophyll plants, used to open conditions, low nutrients and often fire, may grow well at first but as the garden matures they may become weak and leggy, and not recover well from pruning. Some low nutrient mulch from leaves and a little firewood maybe the final yields. If we site these species at sunny edges where they might do better we lose our most productive sites for vegetable production and fruiting plants requiring full sun. Bushfire hazard can also be increased as most sclerophyll species are fire prone through a combination of combustible oils in the foliage, dry litter accumulation and (in some cases) shedding or fibrous bark.

On the east coast of Australia, the local rainforest vegetation is more suitable for inclusion in gardens because it includes species better suited to high nutrient, partially shaded conditions and are sometimes food (or poultry forage) bearing plants. Lilly pillys are good examples of tough food and forage bearing rainforest trees suitable for hedging to control form and provide mulch. Cherry Ballart (Exocarpos cupressiformis) is one of the few dry forest species native to southern Australia which has similar characteristics and uses and is a remnant of rainforest-like vegetation which was more common before the effects of thousands of years of Aboriginal burning. Unfortunately the propagation and cultivation of this beautiful small tree is still problematic although current experiments may overcome this².

Some dry forest species are well suited to productive gardens. For example Cootamundra wattle is a low fire hazard, relatively long lived Acacia which is an ideal dense shelter shrub or small tree for very poor and dry soils. It sheds loads of soil improving fine mulch and a huge crop of seed for poultry feed or human food. Few wattles are as useful.

However we should not go overboard about the bush foods fad. For decades I have been eating bush food and where appropriate growing some species in gardens, but as a “good peasant” I know what plants make most productive use of space, what is easy to prepare and serve and what fills the belly, and it’s rarely a native species. Bush foods have a limited role in the limited space of the home garden. Selection of cultivars (as with Macadamia) by committed native food horticulturalist with more space to experiment, may over time change this situation somewhat.

2 Marilyn Sprague (personal communication)

We need to consider each species on its merits and not place too much importance on these artificial categories which disguise the real issue. **Our gardens and towns are human ecologies which make use of a diverse range of botanical species directly and indirectly. If we are to make them sustainable then we need to design human ecologies from the widest range of genetic materials available.** This is exactly what Nature does in dealing with all new situations. Nature is an equal opportunity employer and doesn’t discriminate on the basis of race, genera or species.

This doesn’t mean we ignore rampancy as a (negative) factor in selection of species. It is clearly unwise to plant rampant herbs such as yarrow in the richly composted soil of our vegetable garden for some herbal medicine value when it will grow quite well underfoot competing with grasses in the lawn.

This situation is more complex when we consider species which have the potential to invade areas of native vegetation. For example Cootamundra wattle is regarded by many as a serious “environmental weed” in Victoria and South Australia. This is not an issue I can address in this article³ but a more holistic approach to the issue of the continuing evolution of our ecologies and landscapes is desperately needed. Efforts to prevent spread of plants well suited to prevailing conditions are doomed to fail in the long term and whether we like it or not, exotic and native species from other parts of Australia will spread to limits determined by ecological factors, rather than community campaigns or government funding to “eradicate” environmental weeds. This is especially true for plants spread by birds.

On the issue of ecological diversity, the suburbs already provide incredibly diverse plant systems (admittedly very different from the pre-settlement ones) which have the potential to support a diverse range of native wildlife. Factors other than lack of locally indigenous vegetation currently limit the range and numbers of native animals and birds in our suburbs, such as huge populations of predators especially cats, road traffic and roads dissecting areas, and use of pesticides and other toxins. This is especially true now that native and locally indigenous vegetation is predominantly used in public open space plantings.

If we are serious about reducing the environmental impact of our cities and suburbs then we need to focus a lot more on our use of transport, home energy use and where our food comes from, and a lot less on whether our backyard supports three or four species of honey eater.

3 I have found very few good references putting the case for exotic and naturalised vegetation. The following paper provides a good starting point.
Nanninga, P. et al Exotics Verses Natives - Why Not Both? in *Proceedings 1994 Greening Australia Conference*
In my own book, *Trees On the Treeless Plains Revegetation Manual for the Volcanic Landscapes of Central Victoria* Holmgren Design Services 1994.) I demonstrate a balanced use of natives and exotics in farm tree planting.
In a book in preparation (*Migrant Plants and Animals: Ecological Imperialism or Ecological Evolution*) I am attempting to put together more comprehensive arguments for a positive approach to naturalised plants and animals to counter what I see as an excessively negative view taken by most conservationists and many biological scientists.

In the end, a garden full of local native plants may appear to be environmentally sound but if we include the power station, the market garden, commercial orchard and the rubbish tip, and other facilities necessary to sustain us then the picture doesn't look so rosy. I believe the real reason that more people prefer to grow native plants is that it involves less work and skill than growing your own food and that food remains so cheap (while farmers go broke and the land degrades) that most householders can't be bothered. For those of us committed to household environmental responsibility, an apple is a better symbol than a gum nut.



PERMACULTURE AND REVEGETATION: CONFLICT OR SYNTHESIS

*This article is updated from a paper which was included in the proceedings of a Greening Australian seminar held in Melbourne in August 1996. The seminar was titled **Is There a Role for Indigenous Permaculture: Integrating the Goals of Ecological Restoration and Permaculture**, and had been organised to facilitate dialog between two environmental movements which were seen to be at loggerheads over the issue of use of exotic vegetation and weeds.*

*As well as putting the weeds debate in the wider context of Landcare, this article outlines the concept of Ecosynthesis which is the theme of a book I am researching on the subject of naturalised plants and animals (tentatively titled **Migrant Plants and Animals: Ecological Imperialism or Evolution**). The seeds of this concept can be seen in **Impressions of New Zealand** (Article 2). A shorter article on this subject "**Weeds or Wild Nature**" (Article 23) was published in the **International Permaculture Journal** issue 61 February 1997.*



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The permaculture movement's development from its conceptual origins¹ in the 1970's has been closely connected to revegetation and Landcare.

The primary agenda of the permaculture movement was to assist people to become more self reliant through well designed garden agriculture. The design principles used were derived from study of both the science of systems ecology and pre-industrial examples of sustainable landuse. They suggested agricultural systems needed fundamental redesign rather than fine tuning. A much greater role for trees and other perennial plants to stabilise the landscape and provide for human needs, was one of the cornerstones of the permaculture strategy. From one perspective, permaculture is a revegetation strategy.

RURAL LANDCARE

The Landcare movement emerged in the early 1980's from diverse local rural groups concerned with land degradation, most notably salinity and tree decline². Revegetation with perennial and in particular woody vegetation has been an almost universal element in the response to the diverse symptoms of rural land degradation. With this has come widespread recognition that locally indigenous species have an important role for utilitarian, environmental and cultural reasons. Many government extension workers and funding groups have gone further in suggesting only indigenous species are appropriate.

Practical farmers with more experience in revegetation who are driving the Landcare push, recognise that new resource values must be generated by revegetation if it is to become an economically viable part of farming. Farm forestry and fodder trees are the dynamic expanding edge of Landcare which is promising to generate wealth.

In this context restriction to indigenous species is akin to try to plant a tree with one hand tied behind one's back.

The initial permaculture vision involved forests of useful species planted in arrays to mimic natural systems. Food species dominate the strategy for intensive (permaculture zone 1&2 systems) but in more broad acre areas, fibre, animal fodder and timber along with passive environment functions such as shade, shelter, erosion and salinity control, wildlife habitat, etc., are the appropriate uses of revegetation. My volcanic plains revegetation manual³ concentrates on these broad acre landscapes and functions of revegetation. What identifies this work as permaculture is the design system approach and the integration of the productive and environmental functions of farm landscapes.

1 Mollison, B & Holmgren, D. **Permaculture One** Corgi Melbourne 1978.

2 Holmgren D. The Landcare Movement in Burgess, G. **Building Community** in press 1995 RAIA

3 Holmgren, D. **Trees On The Treeless Plains: A Revegetation Manual For The Volcanic Landscapes Of Central Victoria** Holmgren Design Services 1994

URBAN REVEGETATION

In urban areas people have been more protected from the direct effects of land degradation but increasing awareness of both the loss of indigenous species and their underestimated values has become a central issue for many urban environmentalists. While the loss of bush land to inappropriate development was a focus for early urban environmental campaigns such as the Sydney “green bans”, in the last decade the passive destruction of indigenous ecologies by environmental weeds has become a primary target for environmental action

This shift can be partly attributed to the success in preventing active destruction of remnant urban bush land, and on the other hand, partly attributed to the general failure of environmental activism to make significant impact on the structural basis of unsustainable urban development and consumption, despite gains in environmental awareness and industrial efficiency.

This focus on the new concept of environmental weeds (invasion of non indigenous biota into bush land) has expanded on the back of public support and official recognition into an urban Landcare model of recreating indigenous ecosystems in public open space and urban wasteland. Relatively generous state and federal funding has seen the rapid growth in both number and scale of projects involving the community as well as spawning an urban revegetation industry.

The vision involves re-establishment of indigenous ecosystems as the backbone of productive rural and urban landscapes. However the inherent contradictions of actually destroying healthy non indigenous vegetation systems, with existing (if unrecognised) values, to recreate systems with no potential to exist in isolation from the surrounding land uses, have never been properly addressed. The adverse environmental impacts of these schemes are not properly assessed.

PHILOSOPHICAL CONFLICT

Much of the criticism of permaculture has revolved around its potential to spread environmental weeds⁴. The depth and intensity of criticism by some environmentalists may reflect active promotion of the values of so called environmental weeds by permaculturists. The valuing of weeds in permaculture is part of an older tradition within the wider organic agriculture movement which saw value in plants despised by farmers and gardeners, rather than the demonising which has become standard in public discourse on environmental weeds.

Mainstream urban and rural revegetation activities are major contributors to the spread of past and future environmental weeds but do not draw such vociferous condemnation

4 Robin J. Unpublished paper (1980?) John Robin has been one the strongest critics of permaculture although a public debate at the Tasmanian University in 1990 involving us both as well as Terry White and John Rankin demonstrated less differences than rhetoric suggested.

because this process is not an intentional outcome. In other words it is the “bad” **intentions** rather than bad results of permaculture which have attracted such negative attention.

An increasing amount of government and community resources are now being devoted to attempts to the destruction of naturalised non-indigenous species. This destruction of vigorous and healthy vegetation is very similar to the war by farmers against introduced weeds and native regeneration, which preceded the revegetation of salted and degraded rural land which started the Landcare movement.

In general, permaculture has made little impact on urban public land management because efforts to introduce food producing and other productive species have not been very successful. Proposed and actual plantings in permaculture inspired projects tend to divide into species which require too much care and attention for public land or successful species which (given the right conditions) naturalise and are thus automatically deemed environmental weeds. Most permaculturists have focused on getting their own house in order, leaving the public land to others, or have themselves adopting a segmented view of land use where small scale food gardens on private land would be surrounded by indigenous systems on public land.

However, the logical extension of indigenous revegetation, to control the sources of environmental weeds on private land via regulation or legislation, has produced a very strong reaction from permaculturists specifically and gardeners and horticulturalist generally. In Victoria the proposed pest plant law of the old Eltham shire⁵ effectively expanded the Noxious weeds list many fold, and became the flash point for conflict between environmentalists of the permaculture and indigenous persuasions.

Leading proponents of indigenous revegetation⁶ acknowledge that a legislated approach to environmental weeds will be ineffective and unenforceable but feel that the public education value override any adverse effects on people’s land use rights.

The productive result from this conflict is that the fundamentals of the respective conceptual frameworks need to be articulated. Unaddressed contradictions in both positions need to be worked through and practical strategies developed which can be applied by both private landholders and managers of public land who find themselves in an understandable state of confusion.

From my perspective however, the positive view taken in permaculture to many plants which naturalise, is widely misunderstood by environmentalists as simply selfish

5 Pest Plant Law no. 10 (1994) failed because of strong public opposition. It required the destruction of 54 species (in addition to species listed in the state Noxious weeds legislation) and required control of propagation of a further 29 species. The amalgamated Nillumbik shire has since attempted to use planning controls to the same effect based on much larger lists (216 species) included in the Pest Plant Management Strategy 1992 and based on a plant survey (McMahon 1989) which identified half the flora of Eltham as weeds. The current Inquiry into Pest Plants in Victoria by the Environment and Natural resources Committee of the parliament sees this attempt at control moving to a state wide stage.

6 Lincoln Kern, Randal Roberson and others at Greening Australia forum August 96

utilitarianism. The ecological reasoning behind the permaculture view has not been fully articulated. Here all I can do is sketch the larger context for the permaculture approach to environmental weeds.

ECOSYNTHESIS

Implicit in permaculture strategy is the acceptance that nature is an active designer herself and that it will be the co-evolutionary development of wild systems which may be the real keys to sustainability. Wild nature is evolving new ecosystems from a mix of self reproducing species at an ever increasing speed. This co-evolutionary process is a self organisational response to the disturbances since European settlement and follows patterns described by the science of systems ecology as developed by Howard Odum and colleagues⁷.

In some areas especially along streams this ecosynthesis process is advanced to the point where forests of mixed native and exotic species are beginning to show systemic characteristics. Reaction from indigenous revegetation folk to these areas ranges from the same disinterest they have in a weedy paddock, through to fear and loathing, and renewed trust in Roundup. In a low energy future (which I and others have argued is inevitable) ecosynthesis is likely to be more important in both stabilising resource degradation (erosion, salinity, acidification eutrophication, etc.) and at generating economically harvestable resources (timber, fodder, food, etc.) than either our chosen crop systems or indigenous revegetation.

Attempts at working with the ecological succession processes towards closed canopy forest in these riparian weedscales is conspicuous by its absence apart from a few informal permaculture inspired projects⁸. Recognition of the amenity values of these areas is thwarted by being labelled as “weed infested” and “alien”, drawing on ancient phobias about wild nature. Scientific study of these advanced examples of ecosynthes is noticeable by its absence⁹. Any discussion of current or future resource values is dismissed as something irrelevant to economic wellbeing in a high energy affluent society.

⁷ Odum, HT. **Environmental Accounting: Emergy and Environmental Decision Making**. Wiley 1996 is the definitive and up to date text about the application of systems ecology.
Odum, H.T & E.C. **Emergy Basis For Man and Nature** McGraw Hill 1981 provides an earlier overview of the concepts.

⁸ Spring Ck community forest project in Hepburn, central Victoria is a good example of permaculture principles applied to public land weedscape management. We make extensive use of this extensive site in teaching ecologic succession, reading landscape and a permaculture approach to environmental monitoring and revegetation in our residential Permaculture Design Courses.

⁹ Two recent local research projects
Sniderman, J. M. [Kale] **Successional Dynamics in a Mixed Native/Introduced Riparian Forest In Central Victoria** Uni of Ballarat 1998 AND
Wilson, Michael **Post gold rush Stream regeneration: implications for managing exotic and native vegetation** Centre for Environmental Management, University of Ballarat (presented at the Second Australian Stream Management Conference in February 1999)
have provided documentation and interpretation of some aspects of ecological processes in Spring Ck. This work stands out in the sea of repetitive documentation on environmental weeds invasion in the scientific literature as pointing the way to a new field of research in ecosynthesis.

Observation of weedscape succession in southern Australia and New Zealand over twenty years leads me to the conclusion that ecosynthesis of indigenous and migrant systems is likely to provide the most effective solutions to land and water degradation problems at the lowest cost. In addition to these critically important functions, ecosynthesis will yield the information on which to base more deliberate design based approaches (permaculture) to productive rural and urban land use.

Ecosynthesis is a reality which few ecologists would deny. In the process of dealing with both technical uncertainty and a range of environmental values and agendas, we need to accept that a diversity of approaches to understanding and managing land will provide the most useful results for the next generation to evaluate and use. Inevitably these will all be real ecological experiments on the edges of the gigantic experiment we call modern industrial society.

Whether we like it or not future choices are foreclosing all the time and a herculean effort to prevent the spread of environmental weeds will close at least as many future ecological options as it maintains. We should not delude ourselves that a war against weeds is reasonable or winable.

Wild nature may turn out to be a critical fall-back resource for society in crisis and even contribute to new biodiversity adaptive to a planet changed forever by the mining of 750 million years worth of stored solar energy in fossil fuels and a probable peak human population of 8 billion.



INQUIRY INTO PEST PLANTS IN VICTORIA

This joint submission was in two parts. The first, reproduced here was largely my words and deals with general policy issues concerning pest plant laws and in particular the proposal to add large numbers of environmental weeds to the lists of plants proscribed by the Noxious Weeds legislation.

*The second part (not included) was a case study which illustrated the issues involved in more economically and ecologically rational management of so called environmental weeds by focusing on Willows, a group of species which are major functional elements in Victorian rural landscapes. It was largely Michael Wilson's words (Centre for Environmental Management, University of Ballarat) drawing on the early stages of his PhD research on willows, which was later presented at the Second Australian Stream Management Conference in February 1999 (Michael Wilson **Post gold rush Stream regeneration: implications for managing exotic and native vegetation**).*

*This submission provides more formal and perhaps mainstream arguments relevant to the weeds debate covered in **Permaculture and Revegetation: Conflict or Synthesis** (Article 21).*

The outcome of the inquiry seemed predestined to continue the push to spend more public money on plant destruction especially when the minister Marie Teahan launched the new "War On Weeds" before the committee had completed its inquiry or reported to the parliament.



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Submission to Environment and Natural Resources Committee of Parliament of Victoria. September 1996

- David Holmgren B.A. (Environ. Des.) (Holmgren Design Services)
- Michael Wilson M. Sc. (University of Ballarat)

Weed invasions are SYMPTOMS of ecological change and imbalance not their CAUSE. Shooting the messenger exacerbates the problems.

We believe this submission addresses directly and indirectly most if not all the terms of reference. The submission follows its own logical structure but is particularly relevant to the following terms of reference:

1. Identify the impact of pest plants on the Victorian economy and environment.
2. Determine the current and projected costs of control of pest plants on private and public land.
3. Assess the adequacy of current information and research on pest plant control strategies.
4. Advise on the rationale for classification of pest plants and distinctions between environmental and agricultural weeds.
5. Advise on statewide priorities for pest plant control.

If the Committee requires further explanation of this submission we are willing to provide clarification and answer questions in a public hearing.

OVERVIEW

Poor ecological science combined with guilt about the great changes we have wrought on indigenous ecosystems is threatening to sidetrack the real moves towards sustainable land use in Victoria and Australia through a massive expansion of weeds legislation.

The existing weeds legislation provides substantial impediments to sustainable land use by assuming that a plant is inherently bad because it is a problem to current land uses and management strategies. It may be the land use which is the problem.

Examples abound;

Goats being introduced to sheep grazing properties to control shrub weeds proving a valuable diversification while changing attitudes to the so called pest (fodder) plants.

Serrated tussock, a dreaded weed for pastoral farmers has led to steep hillsides being "abandoned" and planted to pines which prove to be a more ecologically sound and economically productive land use on such sites (with or without serrated tussock).

Lack of suitable methodologies for assessing the hidden benefits from weeds have led to constant underestimation of their contribution to land rehabilitation and future resource use opportunities.

Campaigns to eliminate weeds have generally been unsuccessful despite heroic efforts often by whole communities (eg Ragwort in the Otways in the 1930's).

Entrenched attitudes by land holders combined with poor science has, over the decades, maintained noxious weeds legislation as a regulatory support for the most powerful primary industries. In New Zealand, Pasture Protection Boards were handed over to the pastoral industries to fund and run since most of the proscribed weeds were not problems to either the horticultural or forestry industries (which are emerging as NZ's dominated export industries).

It may be politically unrealistic to reform pest plant control in Victoria according to economic and ecologically rational principles. However the pressure to greatly expand the range of proscribed species by inclusion of “environmental weeds” is alarming and should be rejected as economically and ecologically unsound.

The environmental weed concept¹ is not based on an integrated or complete assessment of environmental impact but simply the likely displacing of indigenous vegetation in “natural” or near natural environments.

This flawed approach is compounded by any weeds legislation which is inevitably based on taxonomic definitions (ie species definitions) rather ecological (functional) assessment on a site specific basis.

A majority of so called environmental weeds are valued species in agriculture, forestry, horticulture and landscaping. In general these species are valued because of their hardy characteristics under the prevailing conditions, and low cost of establishment and maintenance. (These are the very characteristic used to promote the use of indigenous species.)

Prohibitions or impediments to the use of these species will increase the total cost to the Victorian community, economy and environment by both the costs of removal and control, and replacement with less well adapted species.

The ecologists and indigenous revegetation experts who developed and promoted the environmental weed concept have openly admitted² that legislation will have little real effect in control of environmental weeds but support it for its perceived community education value.

1 Carr, G.W. Yugovic,J. V. and Robinson, R. (1992) *Environmental Weed Invasions In Victoria* Department of Conservation and Environment and Ecological Horticulture Pty Ltd Melb.

2 Robin, J, Robinson, R. and Kern, L. personal communication and public debate.

We believe unworkable legislation is an historically proven recipe for misallocation of resources, and selective and unjust application.

The State government and CALP Boards should not add any plant species to the Noxious Weeds Lists or any other lists of proscribed plants without a comprehensive environmental impact statement and full and open public inquiry.

ECOLOGICAL PREDICTIONS

Our own research and experience suggest naturalisation and spread of exotic and Australian species will continue to increase in Victoria in the foreseeable future irrespective of all but the most massive and extreme control strategies.

We predict that the;

- (a) number of species
- (b) geographic spread
- (c) total populations;

will all increase due to increased seed sources, declines in active land management, and increased dispersal potential.

We do not expect large increases in new naturalisations of herbaceous and grass species, the traditional focus of concern by agricultural industries.

Instead we expect major increases in naturalisation and spread of;

- Australian native tree and shrub species widely planted in the last 30 years especially following bushfires through urban fringe, rural residential, highways, and farms where extensive planting has occurred in recent years.
- Bird distributed berry producing shade tolerate (rainforest analogous species) trees and shrubs
- Trees and shrubs palatable to grazing animals.

Under prevailing definitions virtually all these naturalised species will be classified as “environmental weeds” while a much smaller number may be considered agricultural and forestry weeds.

Naturalised species should be thought of as “migrant plants” which are in the process of become Australian. The fact that a large number of Australian and even Victorian species are now considered environmental weeds emphasises how counter productive this concept is especially when combined with the taxonomic basis of weeds legislation.

INDIGENOUS REVEGETATION

Current attempts to control spread of environmental weeds focus on the most infested areas especially around settlements and along riparian corridors for political rather than ecological reasons.

Adverse environmental impacts of control methods in these areas are much greater than any environmental benefits for the following reasons;

(a) serious effects of control strategies especially earthworks and herbicides on aquatic ecosystems.

- evidence of links between widespread use of Glyphosphate and frog decline
- increased sediment and nutrient loads from herbicide, burning and or earthworks.
- loss of fish habitat by earthworks and bird habitat including predator protection
- loss of efficient nutrient absorbing and erosion controlling species

(b) rapid re-invasion due to elevated nutrients, water and weed seed sources from urban and agricultural runoff.

Successful establishment of indigenous sclerophyll vegetation systems presents severe long term fire hazards especially in urban areas unless active fuel reduction management is implemented.

Study and management of mature examples of weed invaded riparian landscapes in Victoria over a decade³ show a general ecological pattern;

- (a) closed canopy forest (analogous to rainforest and/or deciduous forest)
- (b) open understorey (reduced primary colonisers eg blackberry)
- (c) humic soil (similar to compost rich garden soil)

With increasing ecological maturity the following beneficial characteristic develop

- (a) low fire hazard or fire barrier
- (b) high amenity and improved accessibility to people
- (c) high nutrient and water holding capacity, efficient purification of toxins
- (d) increasing stream bank stability
- (e) increasing ecological diversity (total number of species present)
- (f) increase resources use potential (animal fodder, timber, food)

3 Holmgren, D. & Morgan, P. (1982) *The Yarra Floodplain: The study of an urban ecosystem* Environmental Studies Ass Melb
Holmgren, D. (1994) *Trees On The Treeless Plains: Revegetation Manual for the Volcanic Landscapes of Central Victoria*. Holmgren Design Services
Holmgren, D. (1996). Management of Public Land Incorporating Biodiversity and Productivity; Spring Creek Community Forest Project Case Study in *Is There A Role For Indigenous Permaculture: Integrating the Goals of Ecological Restoration & Permaculture*. Greening Australia Forum proceedings

Streams dominated by environmental weeds in both urban and agricultural landscapes should be managed for multiple values by low cost skill based minimum intervention, to accelerate ecological maturity.

Labour and skill intensive bush regeneration strategies should be concentrated on reserves and other relatively intact remnants of native ecosystems especially those where results will be long lasting.

In particular sites

- (a) of low nutrient status away from stream corridors, and
- (b) remote from human settlement and intensive agriculture

will be most practical to maintain in an indigenous state.

State and local government funding of departmental, Landcare and other proposals which involve large scale removal of existing perennial vegetation should be dependent on the outcome of a comprehensive environmental impact statement.

The State government should provide funding for development and promotion of more ecological (integrated) approaches to management of riparian and public land around settlements and agricultural areas.

SUSTAINABLE LAND USE AND ENVIRONMENTAL WEEDS

Proscribing the control and/or elimination of these species under the Noxious Weeds Legislation or similar regulations will unnecessarily increase burdens on land holders and the State.

Environmental weeds legislation with State funding of control strategies will result in a permanent weeds eradication bureaucracy or industry able to lobby for endless increasing funding for endless increases in “environmental weeds”.

Primary industry can never be competitive unless it uses the most productive biological resources available. Weediness or ability to persist under prevailing conditions is an essential criteria for any species which has the potential to be truly useful to sustainable agriculture and forestry, especially Australian broad acre low input systems.

Most economically useful species are (ecologically) speaking weeds.

For example, Victoria’s most valuable, pasture legume (Subterranean clover), plantation timber (Radiata pine) and tree crop (Apple), are all environmental weeds.

While use by farmers, foresters and horticulturalists of existing valuable crops species can be expected to be protected by any reasonable changes to legislation and regulations, the effects on innovation could be serious.

Proscribing of environmental weeds will stifle research and development in forestry, fodder and horticultural crops with great potential to contribute to the state economy.

For example;

- (a) the most useful tree fodders in Victoria (tagasaste and willows) are both regarded by some as “serious environmental weeds”,
- (b) the best prospective plantation eucalypts (blue gum, spotted gum, sugar gum and mahogany gum) are all environmental weeds, and
- (c) some of the most prospective commercial “bush tucker” species (Cootamundra wattle) are environmental weeds. Olives, probably destined to be one of Australia’s most valuable tree crop exports, is regarded as South Australia’s worst environmental weed.

The state government should focus more of the pest plant control resources on efficient utilisation of so called weeds. This strategy should be integrated with greater emphasis in agricultural, horticultural and forestry research funding toward the efficient utilisation of plant species already common in Victorian rural environments irrespective of whether these are locally indigenous, Australian native or exotic.



WEEDS OR WILD NATURE?

*This article was first published in the **Permaculture International Journal** in February 1997 (issue 61) reflects the more detailed paper (Article 21) and submission (Article 22) written for a more general audience. It has been available on the Holmgren Design Services website for many years and has been widely circulated within permaculture networks.*

The permaculture movement’s development since from its conceptual origins¹ in the 1970’s has been closely connected to Landcare and revegetation. The primary agenda of the movement has been to assist people to become more self reliant through the design and development of productive and sustainable gardens and farms. The design principles which are the conceptual foundation of permaculture were derived from the science of systems ecology² and study of pre-industrial examples of sustainable land use. They suggested agricultural systems needed fundamental redesign rather than fine tuning. A much greater role for trees and other perennial plants to stabilise the landscape and provide for human needs was one of the cornerstones of the permaculture strategy. From one perspective, permaculture is a revegetation strategy.

The initial permaculture vision involved forests of “useful” species planted in arrays to mimic natural systems. Although food species dominate the strategy for intensive (zone 1&2) systems, in more broadacre areas fibre, animal fodder and timber along with passive environment functions are the appropriate “uses” of revegetation. My revegetation manual³ concentrates on these broadacre landscapes and functions of revegetation. What identifies it as permaculture is the design system approach and the integration of the productive and environmental functions of farm landscapes.

Landcare is concerned with the repair and restoration of Australia’s productive land. Its origins were from diverse local rural groups which emerged simultaneously in the early 1980’s in several regions affected by land degradation, most notably salinity and tree decline⁴.

The solutions to salinity, erosion, acidification, tree decline and other symptoms of ecosystem breakdown demanded fundamental changes to agriculture. Revegetation with perennial and in particular woody vegetation has been an almost universal element in the response to rural land degradation.

At the same time there has been widespread recognition that indigenous⁵ species have an important role for utilitarian, environmental and cultural reasons . Many extension workers and funding groups have gone further in suggesting only indigenous species are appropriate and where farmers have little experience this view has been accepted as the “expert opinion”.

1 Mollison, B & Holmgren, D. **Permaculture One** Corgi Melbourne 1978.
2 Odum, HT. **Systems Ecology** Wiley 1984 is the definitive text.
Odum, H. **Living With Complexity** in The Crafoord Prize in the Biosciences 1987 from The Royal Swedish Academy of Sciences provides a good overview.
3 Holmgren, D. **Trees On The Treeless Plains: Revegetation Manual for the Volcanic Landscapes of Central Victoria** Holmgren Design Services 1994
4 Holmgren D. **The Landcare Movement** in Burgess, G. Building Community in press 1996 RAlA
5 Indigenous means native to a particular area or region. The term native is often used in this context but also refers to any Australian species.

The farmers with more experience in revegetation who are driving the landcare push recognise that new resource values must be generated by revegetation if it to become an economically viable part of farming. Farm forestry and fodder trees are the dynamic expanding edge of landcare which is promising to generate wealth. In this context restriction to local native species is akin to try to plant a tree with one hand tied behind one's back.

In urban areas people have been more protected from the direct effects of land degradation. However increasing awareness of both the loss of indigenous species and their under estimated values has become a central issue for many urban environmentalists. The passive destruction of indigenous ecologies by environmental weeds became a primary target overtaking the traditional campaign focus on destructive development projects. This shift can be partly attributed to the success in preventing active destruction of remnant urban bushland. This success can be contrasted with the failure to make significant impact on the structural basis of unsustainable urban development and consumption.

The new focus on the concept of environmental weeds (invasion of non indigenous species into bushland) has been helped by government support and funding for an urban Landcare model of recreating native ecosystems in public open space and urban wasteland. State and federal funding has seen the rapid growth in projects involving the community as well as spawning an urban revegetation industry. The vision involves re-establishment of native ecosystems as the backbone of productive urban and rural landscapes.

Increasingly government and community resources are being used to destroy healthy existing vegetation. The considerable ecological and other values of this non-indigenous vegetation are not considered while the adverse impacts of removal methods (e.g. herbicide) are not properly assessed. The problems of isolated pockets of indigenous revegetation surviving in isolation from surrounding land use are ignored or vaguely addressed by grandiose schemes to progressively get rid of "all the weeds"

Implicit in permaculture strategy is the acceptance that nature is an active designer herself and that it will be the co-evolutionary development of wild systems which may be the real keys to sustainability. Wild nature is evolving new ecosystems from a mix of self reproducing species at an ever increasing speed. This "ecosynthesis"⁶ is nature's self organising response to the disturbances since European settlement and follows patterns described by systems ecology.

In some areas especially along streams the ecosynthesis process is advanced to the point where forests of mixed native and exotic species are beginning to show systemic

6 Nanninga, P., Tane, H. & Dann, P. *Exotics Verses Natives - Why Not Both?* in Proceedings 1994 Greening Australia Conference provides an overview of the case for mixture of plant materials in urban landscapes and uses the term ecosynthesis coined by Haikai Tane .

characteristics. Study of these advanced examples of ecosynthesis is conspicuous by its absence apart from a few informal permaculture inspired projects?

Recognition of the amenity values of these areas is begrudging at best while their hydrological and soil building values remain undocumented. Any discussion of current or future resource values is dismissed as something irrelevant to economic well-being in a high energy affluent society.

In a low energy future (which I believe is inevitable⁸) this process is likely to be more important in stabilising resource degradation (erosion, salinity, acidification, eutrophication etc.) and in generating economically harvestable resources (timber, fodder, food etc.) than either our chosen crop systems or native vegetation.

Much of the criticism of permaculture has revolved around its potential to spread environmental weeds The depth and intensity of criticism of permaculture by some environmentalists⁹ seems to revolve around the suggested use of plants which have potential to naturalise.

In fact mainstream urban and rural revegetation activities are major contributors to past and future plant naturalisation but do not draw such vociferous condemnation perhaps because this process is not an intentional outcome. In other words it is the "bad" intentions rather than "bad" results of permaculture which have attracted such negative attention.

In general permaculture has made little impact on public land management policies and actions because efforts to introduce more productive species have not been very successful. Proposed and actual plantings tend to divide into types which;

- require too much care and attention for public land or
- naturalise (given the right conditions) and are therefore deemed environmental weeds.

Most permaculturalists have focused on getting their own house in order, leaving the public land to others. Others have themselves adopting a segmented view of land use where small scale food gardens on private land would be surrounded by indigenous systems on public land.

7 Spring Creek community forest project in Hepburn outlined in the following Greening Australia seminar proceedings is a good example of permaculture principles applied to public land weedscape management. We make use of this extensive site in teaching ecological succession, reading landscape and a permaculture approach to environmental monitoring and revegetation in our residential Permaculture Design courses.
Is There A Role For Indigenous Permaculture? Integrating the Goals of Ecological Restoration & Permaculture Greening Australia PO Box 525 Heidelberg, 3024 Vic, Australia.

8 Holmgren, D. *Energy and Permaculture* in The Permaculture Edge Vol. 3 issue 3 October 1993.

9 Robin J. Unpublished paper (1980?) John Robin has been one the strongest critics of permaculture although a public debate at the Tasmanian University in 1990 involving us both as well as Terry White and John Rankin demonstrated less differences than rhetoric suggested.

However permaculturalist along with gardeners and horticulturalists generally reacted strongly in 1994 when the Eltham shire in the State of Victoria attempted to declare noxious and demand the destruction of an additional 54 species on private lands.¹⁰ This led to a minor sectarian war between environmentalists of the permaculture and native persuasions.

Leading proponents of indigenous revegetation¹¹ acknowledge that a legislated approach to environmental weeds will be ineffective and unenforceable but feel that the public education value override any adverse effects on people’s land use rights.

The productive result from this conflict is that the fundamentals of the respective conceptual frameworks are being articulated. Unaddressed contradictions in both positions need to be worked through and practical strategies developed which can be applied by both private landholders and managers of public land who find themselves in an understandable state of confusion.

Ecosynthesis is a reality which few ecologists would deny. From a permaculture perspective concerned with ecological sustainability, ecosynthesis of native and migrant species is likely to provide the most effective solutions to land and water degradation. In addition, ecosynthesis will yield the information on which to base more deliberate design based approaches (permaculture) to productive rural and urban land use.

In the process of dealing with both technical uncertainty and a range of environmental values and agendas, we need to accept that a diversity of approaches will provide the most useful results for the next generation to evaluate and use. Inevitably these will all be real ecological experiments on the edges of the gigantic experiment we call modern industrial society. Wild nature may turn out to be a critical fallback resource for society in crisis and even contribute to new biodiversity adaptive to a planet changed forever by the mining of 750 million years of stored solar energy and 10 billion people.

If we are serious about reducing the environmental impact of our towns and suburbs then we need to focus a lot more on our use of transport, home energy use and where our food comes from and a little bit less on whether our backyard supports three or four species of honeyeater.

In the end, a garden full of local native plants may appear to be environmentally sound but if we include the power station, the market garden, commercial orchard and the rubbish tip in the picture it doesn’t look so rosy. I believe the real reason that more people prefer to

10 Pest Plant Law no. 10 [1994] failed because of strong public opposition. It required the destruction of 54 species (in addition to species listed in the state Noxious weeds legislation) and required control of propagation of a further 29 species. The amalgamated Nillumbik shire has since attempted to use planning controls to the same effect based on much larger lists (216 species) included in the Pest Plant Management Strategy 1992 and based on a plant survey (McMahon 1989) which identified half the flora of Eltham as weeds. The current Inquiry into Pest Plants in Victoria by the Environment and Natural resources Committee of the parliament sees this attempt at control moving to a state wide stage.

11 Lincoln Kern, Randal Roberson and others at Greening Australia forum August 96

grow native plants is that it involves less work and skill than growing your own food and that food remains so cheap (while farmers go broke and farmland degrades) that most householders can’t be bothered. For those of us committed to household environmental responsibility, an apple is a better symbol than a gum nut.



STARTING A COMMUNITY: SOME EARLY LESSONS FROM FRYERS FOREST

Written in early 1997 for issue 10 of Green Connections published in March 1997, this article is an early description of the community formation process for Fryers Forest. At the time the planning was well advanced and the first gatherings of prospective community members were happening.

For many people, the idea of being a part of a community where we can contribute, feel supported and truly belong, has been a central theme of the strivings, over the last twenty years, to create a better future by design. However, the success rate, of creating and sustaining intentional communities has, by any measure, not been great. Not that unintentional (traditional) communities have fared any better in recent times. These poor results are largely a reflection of our culture of individualism and affluence, where we don't feel dependent on others, so when the going gets tough we give up and retreat to the apparent freedom of the autonomous lifestyle. It is hardly surprising that we have difficulty with sustaining the complex web of community relationships when our success rate at sustaining the more basic family and personal relationships seems to be at an all time low.

Despite the gloomy statistics, the interest in intentional rural communities in Australia has never been higher. I think this is partly a result of the now collective experience in "going it alone" on rural properties where there is never enough time, labour, skill, finance, ideas, inspiration and emotional support to tackle the interconnected issues involved in living a "simpler, saner" lifestyle. While many have responded by retreating to consumer urban lifestyles (in a rural setting), those of us who believe in the inevitability of a low energy future [see *Energy and Emergy: Revaluing our World (Article 25)*] recognise it is better to learn how to co-operate for mutual benefit while we still have time and choices, and before our children are forced to do so by declining social, economic and environmental circumstances.

At Fryers Forest, in central Victoria, we are in the midst of birthing our community, so it is difficult to develop a perspective on the subject. The following points cover some of the issues we have considered in this process.

INITIATORS

Firstly we have chosen a process where we (a partnership of two couples) use the hopefully complementary skills and personalities of a small and very committed group to forge the framework of the community and then invite others to join. We are halfway between the innovative developer/entrepreneur laying down a framework which others will inherit and the collective group where everything from philosophy to practicalities are worked through by consensus processes. (The guru/visionary which everyone obeys is another sometimes successful version of the entrepreneur model but one from which it is very difficult to continue to grow and change.)

On the other hand, large group collective approaches tend to be vulnerable to lowest common denominator decisions and solutions which restrict the ability of those with the creativity, skill and drive to contribute when and how they are most needed. Just the number of decisions which need to be made at the beginning is very difficult for a large group to deal with. Many of those decisions are very powerful in determining the future form and direction of the community and must be made with limited information. Starting a community is like birthing, in that it is inevitably risky and uncertain in its outcomes.



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LAND TENURE

The way the land is owned and controlled (land tenure) is another critical element in communities. Its importance is reflected in the fact that the form of land tenure a community adopts is often used as a way to describe that community eg. rental housing co-operative, tenants-in-common, land trust, body corporate etc.

In Australia, freehold ownership of land (like money) is an unquestioned foundation of society. The current native title debate illustrates that Australians have great difficulty imagining how other forms of land ownership and land use rights can work.

At Fryers Forest we have chosen to use the Body Corporate structure (also referred to as Strata, Condominium or Cluster) where land is subdivided into a number of freehold allotments together with common land controlled by a body corporate, in which the owners of the freehold lots have one voting share. In our case small residential lots are surrounded by a large managed common forest.

This form of land tenure has mostly been used for common ownership of residential apartment and town subdivision but is also used in some shopping centres and industrial estates. Its application to rural residential subdivisions is less common but Crystal Waters and some other recent permaculture inspired communities (mostly in Queensland and NSW) use this form of land tenure.

Body corporates can provide collective ways of controlling agricultural and forest land as well as essential community infrastructure of roads, water supply, power, etc. while retaining freehold control of private homes and immediate gardens. This allows people to readily borrow money to build and for titles to be freely traded in the open market. Without this “security” many residential communities are slow to attract permanent residents or capital necessary for development work.

The body corporate is the formal decision-making structure of the community. As well as controlling the common land and assets it can make by-laws which reflect the values and functions of the community and apply to how owners use and develop their allotments.

Several fundamental things distinguish Fryers Forest from conventional body corporates:

- Firstly, the developers will be lot holders and residents. In other words we are committed to sharing in what we have designed while very clearly ceding control to the Fryers Forest Community Council (body corporate) as a majority of lots are bought.
- Secondly, a progressive and informal involvement by prospective lot holders in “gathering days” and other activities (instead of a marketing push through the mainstream media) has been used. (So far *Green Connections* magazine is the most public form of promotion of

Fryers Forest.) This organic process has allowed us to test our guidelines and rules against prospective community members’ values and interests.

- Thirdly, the proportion of common land is very large, providing opportunities for extensive and multiple land uses such as forestry, grazing, aquaculture and horticulture to complement the passive use of the land for conservation, recreation and amenity. Our land management plan provides a basis for owners with the skill and motivation to gain a livelihood from the land and in the process, cover management work which would otherwise be paid for by annual body corporate levies on the owners.
- Fourthly, we have used early development works as a unique opportunity to begin implementing the forestry aspects of the land management plan so that as people join the community they will see sustainable forestry in action rather than just ideas on paper. Similarly, the community building will be already partly constructed providing a physical and conceptual shell from which on going development of shared facilities can develop. All of this involves more work and expense than that required for a bare bones development budget to cover council requirements.
- Finally, although as developers we expect to get modest payment for the input of capital, time and skill over the several years necessary to bring the community to self sustaining life, there is no entrepreneurial profit likely at Fryers Forest.

LAND CAPABILITY AND ENVIRONMENTAL RESPONSIBILITY

Assessing the capability of the land to support residential development and the other proposed land uses was fundamental to our conception of the community. There is no doubt that Fryers Forest is fragile and mostly infertile land which still supports a broadly indigenous box (eucalyptus) forest ecosystem.

Any development of such land needs to be managed very carefully and although we have small areas suited to food gardens and orchards, Fryers Forest will never be the garden of Eden which many people associate with permaculture. Instead we are applying permaculture principles in a context which always considers what the land has to offer and what we can contribute to it.

Provision of many of the community’s needs is important without a doctrinaire commitment to being totally self sufficient when there may be land elsewhere in the region better suited for providing some food needs.

PLANNING CONTROLS

While our assessment of the physical capabilities of the land is reasonably confident, our initial assessment of the issues and strategies involved in gaining approval from the relevant authorities have been a bit more than we originally expected.

Certainly the fact that our land had 10 existing titles gave us considerable leverage in gaining acceptance of our proposals under the existing local planning scheme zoning controls. All developers know that “lot yield” is the key issue in determining whether the return from subdivision of land will cover the costs of subdivision and provision of required services. The more lots, the greater the financial viability.

Apart from our own assessment of land capability from a permaculture perspective, gaining more lots would have required a change to the zoning of the land under the planning scheme: a lengthy, uncertain and costly process, unless it happens to fit in with larger changes which shire planners are already considering.

We committed ourselves to buying the land based on some rudimentary assessments of the likelihood of gaining planning approval. After eighteen months of research, design and documentation we submitted our planning application to Mt Alexander shire. It was approved in October 1996 with the usual and some unusual permit conditions attached. In particular, the Shire Planner recognised in the permit conditions that the body corporate was a suitable vehicle for ensuring that on-going issues such as maintenance of roads, a bushfire plan and particularly, forest and water management, could be dealt with to the satisfaction of the council independent of whether David Holmgren fell under a bus tomorrow. This was a vindication of our decision to use the body corporate structure rather than a private company, co-operative or other organisational structure.

Planning approvals are attached to the land not the person. Just because you are motivated by the highest social and environmental ideals doesn’t make much difference to statutory planners. Planners aren’t necessarily obstructionist power hungry bureaucrats by nature but their job requires them to work on the basis that development controls will be effective no matter who buys or inherits land and approvals attached to it. Consequently a lowest common denominator tends to apply in planning. In fact, while planning controls are reasonably effective at preventing the worst kinds of development they also tend to inhibit rather than foster innovative and progressive development.

Our planning application was probably one of the most comprehensive the local shire has ever received for any comparable development project. A more astute developer would have secured an option to buy the land at an agreed price, conditional on gaining council planning approval. This provides more financial security and less stress. However the advantage of our “Rolls Royce” planning application is that the internal planning for how the community will function, already has a firm foundation which, because it has council approval, is a reference point for the community to come back to in dealing with difficult or contentious decisions.

CLUSTERING OF SETTLEMENT: IDEALISM vs PRAGMATISM

Right from the start we were committed to a close clustering of residential lots and associated development. This is the single most important rural hamlet design strategy which;

- reduces adverse environmental impact
- maximises opportunities for broad acre land management
- encourages community interaction
- reduces the cost of provision of services.

In Australia, unlimited space and the early selector land tenure system created pioneer families on separate homesteads. Today, most people moving to the country expect space and privacy from neighbours. Gradually the problems of isolated rural living are leading to more people accepting the European co-housing and eco-village model, which builds on a tradition of small hamlets and villages with an urban nature surrounded by fields and forests.

In the end, the assumptions built into planning schemes that space between dwellings solves land management and social problems, defined the limits to how small we could make residential lots which at Fryers Forest average one acre.

Design for adequate privacy and outlooks while encouraging pedestrian social contact to avoid the evils of excessive car traffic, has been a critical issue. How close do people need to be to the community building to make use of a common laundry? How much car parking at each residence is really needed and how close do common car parking areas need to be to residences to really work? Of course there are no clear answers to these questions and many of them must be answered through a design and development process which starts with typical behaviour, but facilitates the growth towards a more sustainable and co-operative lifestyle.

When I say “typical” I do not mean the average suburban dweller but the environmentally and socially aware rural or prospective rural dwellers, who are the likely residents of Fryers Forest. However, all my experience has taught me to accept that while some distance between our ideals and practice encourages us to strive, ideals too removed from current reality tend to fail. Over the decades of ‘back to the land idealism’, those with more modest aims seem to be the survivors, while many of the environmental or social purists are now cynical reactionaries.

At Fryers Forest a balance between shared vision and pragmatic acceptance that people will apply and express that vision in different ways and to varying degrees, will be important to the development of true community.



ENERGY AND EMERGY: REVALUING OUR WORLD

*An earlier version of this article was first published in **Green Connections** (issue 12) in 1997. It shows some evolution in the explanation of Howard Odum's concepts from earlier articles reflecting the deepening of my own understanding. It places the concepts in a historical context linked to permaculture and includes more current references.*



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LETS AS A LESSON IN CURRENCIES

Understandings of concepts as basic as energy and money are bound to be complex, diverse and contradictory. In our society of constant change, we should expect that discussions are usually built on misunderstandings of the definitions implicit in the views of others and even ourselves.

Take money for example, that mechanism which lubricates material exchange and trade, but which has virtually no material basis itself. Money and markets have always been important but at the end of the twentieth century they have been elevated to the status of gods¹. It is very difficult for us to stand back from our everyday involvement with money and see it in a larger context. Generally we resort to old sayings about "money as the root of all evil" or that "money cant buy love".

The emergence of LETS systems has been a real opportunity for people to realistically consider the role of money by getting their heads around a money system which operates by different rules. However, we are so wedded to money as we know it, that many people don't even recognise LETS as a money system and fail to understand LETS currencies can devalue and crash like other money systems.

Alternative forms of money such as LETS are an important part of the permaculture tool kit for a sustainable society but I want to introduce a much more fundamental concept for comparing and valuing the material world, **emergy** or embodied energy.

UNIVERSAL MEASURES OF VALUE

With the rise of capitalism and the industrial revolution, money and markets began to gain an unprecedented hold on society and everyday life. Many critics emerged, one of the most influential being Karl Marx. Marx concluded that human labour, not capital was the scientifically valid universal measure of value. He saw that it was only when human effort was used to transform resources that real wealth was created. Marxism made it impossible for society to completely ignore the contribution of workers but the passage of history has tended to disprove human labour as the universal measure of value.

Meanwhile the scientific laws governing heat and movement (thermodynamics) were increasingly being seen as applicable to all processes observable in the natural world. The second law of thermodynamics says that *all systems run down to an eventual heat death* ('entropy'). This sobering contradiction of the growth-oriented positivism of modern society has never been regarded as contentious in the scientific community.

The fact that living systems everywhere create order (negative entropy) out of simpler resources, does not contradict the second law. This growth and complexity is always

¹ John Ralston Saul in *The Unconscious Civilisation* Penguin 1997 gives an excellent overview of the historical context for the current ideological obsession with markets.

based on a greater degradation of energy in the wider domain. It depends on where you draw the boundary to your “system” so that even the miraculous growth and complexity of the living earth (Gaia²) is ultimately dependent on the thermonuclear consumption of the Sun (over billions of years).

In all basic physics and engineering courses, students are taught that differing forms of energy can be measured by converting them completely to heat energy and measuring the result in joules or calories. The problem with this conception of energy is that it does not distinguish between differing qualities of energy, which scientists recognise, but largely ignore because of difficulties in measuring these differences.

Energy (measured in heat units) is useful for many comparisons but in the 1930's the technocratic movement advocated the idea of a new currency based on energy. It is not surprising that this was not accepted by economists or society generally. Using energy as a measure of value is only marginally useful in either the natural or human domains since the work of an intelligent human was no more valuable than the equivalent metabolic value of a green leaf photo synthesising, or the value of a book is the same as that of a piece of wood which released the same heat when burnt.

Almost all humanists, social scientists, economists and environmentalists are at one in rejecting the possibility of a universal measure of value.

SYSTEMS ECOLOGY

However, the energetic basis of natural systems laid down by Lotka³ and others did become foundation concepts for the new science of ecology, providing hope that a rational scientific approach to nature could be holistic rather than reductionist. American ecologists Howard T. Odum, and older brother Eugene Odum are two of the pillars of modern ecology but the ongoing development of Howard's work within the field of Systems Ecology over the 70's, 80's and 90's⁴ has been widely ignored or misunderstood by biological scientists let alone economists.

In all natural and human systems enormous flows of low quality energies are necessary to generate small amounts of higher quality energy.

For example, in the simplest aquarium ecosystems 1000 joules of sunlight are needed to produce 1 joule of organic matter. Studies in Swedish spruce forest show that the average production of spruce logs/ha has an energy content of 7.6x10¹⁰ joules and that the total solar energy flow used to generate this yield is 30,000x10¹⁰ joules.

2 James Lovelock, who coined the term provides an excellent picture of the history and process of the living earth in *The Ages of Gaia* Oxford Uni Press 1988
3 A.J Lotka Contributions to *The Energetics of Evolution* 1922
4 See H.T. Odum *Environmental Accounting* Wiley 1996 for the most current and thorough explanation of the use of Emergy as a comprehensive system of environmental accounting.

The energies required to support human industrial systems were even greater.

Making these calculation requires full evaluation of all the inputs necessary to support any process or system.

Using Odum's terminology the 1 joule of energy in the aquarium organic matter (single celled algae) is said to contain (and be worth) the same as the 1000 joules. The unit solar emjoule measures this embodied energy which is necessary to make any product or service. Thus Swedish spruce logs contain 3846 (i.e. 30,000/7.8) solar emjoules per joule of heat energy released when the wood is burnt.

The fact that ecosystems are partly determined by the invisible non-living external energy sources and high quality feedback of information through metabolic, ecological and organisational process within and between plants and animals is universally accepted by biological scientists but they rarely consider these as more than peripheral to their reductionist focus on the plants and animals.

Systems ecology always starts with a macro or top down view of the larger constraining system before focusing in on the main subject. This approach is regarded by many scientists as unscientific because it does use the reductionist method.

Systems ecology provides another challenge to most scientists by claiming that self organising systems occur at all levels in the material universe and are not restricted to genes, organisms and populations of organisms. As a consequence the systems we observe in nature do not result just from chance interactions between competing lifeforms but a top down self organising system which is driven by the maximum power principle⁵ to evolve to some optimally efficient use of energy and resources. Most scientists refuse to accept this as they see it supporting notions of god. Even the Gaia hypothesis that the whole earth behaves as if it were alive is regarded by many scientists as no more than an interesting myth.

THE OIL CRISIS AND PERMACULTURE

Odum's embodied energy concept remained obscure ecological theory until the first oil crisis in 1973 led to a flurry of new applied research into the energy basis of industrial society. Better ways to measure the real value (as opposed to market value) of fuels and what alternatives existed for industrialised economies were sought.

It was widely recognised that many materials (eg. aluminium) while containing little raw heat energy required enormous amounts of energy to make (eg. electricity). This embodied energy was increasingly seen as a currency which might be useful in considering wider environmental, social and strategic issues which money and markets

5 An emergy restatement of Lotka's *Maximum Power Principle*

failed to consider, let alone measure. A range of methodologies such as Input/Output and Exergy⁶ were proposed for measuring embodied energy. Useful results were produced?

These other methodologies all measure the energy contained in any economic (purchased) inputs to processes but fail to systematically take account of;

- the free services of nature in sun, rain, wind, geological uplift, etc. and/or
- the highly embodied human and other information services which are clearly critical to all human processes.

Odum’s work was central to my development of permaculture⁸ with Bill Mollison. It provided a scientifically acceptable way of understanding the power behind human systems as an integral part of nature. This understanding seemed to (a) encompass the truths and values of traditional pre-industrial societies and, (b) provide a framework for designing new systems which could be sustained in an emerging low energy future.

The ongoing development of Odum’s methodology includes ways to estimate the value of these services, again based on understanding the principles from natural systems. In 1985, an Australian colleague of Odum’s coined the term ‘Emergy’ in response to the confusion of Odum’s embodied energy accounting with other methods⁹.

The failure of price rises in fuels to stall economic growth of industrialised countries led to a decline in interest in embodied energy accounting and an increasing belief that embodied energy concepts were not useful in predicting or making decisions in complex human systems. The Club of Rome warnings of the limits to growth in the early 70’s now seemed premature if not wrong. Competition between differing methods led to Odum’s more complex and theoretically challenging methods being ignored as others in the field tried to establish environmental economics as a respectable field for research funding in the face of rising economic rationalism.

Today, biological scientists continue to point out the increasing symptoms of unsustainability but seem powerless to provide any clear explanation of how nature will eventually limit economics. In this void, economic rationalism seemed to herald the triumph of markets and money as the measure of everything.

6 Input/Output methods are commonly used to estimate “embodied energy” of building materials while Exergy analysis is used in widely promoted “Natural Step” approach to industrial ecology.

7 For example one study of Gippsland dairy farms showed that use of superphosphate and other fertilisers was the biggest single factor in determining whether the farms represented a net energy gain or loss.

8 Odum *Power Environment and Society*, 1971, is the first reference in *Permaculture One* for good reason.

9 In teaching and writing about Odum’s work and its relationship to *Permaculture One* continued to use the old term “embodied energy” (see Energy and Permaculture in *The Permaculture Edge* vol 3 issue 3 Permaculture Nambour 1993) until I came across people in Sweden who were actively using Odum’s methodology.

USING EMERGY CONCEPTS

Over the last 20 years, with gradually increasing understanding of the emergy concepts, I have found they have been consistently useful in understanding, and to a degree, in predicting the big picture changes as well as useful in assessing practical alternatives for sustainable development.

The results of emergy accounting are dynamite for current understanding by governments, industry, environmentalists and society generally. Without resorting to conspiracy theories, I am also convinced that the think tanks which inform the multi-national corporations on global investment strategies are using emergy accounting, amongst other tools, to suggest where undervalued resources still exist in the final scrabble for the sources of real wealth. It was no surprise to me when the World Bank using some new methodology rated Australia as the richest country in the world on a per capita basis. Emergy accounting showed this in the mid 1980’s.

What is so frustrating is the fact that ecologists, environmentalists, policy makers and advisers seem to be unaware of this alternative to the dead hand of market economics.

The consistent results from thousands of emergy accounting studies around the world of systems from insect populations to the earth energy flows, from national parks to farms, from industries to national economies, has now built up an enormous body of knowledge about how our world works from a holistic but scientific perspective.

A FEW NUMBERS

A few examples may illustrate how emergy accounting could reorganise our thinking about what’s real and what’s important.

Back in 1983, Odum calculated emergy values for primary commodities in world trade¹⁰. When compared to the average solar emjoules per dollar ratio, this showed an advantage to the buyer ranging from 2:1 to 18:1. In other words farmers, producing regions and nations are being badly ripped off by, the mostly rich, consuming nations. Most well informed people now know this, from other evidence, but in this society obsessed with rational method and numbers, these results have the power to change negotiations and relationships if widely known and acknowledged.

At 18:1 wool was the most undervalued commodity assessed and since 1983 prices have collapsed! Innovative new uses for wool such as insulation get some return from Australia’s wool stockpile (better than proposals to burn it) but emergy analysis shows that using wool for insulation is a bit like feeding human quality grains to beef cattle - a great deal if you are the buyer, but a rip-off for the seller and poor use of resources for the whole of society.

10 Odum 1996

Emergy analysis provides a surprising and challenging result for the renewable energy industry. Photovoltaic panels may be the most environmentally sound way to provide a needed commodity called electricity at some sites not connected to the grid, and, banks of panels may be used to complement other primary sources of grid power. But emergy studies of existing solar electric systems¹¹ shows a net loss so large that improvements in technology are unlikely to make the sun a rich source of industrial energy. In other words an industrial society running on solar energy without fossil fuel subsidy is thermodynamically impossible.

EMERGY AND INDIGENOUS BELIEFS

Another example on a different scale.

The total emergy budget of the earth is as follows¹²;

- Input from the sun 3.93×10^{24} solar emjoules/annum
- Input from the deep core heat 4.07×10^{24} solar emjoules/annum
- Input from the moon (tides) 1.5×10^{24} solar emjoules/annum

All other apparent sources are derivative of these.

This dramatically illustrates the beliefs of indigenous people that the natural world is the result of the union of Mother Earth and Father Sky with notable contribution from Sister Moon. The implications of this directly translates into our understandings of the fertility and vitality of parts of the world where the deep core heat of the earth is focused in mountain building and volcanism such as New Zealand, Japan, New Guinea, Italy etc. and the tired and fragile (if gloriously diverse) nature of places like Australia where very little of this energy is present. This distinction between geologically young and old landscapes is a fundamental understanding of land which I teach in our Permaculture Design Courses.

To the above Emergy budget we now need to add that of fossil fuels (stored and upgraded solar energy) which we are mining each year. Recent figures are 9×10^{24} solar emjoules/ annum almost doubling the pre industrial budget. So, in emergy terms, humans are extracting and using a store of embodied energy from the earth each year which is almost as big as the whole of nature’s annual flow (a large slice of which we have also commandeered). The extraordinary and unprecedented results are all around us and will echo into the next century and beyond.

What is also clear from emergy accounting is that no new sources or stores of energy exist which can sustain current, let alone future growth in human systems. The increasing severe environmental, political and social upheavals of the last thirty years are the symptoms of this underlying reality.

11 Odum 1996
12 Odum 1996

NEW AGE SPIRITUALITY

Of course, these predictions of decline, if not doom, are generally rejected not only by most economists and technologists but also by many New Age spiritualists as simply the machinations of the material plane. They suggest that, through a change in consciousness, we can access limitless free energy.

I believe that the inevitable decline in material wealth will see a resurgence and eventual dominance of a spiritual view of life but the transition may not be as painless as many gurus and teachers suggest. All the sages of the past have spoken of the harmony of spiritual peace available to all, but history also teaches us that the road is marked by endless false leads and nightmares. I remain very skeptical that, after having gorged ourselves on the body of nature and unleashed the genie of fossil fuels, we (the billion or so middle class people of the earth) can simple shed our unprecedented addictions to the material consumption and step across into harmony and balance without experiencing something of the biblical “valley of death”.

PERMACULTURE AS A WAY FORWARD

In this context Permaculture is more than a tool kit for sustainability. It is a stepping stone for the transition from addicted consumerism to responsible production¹³, a half way house between the paralysis of environmentalist gloom about the end of the world and the delusion of spiritual consumerism.

My humanist upbringing makes me cautious about accepting Odum’s claim to having found the “holy grail” of numerical valuation within a universally applicable general systems theory. All world views have their limits including rational science but emergy accounting at the very least seems to be a powerful tool for using the best of scientific rationality in the shift to a more holistic world view.

The complexity of emergy accounting makes it difficult for the average person (let alone politician) to fully understand, but the mathematics which underpins emergy accounting is very simple compared with complexity of Relativity or Chaos Theory. Texts have been written for undergraduate university courses¹⁴ but these are now somewhat out of date. The latest book *Environmental Accounting: Emergy and Environmental Decision Making* which is the best source with the most up to date data is available by order from the publisher, John Wiley, for \$175! Not the most accessible information but essential reading for anyone who wants to make headway through the intellectual mire of sustainable development. Ask for it at your library.

13 I enlarged on this theme in a paper titled *Permaculture as Development Aid for the North* to the 1994 European Permaculture Conference
14 H. T. Odum & E. Odum *Emergy Basis For Man and Nature* McGraw Hill 1979

For those asking for guidelines on how to act now to help achieve a sustainable future, permaculture principles for building diverse biological support systems are the best we have at present. For down to earth folks, personal, household and community self reliance remains the best security and inheritance we can pass on to our children and grandchildren on the unpredictable slide down the emergy scale.



PERMACULTURE: THINKING AND ACTING FOR SUSTAINABILITY

*This paper was presented as a public lecture at Castlemaine Town Hall in February 1998 as the “support act” for a three hour presentation by Edward De Bono organised by the magazine **Green Connections**. The audience was mainly business and public sector managers including representatives of local government and water authorities. It attempts to explain aspects of permaculture to an audience unfamiliar and possibly uninterested in the concept. It was published in an edited form as “Bottom Up Change” in *Green Connections* (issue 17), May 1998. My rhetorical question at the end of the presentation was largely sidestepped by Edward De Bono. His powerful and entertaining presentation of his famous thinking and decision making concepts left the impression that these are “value free” tools accessible to every person and organisation even if the most powerful examples of their use were corporate ones.*



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INTRODUCTION

When Joy Finch from *Green Connections* invited me to talk to you today I told her she should know better than to ask me to do anything during our annual two week residential Permaculture Design Course. But somehow I got here. We did consider bringing our course participants to hear Edward De Bono but our lateral thinking wasn't quite up to splicing that into what is a highly evolved and intensive program.

So why has *Green Connections*, a magazine promoting permaculture brought Dr Edward de Bono to Castlemaine? Permaculture is an environmental concept which has influenced grass roots movements toward self sufficiency in rich and poor countries. What are the links between permaculture, and De Bono's thinking concepts which have become household words and helped organisations and corporations adapt in a rapidly changing world?

It was in the mid-1970's that Bill Mollison and I first developed the systems approach to the design of sustainable agriculture which became permaculture¹. Permaculture is a design system for bottom up change towards a sustainable society. It is based on a set of design principles derived from systems ecology which can guide us toward sustainable solutions.

We believe these principles are universally applicable but the particular strategies and techniques used in permaculture will vary with the environment and situation. The primary focus of permaculture was, and still is, on how we provide for our basic needs of food, water and shelter. Despite industrialisation, these needs are, in the end, mostly met through working relationships with nature. Of all these relationships, agriculture is the most pervasive, important and problematic. Traditional subsistence agriculture was labour intensive, conventional market agriculture is energy intensive. Permaculture systems are information and design intensive. In this sense Permaculture is more about thinking than it is about gardening, chooks or dams.

PERMACULTURE EVOLUTION

In recent years many people involved in permaculture have begun applying the principles to the development of what has loosely been called 'green enterprises'. This expansion from the household to the wider economy follows the permaculture principle of *Use of Succession and Evolution*. In the process, other innovative and positive ideas are being added to the permaculture toolkit including those of Edward De Bono and Ernesto Sirolli.

Green Connections has been at the forefront of facilitating the development of green enterprises in central Victoria. Although the focus has been on environmentally-based opportunities for self employment and small business, it has become increasingly obvious that a wider partnership with local government, semi-government authorities, established business and the wider community is essential if these opportunities are to be realised.

¹ Mollison, B. & Holmgren, D. *Permaculture One* Corgi 1978

GLOBALISATION

At the same time, the impacts of globalisation are increasingly determining local agendas and outcomes everywhere. If local and regional communities are going to maintain, let alone increase, their autonomy and self reliance, then they will need more effective tools for co-operative development; development which serves local needs and interests rather than anonymous powers and forces, with no local commitment.

We hope that Edward De Bono's visit to central Victoria can stimulate positive action and change in local and regional organisations and businesses. Green Connections has no particular agenda other than seeking better outcomes for our community and region through our own efforts. The credibility of Dr De Bono's ideas and methods provides an opportunity to achieve a wide consensus about appropriate directions.

ALTERNATIVE PERSPECTIVE

While recognising the need for mainstream change, supported by community consensus, I also want to take this opportunity to point out that innovative change from the margins is essential to a healthy community and economy. As the capacity to adapt in a rapidly changing world becomes the focus, the value of innovation at the margins will be increasingly important.

I want to spend a little time on a few permaculture anecdotes and analysis to reinforce the need for changes in the way we think and the wider relevance of permaculture thinking to important issues we face.

ENVIRONMENTAL DESIGN

In the early 1970's I was an undergraduate student at the Hobart Environmental Design School set up by architect and educator Barry McNeil. In what was arguably the most radical experiment in tertiary education in Australia, there was no fixed curriculum, no timetable, no exams. Instead there was real world consultancy project work, visiting design professionals as lecturers, participatory democracy and self assessment leading to a thesis assessed by peers, staff and professionals. Amongst design professionals, Environmental Design was regarded as either the best course in Australia or the worst.

McNeil's idea was that there was no point in teaching design students the technical skills of the professions because these would most likely be irrelevant by the time they came to practise. Instead, the focus was on real world problem solving and design thinking, much of it in groups. Technical skills were mastered as part of the project work but I never sat at a drawing board and ignored the new fangled computer. Instead, I developed a deep and obsessive working relationship with a brilliant, if somewhat eccentric, ecologist and thinker, Bill Mollison, who had no connection to the school. Out of our intellectual exchange and research emerged an extensive garden and a design system for sustainability which has since spread far and wide.

PERMACULTURE POSITIVISM

At the time I met him, Bill Mollison was becoming disillusioned with environmental activism's focus on stopping what we didn't want. (He had been active in the United Tasmania Group, Australia's first green political party which grew out of the campaign to save Lake Pedder). After three decades of oppositional environmental activism and growth in environmental regulation, even the mainstream environmental organisations now recognise the need to promote positive alternatives to the endless stream of things we don't want. Permaculture, in its design principles and diverse forms and examples, is a positivistic alternative to both strident objections to everything and the strictures of sustainability by regulation and risk management.

DESIGN IN AGRICULTURE

When Bill Mollison and I began explaining permaculture as a design system for sustainable agriculture we received lots of blank looks. Today Landcare and whole farm planning are making design a central activity for farmers along with the traditional concerns of management and husbandry. Design thinking makes possible the consideration of alternative farm layouts, new stock management and crop harvesting systems, new land uses and most importantly integration of new and existing land uses. Traditional farms had designs but they were mostly unconscious, based on slowly evolved practise. Rapid environmental and technology change demands that the design process become conscious.

It is for these reasons that we spend more time in our PDC courses on principles, design methods and group design exercises than we do on teaching organic gardening methods. However a focus on cerebral reorganisation must never get in the way of ensuring that our hands and our hearts are fully engaged.

OBSERVATION AND RELATIVISM

After 20 years of practising and teaching permaculture I am convinced that the ways we observe and fail to see, the ways we think and fail to grasp, the ways we speak and fail to listen are all more important to the long term achievement of a sustainable society than any particular information about appropriate technology, plant and animal species or land management. While information and experience with these elements in the permaculture toolkit are necessary, they do not, of themselves, lead to sustainable systems.

In permaculture there are no fixed techniques, no right and wrong way. It is a relativistic concept in which strategies and solutions are always context dependent. In some cases, careful introduction of available technology or species can help. In most cases the tools of strategic planning and spatial and temporal design are useful, but in almost all cases an attitudinal change works wonders. Hence the slogan "the problem is the solution" often applies. This summarises a key element in our teaching of *Observation* as the second principle of Permaculture.

PERMACULTURE SOLUTIONS

So many current environmental problems which are seen as intractable are, from a permaculture perspective, opportunities². In the late 1970’s media popularisation of permaculture focussed on the opportunities to use household, industry and agricultural wastes to create instant food gardens. Sheet mulch gardens spread across the suburbs using everything organic from cardboard to lawn clippings. Twenty years later organic waste is a valued feed stock for large commercial compost production. Much more waste is quietly and efficiently recycled by households via compost heaps, worm farms and backyard chooks; common sense solutions which twenty years ago were regarded as weird, even distasteful, ideas.

Perhaps more interesting over the same period, is the rise (and I suspect demise) of the romance of industrial paper recycling. Recycling of waste paper has become a fully integrated element of the economy. But recent studies³ of total environmental impact suggest burning paper in fuel efficient furnaces or composting are more environmentally sound than recycling. The simple permaculture “rubbish garden” may turn out to be the most sophisticated of all options. This example illustrates the desperate need for effective environmental accounting methods and their integration into our everyday financial accounting.

Two environmental issues which currently generate a lot of heat and negativity amongst environmentalists, planners, landholders and local government are the spread of environmental weeds and rural resettlement.

ENVIRONMENTAL WEEDS

Consider, for example, the spread of willows along our urban and rural waterways. This spread has been followed in recent years by hysteria (even from sober biological scientists) and Canute-like projects to turn back the tide. The simple fact that willows are nature’s adaptive response to hydrological and nutrient changes brought about by our land use tends to be overlooked. Willows are one of the best water filtering plants yet studied and are probably helping to ameliorate much greater problems such as blue green algae.

The permaculture approach to willow infested streams is a design and management system to seasonally harvest the trees for animal fodder and, in the process improve, their performance in water purifying. Secondary benefits of this management would be the opening of ecological niches for revegetation with some appropriate native plant species. This is a truly win-win solution. The fact that Landcare money continues to be wasted on willow removal projects while such positive alternatives are not funded or investigated indicates the thinking revolution has a long way to go. We find the environmental weeds issue so contentious and confusing on our PDC that it is an ideal candidate for group discussion using De Bono’s six hats.

2 Holmgren D, *Landcare, Permaculture and Revegetation* in Proceedings, Greening Australia seminar Melb. August 25th 1996
3 Reported on ABC Radio National Science Show Feb '98

RURAL RESETTLEMENT

Rural resettlement is another of these contentious and confusing issues. The effects of rural residential development in urbanising the countryside, creating unrealisable demand for services and adverse environmental impacts are ones which have concerned planners for decades. The regulatory response has been to dilute the impacts by larger minimum lot sizes in subdivisions, a very Australian solution - “use more land”. Those that can afford to are forced to buy 40 or 100 acres and become so-called “hobby farmers”. A perception that rural residential development is bad but hobby farming is just ok changes nothing, so the well off do nothing on 100 acres and while the battlers try to pack endless livestock onto 1 acre blocks.

The current wave of rural resettlement (in all its diverse forms) is the third in Australia’s history. Earlier waves under the closer settlement and soldier settler acts were planned by government in response to social pressures. The current wave was unplanned, unpredicted and barely recognised as a major social and economic force. Rural resettlement has been one of the few sources of economic vitality in rural Australia over the last quarter century and is probably, the largest “industry” in central Victoria⁴. The lack of recognition of the economic importance of rural resettlement can be partly attributed to the ways the Australian Bureau of Statistics and other organisations collect and analyse data. As is so often the case, the measures have become more real than the subject.

SITE BASED WASTE MANAGEMENT

Perhaps the biggest single factor driving controls on the spread of houses across the rural landscape is the evidence that septic tanks don’t work and that they contribute substantially to the crisis of nutrient pollution in our fragile inland rivers. The solution, almost universally accepted by politicians, planners, catchment managers and waste water engineers is in-fill residential development in our towns and villages, and subsidised sewerage treatment. Thus the failure of an approved technology for site based treatment drives the whole rural planning process and prevents people from settling in rural areas.

This apparently intractable problem of effective site-based effluent treatment arises because every site and situation is different, all systems need monitoring and maintenance, and modern lifestyles reinforce the “pay and forget” approach to everything. For water authorities with a history of centralised treatment managed by professional engineers, the opportunities presented by land capability mapping, new site based technology, distributed management and quality control systems are seen as irrelevant or a threat. For the new privateers, planning to run public utilities, large (preferably newly constructed) infrastructure is simple to value and manage, especially if it comes from London or Los Angeles.

4 Holmgren, D. *Submission to Review of Rural Land Use Vic Govt* 1991 (Article Six)

These issues provide an example of the inter-linking of environmental, social and economic problems across administrative and discipline boundaries which besets society everywhere and illustrates the need for new ways of thinking. The now common references to niche markets and “narrowcast” media replacing mass markets and “broadcast” (mass) media are examples of how new solutions are diverse and fine grained. But it is wrong to assume that the thinking and principles which generate diverse outcomes in markets (for sewerage treatment or anything else) will be specialised and disconnected.

PERMACULTURE PRINCIPLES AND SOLUTIONS

In permaculture a limited number of general principles generate the most diverse site and situation specific solutions. The Permaculture principles of *Personal Responsibility*, *Small Scale Site Specific and Diverse systems*, and *Recycling of all Wastes* all reinforce site based waste management as more environmentally sound than large centralised treatment even if the specific systems will vary with people and place.

Proven and effective site-based treatments can be installed and managed for much less than the cost of new centralised effluent treatment infrastructure⁵ but the old solutions continue to prevail. The reasons for this curious situation are no doubt complex and include lack of relevant research and models, cultural and belief systems, established interests and simple inertia of large organisations. But it is the lack of holistic and systemic thinking at the highest levels of decision making which ultimately allow excellent solutions to be ignored. A general knowledge of the concurrent challenge to centralised solutions in many sectors and industries would reveal an emerging pattern which should have implications for the waste water industry.

FRYERS FOREST

The permaculture solutions to the very real problems associated with rural resettlement involve redesigning the way we own and manage land as much as the use of this or that technology. At Fryers Forest, which is our rural residential development here in central Victoria, we have used Body Corporate land tenure models well proven in urban areas but little applied in the countryside. We have clustered 11 freehold 1 acre house sites to form a hamlet within 300 acres of sustainably managed common forest⁶. Rather than detracting from any existing agricultural or environmental values we aim to show how it is possible to enhance these through the sustainable settlement of 11 or more families on what is, by any measure, fragile and marginal land.

5 *Avoiding Another Tragedy of the Commons. The Bundeena Maianbar WaterCycle Management Study.* The Port Hacking Protection Society 1997

6 Holmgren, D. Fryers Forest Village in *Green Connections* Sept 1996 AND Fryers Forest Research and Development *Fryers Forest Body Corporate Plan* October 1997

I believe these systems of land tenure and management are models which can be applied to very diverse land including our best farms. Rural resettlement is one of the few opportunities available to fund the shift towards more intensive and integrated sustainable agriculture. Instead we see State and local governments using planning controls to preserve and entrench existing unsustainable farming on our most productive land.

In-principle support from the Mt Alexander Shire Council for our positive innovations at Fryers Forest have, unfortunately, become muddled through over-restrictive and cautious application of planning, and more particularly, engineering standards during the design and implementation phases of our project. At every turn, the cancer of legal liability has overridden common sense as the final test of all our plans and designs.

Our sobering experience in working through these issues has emphasised that a regulatory approach may be effective at controlling the worst excesses of the marketplace but they also have the effect of stifling any progressive innovation. Recognition of the principle that innovation tends to come from the margins rather than from powerful top-down processes would be a step forward. So called deregulation by state and federal governments has often simply changed the game rules to assist influential large players. What we then need, is to think more carefully about how to recognise the creative opportunities and solutions which benefit the whole community as well as future generations, and then facilitate their adoption.

DE BONO

The questions I have for Edward De Bono revolve around how the thinking revolution can be better applied to take advantage of the diverse opportunities for transition to a sustainable society. The corporate sector provides some examples of success in using its substantial resources towards implementing the thinking revolution in a context of fast moving marketplace determined goals. How can rural communities and their last vestiges of representative democracy in local government use these same tools for positive change in a context of limited resources, diverse and long term goals and the shadow of globalisation?



DO MEDIA TECHNOLOGIES SCRAMBLE YOUNG MINDS?

Our ability to observe, think and learn is affected in profound ways by cultural and technological innovation. It is common to think of these issues in terms of a progressive advancement, where innovation adds icing to the cultural cake. In this article I speculate on how innovation may also involve regressions and losses which undermine our ability to think holistically and adapt to the emerging energy descent future. The ideas were stimulated by the experience of learning and teaching skills in reading landscape and have been refined through informal discussions on Permaculture Design Courses over a number of years. The bleak analysis it contains provides a counter balance to my prevailing optimism about information and design creativity providing the lubricant for rapid evolution of low energy systems.



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In pre-literate societies, story telling, poetry, songs and art were essential ways of conserving, passing on and adapting knowledge and culture. The advent of writing thousands of years ago allowed a huge expansion in the range of knowledge and culture which could be conserved and passed on, although it was not until the development of the printing press in the 16th century, and the spread of literacy in the centuries since, that reading and writing have dominated our ways of seeing and thinking.

Although literacy brings new powers there is little doubt that it has reduced memory capacity and replaced many complex patterns of seeing and thinking with precise but linear symbolic thought structures. On the other hand, because it is difficult for a very young child to learn to read and write, literacy does not reorganise the foundations of our mind which are created in the early years of life through exposure to our mothers, others close at hand and the natural world. In Steiner education it is recognised that other ways of seeing and expressing oneself should be allowed to flower before children are taught to read and write. Seven is considered the age generally suited to introducing literacy in Steiner schools.

The next great cultural innovation comparable to literacy in its power has been the developments of recorded sound and moving picture. Invented in late 19th century, the radio became a household fixture in my parents' childhood homes. Within my lifetime most of the affluent world's population have become exposed to regular consumption of recorded image through broadcast television. Because humans are predominantly a visual animal, the effects of video image have been more potent than audio. The power of video to change culture was amply demonstrated in the highlands of New Guinea by the "first contact" adventurers, the Lay brothers, who took film footage of local ceremonies in the 1930's. The story goes that when shown themselves performing ceremonies including mistakes, the locals then took the film version to be the correct record of their culture. The moving picture is so close to nature that at a very primal level we can mistake it for nature.

Unlike literacy, as soon as a baby can focus it can begin to take in video image which in turn structures its mind in a similar way to seeing the natural world. My generation, born in the 1950's was the first to have its mind formed in this way.

Most of the debate about the effects of television on children, focus on the content, very little on the nature of the medium. The most important aspect of this medium is that it can be, and always is, edited, cut and pasted, rearranged in any and every conceivable way for art, entertainment, commercial or political purpose. While this might be ok for the mature mind, it tends to scramble the pattern language of visual input which contributes greatly to the structure of the young mind.

In the world before TV we became attuned at a very young age through our eyes to the patterns of day and night, the rhythm of daily life, the irreversible and slow processes of seasonal change, germination, growth, flowering and death in the plant world, birth, growth, decline and death in the animal and even human world and so on.

In developing my own pattern recognition skills in observing nature and landscape¹ over the last 25 years and trying to teach these skills to others over the last 15, I have begun to suspect that being raised with television is an impediment to being able to see nature as process rather than static image. There is a supreme irony in a medium which creates endless moving pictures but kills our ability to see nature as a dynamic process and replaces it with a dead static image which tells us little of what has been or what is about to happen.

The loss of this skill can be attributed to many aspects of modern life but I am convinced that regular exposure to video image at a young age is the prime culprit.

[I speculate on all this having grown up without TV which dominated the childhood of every one of my peers but without knowledge of the whole field of childhood development theory. Maybe I am struggling to reinvent the wheel of some well known and debated childhood development theory but then again, maybe this is a novel idea because its just possible that most of the academics in the field have themselves had their brains scrambled by TV.]

The key lesson for me from these musings over the last decade or so is the enormous cultural value in the living memory of older people who remember a time when things were very different but struggle to describe that world in words which younger people will understand.

So what about the effects of radio which have been a powerful influence on the minds of babies and children for a generation longer than television? To some extent radio was a precursor to television which may have had the effect of scrambling our auditory sense in a similar way to which TV scrambles the visual sense. But sound is very different from sight. We are used to a variety of chaotically mixed and changing auditory patterns as unborn babies in the womb and continue to experience the soundscape after birth as a mixture of sounds and voices quite unlike the way we see the world around us. There is little doubt that modern life since the industrial revolution has scrambled the soundscape and overlaid it with the harsh sounds created by movement, especially high speed movement of machines, things and people. The patterning of maternal and fraternal language and song which dominated the soundscape for the new born in more traditional societies is now a minor element in the domestic soundscape.

Recorded and broadcast sound is different, however, in that it is predominantly human speech and music and so acts as a substitute or surrogate for the traditional soundscape. There is no doubt this has enriched our experience with other voices, accents and languages as well as a diversity of musical experience beyond that imaginable a hundred years ago. My mother tells of her childhood fascination listening to shortwave broadcasts in Chinese, a window into an alien world (more extraordinary in some ways than that

¹ See *Reading Landscape* paper (Article three)

created by the arrival of the Internet). But like the later, more pervasive, visual electronic media, recorded sound is (almost always) selected and edited. It scrambled the human voice landscape of the pre audio era. Like video it took something away.

Perhaps the most important aspect of audio recording and broadcast (as radio and records or with video image in TV and film) is its pervasive, even constant presence in the modern home. In some families, that has been the case for three or more generations. For my father, a natural musician, the radio and the record of his youth was something to be listened to intently but for limited time. In my own childhood my parents love of music and politics made the record and the radio an almost constant part of my childhood experience. Perhaps my own appalling auditory and musical sense maybe partly attributed to that environment.

In focusing on the adverse nature of the electronic media, I do not want to underestimate the effects of the content of those media. I am so grateful to my parents that it was only ABC radio without advertising which filled my childhood home. Before radio and television, the home was a whole world largely free of the direct effects of mercantile capitalism. The travelling hawkers and grocers dealing with the woman of the household was the closest it came, with jokes about the salesman getting the foot in the door. Children were specifically protected from the values of the market place and were initiated into the world of economics through the household economy where cultural, moral and spiritual constraints applied.

American author Russell Banks² has spoken of the arrival of TV into the 1950's as inviting the salesman to a permanent and honoured place in the living room and then, over succeeding decades, into the bedroom and the nursery, as fraternal and nurse companions. Banks describes this invasion of the home by capitalism as 'autocolonisation' by which it creates succeeding generations of consumers to replace the contracting frontiers of "natives" to be colonised. The consequences of this autocolonisation are manifold but Banks see it as the source of the pervasive anger and violence which are the focus of his stories.

Before we have had a chance to culturally digest and adapt to audio and video image, the next massive cultural innovation is upon us from computers. Invented in the post war period, the computer became the tool of corporations and government in my childhood and adolescence but have only entered the everyday home domain in the last decade.

Adding interactive capacities to audio and video image, computers provide a fantastic learning tool for mastering complex and important skills with little risk or consequence. One of the first uses of computer simulation was to teach astronauts how to land on the moon, not the most valuable human endeavour, but better than crashing. Today from a young age, children play an endless array of video games where you get instant rewards,

² Interview on *Spirit of Things*, ABC Radio National 19/7/2000

excitement, thrills and nine lives, in environments which mimic reality but without risk (except EMR exposure).

Again the debate is about the content and the need to tone down the blood and gore when you slaughter people. More important for the young mind, is the building of the expectation that if there isn't a reward in 5 seconds then its not worth doing, that anything slow must be dead or as good as, that there are no consequences to any action, that it is possible to bail out of any situation and restart the program. Perhaps for a child approaching adolescence, who's taken the skin off their knees in a bike accident, had their best friend move away to another state, and seen their dog die after being run over by a car (for example) the distinction between reality and games is clear enough but for the very young it may be quite different even if they do later intellectually understand the difference.

Coming to grips with the non-negotiable nature of many of life's challenges is hard enough. In the affluent world we have found many ways to avoid at least some of these challenges through medical and other technology, while scientists continue the search for more solutions to life's hardships. In a low energy future, options to move sideways, restart, or take another path than the one you are on, will decline. Even without the effects of computer gaming, this or future generations will be faced with the frustration and anger that the opportunities and freedoms of the past have gone, that the party is over, that they will have to grow up tough in a way no previous generation has had to. To face this world we will need very different skills and beliefs from those learnt at the computer simulator.

Within a decade current advances in virtual reality threaten to immerse the next generation fully within the machine. It is hard to imagine a quicker way to destroy human capacity to survive and prosper in a uncertain world, but while the oil keeps flowing and the wheel of technology keeps spinning, the promise of new possibilities blinds us to the loss of old ones, or as Joni Mitchell sang "You don't know what you've got till its gone".

We have many examples where the consequences of loss of natural resources are not felt until the machine of growth and hubris fails. In the ecological history of the decline of the Roman Empire, it is well documented³ that the land degradation in the food bowl of central Italy only became a critical problem when it was no longer possible to maintain the grain supply from Carthage in north Africa. In the modern world we have also accumulated massive ecological debt, the import of which will not be felt until growth in energy and technology fail. Like the depletion of natural resources in the modern world we are accumulating massive social and psychological debt, of which, the side effects of video and computers are but one part.

It is only the return of a low energy slow moving future which will show us what we have lost. Perhaps an antidote to this bleak analysis of our current situation is the realisation

3 See Goldsmith, Edward The Ecological History of the Decline of the Roman Empire in *The Ecologist* [1973]

that the prospect of decline in material wealth and opportunity in a low energy future doesn't look so bad after all, and that it is possible to unlearn these dysfunctional ways of being and seeing and reconnect with a more sensible and sane natural world before we are forced to change.



WHY NATURAL LANDSCAPES CATCH AND STORE WATER, NUTRIENTS & CARBON

*This previously unpublished article contains material which has been central to my teaching of permaculture for over a decade and in particular to the permaculture principle **Catch and Store Energy**. It provides a framework for evaluating catchment management and land restoration strategies more fundamental than the indigenous biodiversity conservation framework which dominates the environmental mainstream.*



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CARBON SINK OR CARBON STORAGE: GREENHOUSE GAS AS A SYMPTOM RATHER THAN CAUSE.

According to the consensus of the global scientific community the “enhanced greenhouse effect” is already contributing to global climate change which is predicted to intensify over the next century. Climate change is now widely accepted as the greatest environmental threat to humanity.

Too much carbon dioxide and other greenhouse gases accumulating in the atmosphere from human activity over the last century is the cause. The solutions proposed fall into two broad categories,

- reducing the burning of fossil fuels (which is the primary source) and
- creating storages which will take carbon dioxide out of the atmosphere.

These storages of carbon are called sinks, predicated on the view that carbon is a pollutant to be got rid of.

There is now a great body of research, literature and debate about the relative value of carbon storage in trees (as opposed to the trees themselves). This storage is likely to become an internationally tradable asset to partially offset fossil fuel carbon currently being burnt. This idea of tradability is a legal response to the fact that “carbon storage” tied to ownership of trees and land is not currently useful to the corporations who need to create or buy more carbon storage to offset their massive outputs of greenhouse (carbon containing) gasses. This market solution has some merit from the top down management perspective of governments and corporations on how to respond to the buildup in the atmosphere of greenhouse gasses but the accounting and verification costs are likely to be so high that only large growers of monocultural tree plantations will benefit. The even larger carbon storage potential of soil humus has been slow to come onto the agenda for inclusion in carbon trading because of even greater complexity and uncertainty in accounting and verification.

The attempts by governments and corporations to work out political and economic survival strategies is being driven by the wider popular concern (at least in rich countries) for the well being if not survival of our children and grandchildren. The environmental movement sees the changes required for dealing with the greenhouse effects as reinforcing many of its other agenda's.

Permaculture thinking goes deeper in providing a positive view of carbon as “the staff of life” rather than a pollutant and that we should take every opportunity to catch and store carbon in trees and soil humus as the most important investment in natural capital we can make for the well being of future generations.

This change of mind set is not simply about taking a positive or optimistic view but arises from a more fundamental understanding of how nature works.

Life on land has evolved over hundreds of millions of years to store not only carbon but also water and mineral nutrients because these three resources are the drivers of biological productivity in all terrestrial ecosystems. The optimum processes for capture of these three resources are mutually reinforcing. In a low energy future these resources will again be critical to the well being of humanity while the threats from climate change will receded as fossil fuel use (and eventually population) declines. Land use and cultural patterns of organisation which mutually reinforce their capture, represent our best options for building the natural capital to support future generations.

SELF ORGANISING LANDSCAPES

Terrestrial landscapes are self organising systems which have been evolving since life from the sea colonised the land masses hundreds of millions of years ago. That evolution is structured to maximise the power for living systems from optimum use of climatic and earth energy sources.

The climatic energies (sun, rain, wind etc) influence not only the type of plants which grow but also the nature of soils and the shape of the land from river catchments to drifting desert dune fields.

The earth energies of tectonic uplift and volcanism builds and reshapes mountains and delivers rock minerals critical to soil fertility and all living things.

Changes in either or both the climatic or geophysical energies result in radical reorganisation of terrestrial landscapes and ecosystems. These larger scale system changes can cause massive erosion, physical destruction, biodiversity loss, habitat destruction and fragmentation, as well as new soil building and fertilising, rapid invasion and evolution of new life forms. The time scale for these changes in landscapes range from millions of years down to human life spans.

Humans like all other animals have evolved to take advantage of resources created by these larger processes but also have themselves become agents of change which is now geological in scale through the harvest and use of fossil fuels. Within a few human generations the low energy patterns observable in natural landscapes will again form the basis of human system design.

Although it is tempting to think of these natural landscapes as reflecting a stability in climatic and earth forces, long periods of climatic and geophysical stability actually result in a rundown of the available energy to ecosystems and people. Geologically young regions with recent¹ mountain building and volcanism tend to be much **more** biologically productive and more quickly develop larger storages of soil minerals, carbon and water which in pre-industrial times supported large populations of people despite their vulnerability to natural disasters. Geologically old regions (most of Australia) tend to have low biological productivity and supported fewer people.

1 The last 100,000 years

The inexorable force of gravity causes water, organic matter and nutrients to constantly be flowing away to the ocean or being locked up in deep or unavailable earth storages where they are effectively lost to terrestrial systems. These forces have been so consistent in their effects since life emerged out of the sea, that all terrestrial ecosystems and landscapes can be seen as design responses to overcome or at least limit the effects of these forces. **Thus we can say that all terrestrial ecosystems have co-evolved to catch and store the energy in water, mineral nutrients, and organic carbon as effectively as possible.**

WATER STORAGE IN LANDSCAPE

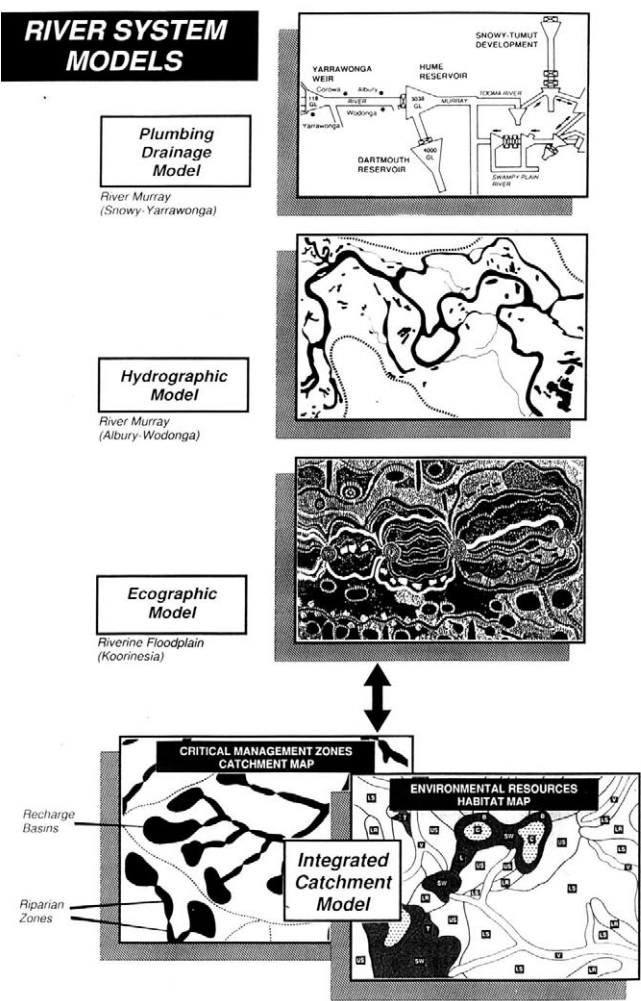
Water is perhaps most easily understood as a limiting factor, especially in Australia, the driest inhabited continent. The erratic nature of rainfall and the constant needs of microbes, plants and animals for moisture means that landscapes have evolved as efficient rain water storages. Vegetation holds substantial quantities of rain water both in their tissues and in the humid air and moisture trapped by forest canopies and under stories. Forest litter and mulch act as an open sponge absorbing and holding water. Soil chemistry balance and humus development in topsoils provides a more stable moisture supply for plants while deep subsoils especially clay provide very stable if harder to access moisture. Rainwater which infiltrates beyond the reach of plants contributes to catchment productivity by slow release through springs and soaks lower down the landscape especially along gullies and water courses. It is these springs and soaks which sustain the base flows in streams and rivers between runoff events. Deep rooted plants can recycle water from ground water aquifers but some water moves down into deep ground water storage, beyond landscape or plant recycle mechanisms.

The pattern of these storages is from more ephemeral to more permanent as water moves down under the influence of gravity.

Catchment landscapes show similar patterns of development which also involve major water storages such as the deep pools, and in dryer climates, gravel and sand filled stream beds. The pool and riffle pattern of stream beds acts to filter and oxygenate water. Swamps and wetlands are even more important as temporary storages and important filters. They have been called the kidneys of catchment landscapes because of their role in filtering and purifying water. Streams and wetlands are also systems for ameliorating the destructive forces of large flood flows which recur at intervals from 1 to 1000 years or more. In the process some of the energy from flood is captured as new alluvial soils of floodplains.

Changes in our thinking about catchments and rivers is graphically illustrated by Tané's plumbing drainage, hydrographic and ecographic models of river systems².

2 Tané, H. *The Case For Integrated River Catchment Management* Keynote Address Proceedings of the International Conference on Multiple Land Use and Integrated Catchment Management Macaulay Land Use Research Institute Aberdeen UK 1996



The old plumbing drainage model depicted by the Murray Darling Basin Commission’s system description for the managed flow of the Murray River has been largely discredited as destructive of natural resources. The storages (public dams) are too large and low down in the catchment landscape and the regulated flows are too fast and constant for the sustenance of river health and productivity which has evolved to use the seasonal variations and pulses of natural flows. The hydrographic model depicted by the mapping of floodplain water bodies recognises the sinuous and complex nature of natural river floodplains, which slow and divert the flow of water, as optimal for maintenance of

natural resources. The ecographic model incorporates the latest understandings of rivers and their floodplains as highly productive ecosystems which are constantly renewing and rebuilding themselves in response to catchment change. Tané sees Aboriginal “abstract” paintings of these water dominated landscapes as a graphical description of how these physical and biological resource patterns form an integrated whole.

NUTRIENT STORAGE IN LANDSCAPE

How ecosystems and catchment landscapes evolve in response to the limited availability of mineral nutrients is more difficult to understand than water. This is due to the largely invisible nature of mineral nutrients and the subtle but important ways in which they control the productivity of every ecosystem. The essential elements of Carbon, Oxygen, Hydrogen and Nitrogen are abundant in the atmosphere and are supplied to living things through the energy harvesting system of photosynthesis and other associated processes in plants but the mineral nutrients of Calcium, Magnesium, Potassium, Phosphorous, Sulphur and trace elements essential to living things, occur in small and varying amounts in the diverse rocks types which make up the earth’s crust. Plants can easily absorb

these nutrients in water soluble forms but solubility also leads to leaching of the nutrients beyond the reach of plants. Consequently soil ecosystems have evolved to catch and store plant nutrients in non soluble but available forms.

Ecosystems develop against a geochemical background of nutrient imbalance and deficiency which they seek to overcome through mechanisms which mine bedrock and other inert sources as well as catch nutrients leaking from adjacent systems and atmospheric transfer. Humus is perhaps the greatest “invention” of nature which increases the mineral nutrient storage capacity of soils (as well as being an excellent contribution to increasing water and carbon storage). There are good ecological reasons for the veneration of humus in the organic, biodynamic and permaculture movements.

Over long periods of geological time, there is a loss of mineral nutrients from all ecosystems through the forces of gravity and leaching as well as periodic fires, droughts, floods and other natural disasters. In addition, chemical bonding (by natural processes) of nutrients into highly unavailable forms provides more and more difficulties for plants to obtain balanced mineral nutrition. Unless a landscape can mine or catch more than it loses, there is a progressive decline in productivity and replacement of high nutrient requiring species with those adapted to both low levels and chronic imbalance of mineral nutrients.

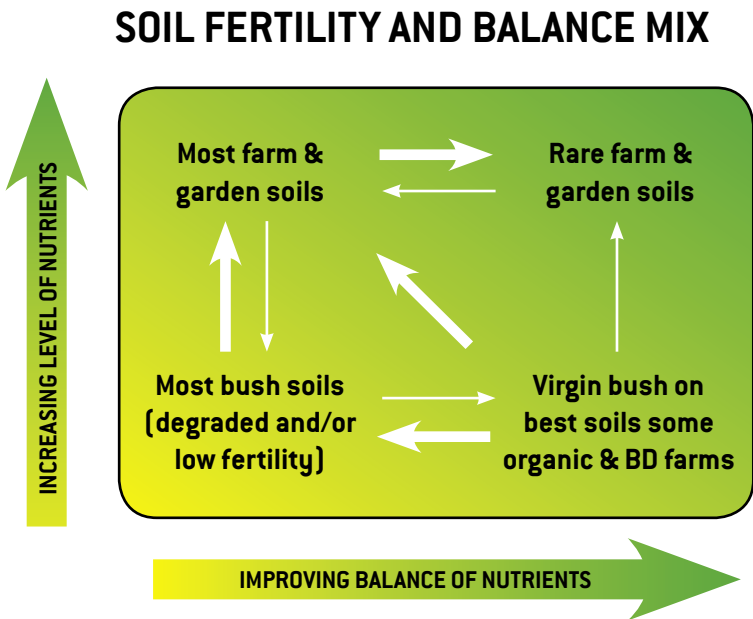
In Australia much of our exquisite biodiversity results from endless adaptations to lower and unbalanced mineral nutrients. Unfortunately humans, by our very nature, are completely dependent on very high and balanced mineral fertility in our foods. Without adequate and balanced mineral nutrition, humanity from hunter gatherers to great civilisations have crumbled because their soils could not provide them with the quantity or quality of food required.

The American soil scientist William Albrecht³ was one of the first to recognise that an ideal balanced soil in which all crops will give high and good quality yields was possible and he did the pioneering scientific work to identify the mineral and biological characteristics of this ideal soil. Albrecht’s ideal mineral balance also increases the capacity of a soil to store water and resist erosion by creating a open absorbent fabric. In addition this ideal mineral balance optimises the conversion of soil organic matter and litter to humus.

My own observations suggest it is reasonable to extend the concept of Albrecht’s ideal soil for all crops and that this represents a biological optimum soil in which all plants will thrive. Within the constraints of climate, this soil will support the most productive biological system in terms of total energy capture and storage. Thus balanced and fertile soil is nature’s most important, integrated and self reinforcing design solution for maximum power of terrestrial life by optimising capture of nutrients, water and carbon.

3 Walters, Charles Jr. editor *The Albrecht Papers* Acres USA 1975

We can think of soils on a matrix which combines level and balance of mineral fertility. On this matrix we can see how modern food production has increased, especially in Australia, by use of selected mineral nutrients but in the process has led to increasing imbalance which is reflected in quality of food and leaching of soils.



In future (perhaps within 100 years) after the fossil fuel energy subsidy to agriculture has declined, the mineral fertility and balance of our farmlands and entire catchment landscapes will become one of the most important resource management and economic issues, and yet the powerful means currently available to achieve this on a large scale will be very costly⁴ or simply unavailable⁵. In this situation we will once again be dependent on the slower low energy processes of fertility building and balancing.

Soil is the most important storage for nutrients in temperate climates but in tropical systems, the oxidation and leaching rates are so high that natural systems rely more on storage of nutrients in living plants. Even in temperate ecosystems, plants represent an important storage which can be recycled to the soil by annual leaf drop, insect and herbivore browsing, or fire.

In clearing forests for agriculture, humans have mobilised the nutrients in large woody biomass for uptake by crops. Annual crops provide no permanent nutrient store but where perennial pastures or other perennial crops are grown, nutrient storage in plant biomass can be as great as that in native forest and woodland⁶.

4 Primarily because energy to crush and transport minerals (especially lime which is required in tonnes per hectare) will be much higher for places remote from mineral sources.

5 Rock phosphate is one of the most important and severely depleted mineral resources. In countries where phosphate use has been widespread there is often abundant reserves locked up in agricultural soils, which can potentially be released by soil microbes but in many poorer countries where fertilisers have not been widely used these soil reserves do not exist.

6 Although total plant biomass in a pasture or an orchard is much less than in a forest, the nutrient rich nature of the vegetation means total nutrient storage may be higher. In the wet tropics, perennial pastures are generally inefficient at nutrient storage.

A balance between stored and available nutrients in all systems is an important measure of the balance between long term sustainability and short term productivity. For example, grazing by livestock converts nutrients in perennial pasture into more concentrated and useful forms (urine and faeces), but these nutrients are also more mobile and easily lost through leaching and gassing off.

CARBON STORAGE IN LANDSCAPE

As indicated previously carbon storage in living plants and soil humus are much more than a way of getting rid of unwanted atmospheric carbon dioxide. Carbon in staple crop plants provides the carbohydrate fuel to directly support human bodily energy needs. Clearly carbon storage by human food crops is literally “the staff of life” and will always be central in any consideration of sustainable land use. But the small quantities of carbon in human food is a minor part of carbon storage in landscapes.

Much larger quantities of carbon in fibrous fodder plants sustain grazing animals which in turn provide us with a myriad of renewable products and services from protein rich foods and wool, to “horsepower”.

Particular forms of cellulose and lignin from some plants provide us with the material for fabrics, paper and ropes, as well as the myriad diversity of timber for every imaginable use.

Last, but perhaps most important to the post fossil fuel age, plants, especially trees provide a renewable fuel for cooking, heating, smelting and other tasks.

Timber and fuel forests, and to a lesser extent, pastures, fodder trees and fibre crops can be grown on marginal soils without the depth, structure or fertility to support human food crops. This fact is the single most important reason why storage of carbon by largely perennial plants and especially trees is so central to the permaculture strategy for sustainability.

TREES AND FORESTS AS MULTIPURPOSE CARBON STORAGE

Trees are especially important as storages of carbon for a number of reasons.

- Their capacity to continue to grow (and fix carbon) at very high rates for decades and then store that carbon for centuries.
- Actively growing forests can be accumulating biomass at rates of 5-35 tonnes per hectare per annum which is similar to grasslands but unlike grasslands the wood in trees is a long term storage which can be stable for centuries.
- The capacity of trees to grow on our poorest land unsuited to other food or even fibre crops⁷.

⁷ See Article 19: *Hemp as a Wood Paper Pulp Substitute?* Environmental solution or diversion from the search for sustainable forestry for discussion of the relative merits of Hemp and Trees as fibre crops and the importance of sustainable forestry to the permaculture agenda.

- Wood in straight and tall trees continues to increase in value long after the rate of growth has slowed because larger, slower grown trees provide sawlogs with a great variety of durable product uses.
- In Europe where there is a sophisticated market for forest wood products, trees capable of yielding sawlogs are worth 10 times more than those yielding paper pulp or fuel wood.
- In a low energy future the value of mature forests capable of sustained yield of a diverse range of wood products will be very high. As in the past the wealth of nations will be measured by the quantity and quality of their forests.

The dependence of European nations on their forests for the building of wooden warships is the great example from history but the breadth and depth of dependence on forests is far greater this particular example. In the same way that steel replaced wood for ships and other uses, as fossil fuel based energy increased, wood will progressively replace steel, concrete, aluminium, plastics and other energy intensive composite materials as fossil fuel energy declines. But this will only be possible if we grow those forests at least a generation in advance.

Without any particular focus on Greenhouse gas amelioration, the principle of catching and storing energy to build natural capital suggests we should grow long rotation mixed species forests for multiple values.

The greenhouse outcomes of this approach would be more useful than the knee jerk industrial monocultural mentality driving much of the current design and investment in plantation forestry.

Some of greenhouse gas advantages of such forests include.

- The best way to establish most long lived timber species is to grow them with fast growing soil improving nurse species (eg acacias) which also have the effect at increasing uptake of carbon in the early years.
- Continuous careful thinning of long rotation forests can maintain good growth rates in some of our most useful timber species for at least 100 years (see discussion of forestry in *Principles and Pathways: Use Small and Slow Solutions*), after which time fossil fuel use should have dramatically reduced.
- Well managed forests of long lived high quality timber trees protected from fire can last for hundreds of years before their timbers values and carbon storage begin to decline.
- Houses and other high quality products made from this type of timber can last for hundreds more.
- Some of decomposition of leaves, bark and wood from older trees accumulated as soil humus is capable of lasting for thousands of years.

- Regeneration of such forests can be done without the massive release of carbon dioxide associated with clear felling and burning.

These are the types of forests which we should be growing for all reasons, with the greenhouse gas sink function being simply one more reason to get on with the job. Permaculture has contributed to the now widespread notion “that reforesting the earth is one of the few tasks left to us to express our humanity”⁸. While it is appropriate to focus on the often invisible environmental services (such as catchment protection) which forests provide, few people recognise that it will be the capacity of forests to store carbon as structural timber and fuel which may allow humanity to be sustained by renewable resources in a low energy future.

SOIL HUMUS AS CARBON STORAGE

While the value of carbon rich plant materials to directly provide for future human needs cannot be overestimated, perhaps an equally valuable storage of carbon is achieved when we simply allow plant materials to rot back into the soil. Organic matter, especially carbon rich bulky plant materials is the fuel for soil micro-organism which in turn, are the key to plant nutrient cycling and availability. After processing by worms and other soil organisms, organic matter is converted into polysaccharides, proteins and other fast turnover products which support soil microorganisms and plant life. Consequently much of the carbon cycles back to the atmosphere as carbon dioxide within a season or so, from respiration by the teaming microbial life in healthy soil. Some of the carbon in organic material is distilled into more stable complex organic compounds such as humic and fulvic acids which increase the nutrient, water and oxygen holding capacity of soils. Under favourable conditions these humus storages can be stable for hundreds and even thousands of years. Wes Jackson of the Land Institute in Kansas⁹ has referred to the loss of this ancient humus from American prairie cropping soils as “the mining of young coal”. The rebuilding of humus in the world’s cropping soils should be seen as the other great task for humanity alongside reforestation of our catchments and degraded range lands.

The loss of organic matter from cropping soils is now recognised by mainstream agricultural scientists as one of the greatest threats to sustainability. Strategies and techniques to increase soil organic matter are no longer regarded as the peculiar obsession of organic farmers, but the problem of how to describe, measure and value differing forms of soil organic matter leads to much confusion. Most soil testing laboratories measure total organic matter rather than attempt to distinguish differing forms and their relative age and turnover time.

8 Bill Mollison from the video *In Grave Danger of Falling Food*
9 Researching the development of perennial grain crops

Soils with a build up of partially decomposed mulch and compost may indicate a mineral imbalance¹⁰ while soils with no visible compost layer but a very dark and well structured mineral layer may have a high humus content reflecting past “digestion” of large amounts of organic matter.

Where supplies of organic materials are abundant (eg gardens supplied by surrounding urban or rural landscapes), favourable mineral balance and microbial populations are the critical factors in soils being able to digest organic matter.

Where supplies of organic matter are limited to what can be grown on site (broad acre farms) appropriate crop rotations, pastures and tree and shrub systems, are as important as the mineral and microbial factors.

It is often stated that crop waste especially grain straw from farmland could provide a huge renewable source of carbon for fuel and fibre board products in the future. Although such schemes might be better than the practise of burning grain stubble, they amount to “robbing Peter to pay Paul”, since crop land everywhere needs full recycling of crop waste through grazing animals and/or directly by soil microbes, if they are to maintain, let alone increase the level of soil humus.

In north Germany grain straw is burnt in high efficiency furnaces for heating buildings, a “renewable energy” replacing fossil fuel. Traditionally this straw would have been used as feed and bedding for livestock contained in large barns over winter. The resulting compost was then returned to the fields in spring, thus maintaining the humus content and fertility of the predominantly sandy soils. Today the slurry washings from the barns are stored in large tanks over the winter and then sprayed onto the fields. Although this slurry provides some organic matter it is not enough to maintain soil humus levels and prevent leaching of nutrients into the ground water which supplies all local towns and cities.

Concerns about nitrate pollution have led to slurry quotas, which in turn have led to slurry quota trading, and even slurry marriages between farming families trying to maximise their production. The next step could be to follow the Dutch solution of exporting animal manure to Spain which would use much more fossil fuel than that saved by burning straw for heating. This story illustrates the complex interconnected nature of environmental problems and the need for a holistic framework for moving towards real solutions. Understanding and applying the permaculture principle “Catch and Store Energy” may help prevent similar absurd circular problems.

BROWN COAL AS NEW SOIL HUMUS

Ironically brown coal, with appropriate processing, is emerging as one of the most valuable resources for building long term humic acid content of agricultural soils. The air pollution

10 Acidity is well recognised as slowing the breakdown of organic matter but this is more the symptom than the cause. Low calcium to potassium ratio is the more fundamental cause.

causing high sulphur brown coals are especially valuable because of the plant nutritional value of sulphur. Coal based fertilisers are increasingly being used in the conversion of conventional agriculture to organic methods.

SOIL HUMUS AS CARBON SINK

The focus on the greenhouse effect has produced some research and policy discussion of the agricultural soils as carbon sinks although this has not received as much publicity as the role of vegetation clearing and tree plantations. This research is providing quantitative evidence to support the long articulated claim of the organic agricultural movement that rebuilding agricultural soil humus levels is the greatest contribution to the survival of humanity.

Alan Yeoman’s who markets the famous Yeoman’s soil conditioning plough originally developed by his father P.A. Yeomans has argued¹¹ that loss of humus from agricultural soils is as large a contributor to greenhouse gas emissions as motor cars and that achievable increases in humus across the world’s farming soils could reabsorb the whole of the damaging imbalance of carbon dioxide in the atmosphere. Working through his remarkably simple “back of the envelop” calculations suggests we are at least talking about quantities in the same order of magnitude.

While more research about the actual and potential carbon cycle (storages and fluxes) in agricultural soil, and debates over complexity of verification and monitoring, will no doubt continue, the greenhouse issue simply gives us another good reason to get on with the job of rebuilding natural capital of soil humus as essential for humanities, survival in the post fossil fuel era.

We can do this in many ways both directly and by supporting farmers and land managers who are doing so (largely but not exclusively organic and biodynamic farmers);

- returning all organic wastes to productive garden and agricultural soils.
- eliminating all intensive forms of livestock husbandry (which consume excessive fossil fuels and reduce soil humus by increasing the demand for field crops).
- provide for (reduced) meat consumption in rich countries from conservative management of natural range lands (mostly native animals such as kangaroos) and more intensive management of grazing animals to build soil humus through perennial pastures.
- use rotations of leguminous pastures to build arable soil humus rather than continuous cropping supported by herbicides.
- replacement of soluble fertilisers aimed at crop feeding with rock mineral fertilisers and coal humus for soil feeding. (see below)

11 See book downloadable from Yeomans web site www.yeomansplow.com.au/

- large scale establishment of tree systems as an integral part in all farm landscapes, especially in high rainfall areas with a strong emphasis on soil building fodder shrubs, tree crop species and long lived timber trees with a lesser role for soil depleting and fire encouraging species such as eucalypts and conifers.

When the earth beneath our feet is less like a dead concrete slab and more like a dark, moist living sponge then we know we are on the right track.

HEPBURN PERMACULTURE GARDENS

The principle of catching water, mineral nutrients and carbon in useful landscape storages has been central in developing our property Melliodora (Hepburn Permaculture Gardens) in central Victoria¹².

For example we have built two dams on the gully which flows through the property to intercept a small proportion of the total seasonal catchment runoff. Some of the catchment is semi-urbanised so we are contributing to slowing the fast and at times destructive rapid flow from paved and roofed areas. This water flows through a silt trap/ reed bed which partly filters it before entering the dams. We also capture some roof runoff for use in the house and for animal needs. Roof runoff and other site runoff is also directed to parts of the garden where possible while minimising the risk of winter water waterlogging and nutrient leaching.

While these built systems contribute to landscape storage, it is the development of a well structured soil and a multi layered perennial vegetation system which has been the major opportunities to increase storage of water at Hepburn Permaculture Gardens.

The first step in this “revegetation strategy” was fencing to exclude rabbits, wallabies and stray livestock, to allow maximum growth of pasture grasses, brambles and other wild existing vegetation which could most efficiently use natural rainfall and be seasonally slashed to form mulch for recycling to soil humus.

In our plantings we catch and store mineral nutrients as well as nitrogen in a variety of ways:

1. First of all we grow an abundance of legumes and other species which host microorganisms which fix atmospheric nitrogen.
2. In the vegetable garden we use sawdust from a local sawmill as garden paths which slowly absorb nutrients which may leach from intensively watered and composted garden beds. As it decomposes, the old sawdust is used as mulch around trees.

¹² Holmgren, D. *Hepburn Permaculture Gardens: 10 Years of Sustainable Living*, Holmgren Design Services 1996

3. We also use sawdust in the compost toilet to absorb very soluble nutrients in urine and faeces. In the chook deep litter yard we use crop wastes, pampas grass and pasture grass to absorb the concentrated nutrients in chook manure and we turn the yard in winter to avoid anaerobic conditions to avoid odours and loss of nitrogen. In the goat's milking stall we use straw, spilled hay and tree fodder waste to absorb nutrients in urine.
4. In the orchard we grow many large and nutrient demanding fruit, nut and fodder trees which themselves become large storages of nutrients.
5. Along the gully we use willows and other species to absorb soluble nutrients in catchment runoff which flows through and past the property. These nutrients are then recycled to the land by pollarding the tops of the trees for animal fodder and compost.

Our planting strategies have created carbon storage in forms specifically appropriate to the site and situation. Because of the intensive, semi-urban nature of the site we have minimised the planting of large competing and fire hazardous forest trees such as eucalypts and conifers, but included many deciduous food and fodder bearing trees as well as nitrogen fixing animal fodder, shelter and timber trees. We have pruned our trees to develop good timber form so, if and when they are harvested more of the wood will be in a form which can be useful as round and/or sawn timber rather than fuel. We feel it is better to transport firewood short distances from sustainably managed local native forests than devoting a large part of our relatively fertile and well serviced urban fringe land to growing our firewood. Nevertheless, we produce about 10% of our annual firewood consumption as a by-product of managing the trees for multiple values.

Our pastures include long lived perennial grasses and other deep rooted species which maintain a significant permanent biomass as well as producing a large surplus in spring.

By slashing and mulching pastures, lopping fodder trees and use of grazing and browsing animals we have recycled much of the annual production of biomass to organic matter which has, over time substantially increased the soil humus content of our soils.

Where we hold animals in yards and pens, we use fibrous organic matter to absorb concentrated manures and urine to form balanced composts for growing our most nutrient demanding annual crops.

In recent years as the system matures we have put more focus on the recycling of much the nutrients stored in perennial pasture and tree biomass into more available forms through animal grazing and browsing. At the same time we have attempted to better balance mineral fertility which has also improved the structure of the soil and its capacity

to hold larger quantities of nutrients¹³. As the capacity of our soil to store water, nutrients and carbon increases we have the flexibility to reduce storage in perennial plant biomass if it suits, without compromising the overall resilience of the system.

PERMACULTURE AS GREENHOUSE STRATEGY

The greenhouse effect is the problem industrial civilisation “had to have” before the limitations of reductionist and symptomatic thinking would become self evident.

Unfortunately rather than a complete revolution in thinking and societal response, the old ways of thinking continue to dominate the formal structure of research and official strategies for dealing with the problem. Research agendas, budgets and debate is still largely determined by a segmented and reductionist world view which generates detail complexity across many different fields. At almost no point can anyone get a sense of the whole picture because of this detail complexity which are then filtered by economic and political structures to generate a small number of technical fixes which can be implemented by powerful government and corporate decisions.

Whether we consider fossil fuel consumption, the carbon sink side of the equation or the adaption to inevitable climatic change, permaculture principles and strategies are a predictor of appropriate greenhouse effect responses because they deal with the more fundamental causes of imbalance rather than the symptoms. Widespread adoption of permaculture principles and strategies would make greenhouse strategies unnecessary.

The holistic systems thinking which generates permaculture strategies works from design principles to recognise a pattern language of solutions which can be used to proliferate small and local solutions which co-evolve to incrementally mutually reinforce one another in an interlocking new ecosystem of human service.

¹³ Total Cation Exchange Capacity is the measure of a soils capacity to hold nutrients and mostly depends on the quantity and types of clay plus the quantity of humus present. Testing over recent years shows a rise in the TCEC from increasing humus. Most interestingly we think our humus levels are increasing due to the nature of its breakdown into true humus rather than greater addition of organic matter. This improved quality of humus we attribute to additions of Calcium and selected trace elements in recent years based on the Albrecht approach to soil fertility balance.



TRIBAL CONFLICT: PROVEN PATTERN, DYSFUNCTIONAL INHERITANCE

*This previously unpublished article (written in 1999) explores the subject of internal co-operation and external competition in human society as part of an expansive view of the permaculture principle of **Integrate Rather Than Segregate**. It outlines ideas which have been the subject of informal discussions on Permaculture Design Course over many years.*

The tribal organisation in “prehistoric” world can be seen as analogous to a cell with women and children forming the nucleus of core functions while men provided an infrastructure of support and membrane to filter outside influences and impacts. Within this structure there was a high degree of integration and mutualistic functions.

However the tribal conception of ethics generally made a distinction between people of the tribe and other humans (aliens). This concept was quite ecologically functional for perhaps a hundred thousand years of human culture. In that world, widely separated tribes existed largely in their own domains with relatively little interaction on a regular basis with aliens. Occasional conflict on a battlefield acted as a way to apply selection pressure on surplus young males without the conflict having too much adverse impact on the tribe as a whole¹. The more rapid colonisation of the planet by people following the retreat of the last ice age over the last 12,000 years and more particularly the emergence of agriculture, urban civilisation, the standing army and the expansion in power over other peoples, which began about 6000 years ago, has changed the situation of the tribes radically².

About 2500 years ago, new spiritual and ethical traditions began to develop (such as Christianity) which involved the then novel idea that “all humans are people”. Over the last two millennia, humanity has been struggling to integrate this new ethical framework. Over the course of the 20th century we have seen this idea emerge as an almost universally accepted truth at the same time that we have experienced some of the largest scale examples of genocide and related expressions of tribalism gone wrong.

Like the war against nature, the war between peoples is a crisis for human civilisation which must see resolution and fundamental transmutation if we are to survive. Most people find it perplexing and depressing that at the end of the 20th century we seem to have got nowhere in this matter. I think there are good reasons for optimism despite the nightly news.

In nature and in people, patterns of form and behaviour which have proven adaptive over long periods of time become deeply embedded within the structure and design of the system. In this way nature is conservative, not giving up easily on proven pathways. When these deeply embedded systems do prove to be dysfunctional, the evolution of fundamentally different patterns is fraught with difficulty.

In human psychology we know that when individuals reject some inherited behaviour, lifestyle or culture, they often find a substitute which although radical different in form, recreates many of elements and functions of the rejected pattern. In politics and history, revolutionary ideas and movements sometimes recreate what they sought to overturn. Although these processes seem to suggest the circle is a more accurate describer of human history than the arrow, the spiral is perhaps closest where things do go around but also move on.

¹ As occurred in the New Guinea highlands at the time of European contact.

² See Mumford, L. *The City In History*, one of the classic works which links these changes together.



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As the dysfunction, falsity or evil in the old pattern becomes more obvious, its repeated emergence becomes more concentrated and often contained in a way that the wider system can begin to see this old pattern as something external to itself which can in the end be discarded completely. The way the body can often condense a systemic illness into a toxic sore or excretion as part of a healing process is a fundamental example which goes beyond metaphor. The old religious concept of exorcism where an evil within a person is firstly perceived as a foreign being and is then expelled leaving the person intact was a way of dealing with what we might call psychological illness which otherwise may have remained systemic.

In this context it is not hard to understand why at the end of the 20th century, we see so many examples of human conflict such as Palestine, Rwanda, Bosnia and Timor which are almost caricatures of human conflict through the ages. We might be well beyond moral edicts to love thy neighbour in dealing with intractable ethnic conflict, but as more resources are focused on a range of approaches to conflict resolution, the limitations of many of the mainstream solutions are becoming clearer. Unfortunately the dominant alternative offered to entrenched obsession with the tribal past, is an acceleration into the fully alienated world of market capitalism and individual consumerism.

Dealing with the psychosocial roots of the problems requires more bottom up network support for the “natural nurturers”³ within communities and letting larger scale systems of governance and economy grow organically.

In the most intractable conflicts it seems that the leadership of women is often critical to bypassing the old ways which are so often inextricably tied to masculine notions of identity, honour and function.

These more organic methods are more likely to disarm and dismantle human conflict where they accept aggression as simply a once functional behaviour which we can discard like a worn out set of shoes if we have some new shoes to wear.

³ A term used within the Laceweb network. Laceweb is based on the work of Dr Neville Yeomans who integrated theoretical and practical aspects of psychosocial transformation in oppressed and traumatised communities. This work is connected to Permaculture by a number of network lineages. See Laceweb web site <http://www.laceweb.org.au/>



THE COUNTER CULTURE AS DYNAMIC MARGIN

*This previously unpublished article draws on themes of informal presentations and discussions over a number of years at our Permaculture Design Courses about permaculture as a counter cultural social movement. It relates strongly to my thoughts on the social applications of the permaculture principle **Use of Margins and Edges** and is as close as I get to a political manifesto.*

The counter cultural movement of the late 60's and early 70's was extraordinary in many ways. For a significant minority of the baby boomer generation, the counter culture was about a lot more than sex, drugs and rock and roll, although those were the prime expressions of a rejection of materialism, a desire to reconnect with nature, the search for the correct place of love, peace and wisdom in the world, voluntary simplicity and other notions which have become themes in a continuing struggle to reinvent ourselves over the last thirty years.

Permaculture was one of the more pragmatically focused concepts which emerged in the mid 70's in response to the questions and possibilities raised by the counter culture. The question which permaculture specifically addressed was whether it was possible to redesign our world and ourselves in nature's image.

Today it is common to hear and read in the mass media, put downs of the nativity and stupidity of hippies and the failure of the counter culture. It is a great irony that many of the sources of innovations which have reinvigorated the cultural and economic mainstream over the last twenty years have their roots in the counter culture. Even the most powerful cultural innovation, the computer revolution owes much to the counter culture¹.

Many of the talented and energetic individuals who rejected standard career paths and followed their hearts, are today leaders in making those innovations the mainstream.

Over the years I keep coming across more examples. While teaching a permaculture course at the Kolding Folk High School in Denmark in 1994, I stayed in a "zero energy house" built in the 1970's when the school was a centre of counter cultural innovation. The wind turbine which had powered the house was no longer standing and more recent construction had not followed the technological innovations explored in those early days. Overall, the zero energy house and its wind turbine were a failure. On the other hand, the giant 2 Megawatt wind turbine which provided power for hundreds of people at another Danish community, Twind was a success. It was designed and built by the community (apparently with gender balanced work teams and regular readings from Mao's Little Red Book).

Today Danish wind turbines are acknowledged as the best in the world as wind power becomes the most rapidly growing and profitable renewable energy source. Danish academia, industry and government is proud of this very important export industry in a tiny country renowned for design and knowledge based industries. The impression I got was that outside of a small circle of wind energy enthusiasts, few Danes are aware that little known counter cultural successes like Twind as well as failures like Kolding were as much the wellspring of the Danish wind power industry as universities and research institutions.

¹ See twenty years of *Co-Evolution Quarterly* and its successor *The Whole Earth Review* as well as the better known *Whole Earth Catalogue* (founding editor Stewart Brand) for the unfolding history of the computer revolution from a counter cultural perspective.



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Closer to home, back-to-the-land self reliance has been the central focus of the Australian counter culture over the last thirty years. In thinking about thirty years of back-to-the-land movement it is hard to say it has been a great success.

The key factors in the limited success of the back to the land movement in creating self reliant rural households and enterprises include;

- Historically low commodity prices undermining all farming enterprises and making consumer lifestyles very economically attractive.
- Easy social welfare options reducing drive to generate home and land based livelihoods.
- Very limited information and demonstrations of sustainable systems.
- Cheap land and individualist culture encouraging isolated households rather than effective community development.

On the other hand, the spin off effects of the back to the land movement on regions where it was focused is both surprising and largely unacknowledged. I have argued² that the rural resettlement in the more desirable coastal and high rainfall parts of Australia is a major social and economic force which runs counter to the accelerating decline of rural economies and communities generally. There is little doubt that on the north coast of NSW as well as other rural focal points of the counter culture³, the cultural and economic foundations of the diverse and vibrant economy is built on the cultural and economic infrastructure created by the counter cultural pioneers.

It is very ironic that some of those who abandoned jobs or university study to buy marginal dairy farms on the beautiful north coast for the purpose of becoming new age farmers, have become successful local business people, artists, Shire councillors, health practitioners and even organic and biodynamic farmers. Many of those buying in are the peers of the pioneers who stayed in city, making conventional careers and money but are now seeking the cafes, art galleries, health food shops, and alternative health clinics along with alternative schools and community activities for their children. This rural cosmopolitan culture flourishes wherever the counter culture was able to generate a critical mass of successful rural resettlement. The burgeoning development and tourist industries and the planning and policy bureaucracy which has grown up to feed off and control this social and economic up welling, are barely aware of the goose which has laid the golden egg of cultural vitality.

For me these invisible successes in reinvigoration of the mainstream represent both an endorsement of radical ideas and sobering lessons on how radical ideas are absorbed and digested by the cultural mainstream. That absorption has involved compromise of cherished values and the shedding of foolish or impractical notions. Most significantly it

2 See *Rural Landuse Review submission* (Article Six) for exploration of these issues

3 Eg Daylesford area in central Victoria, the Willunga area in SA, the Maleny area in S. Queensland and Margaret River in W.A. and Far South Coast of NSW

shows how establishment power never acknowledges that it is the fringe rather than the centre which is the source of inspiration in the modern world. While that maybe a cause for bitterness on the part of crusading radicals who are never acknowledged, it is also a lesson of how anarchistic experimentation and apparently directionless movements can be successful in changing society through invisible infiltration and subversion of the mainstream.

On a more explicit level, the counter culture of the baby boomer generation continues to provide an inspiration for successive generations of young people who believe they can help create a better world by changing the way they live. Despite the baggage of another thirty years of dysfunctional affluence, the minority of young people committed to adaptation to a low energy future are more focused and capable as they stand on the shoulders of those who came before. Despite the high failure rate, there is a constant stream of people, young and older, wanting to be more self reliant on a rural properties as couples or in community. Working as a consultant advising people on rural self reliance over 20 years I am constantly inspired by how relatively well informed young people are today compared to their parent's generation of pioneers.

Perhaps fewer of us in the 60's and 70's who were able to stand on the shoulders of parents and other role models, knew the exhilaration of realising that you are part of a cultural tradition which has its roots in the birth of the modern world in the late nineteenth century and the political and social tumult of the 1930's.

The 1890's and the 1930's were periods when the roots of environmentalism, organic agriculture, feminism, a variety of utopian and economically progressive ideas and renewed spirituality flourished at the margins of society before they entered and changed the mainstream. Mostly those changes were for the better although there are sobering examples of the contribution of counter cultural ideas to the cultural maelstorm that was Nazi Germany.

The idea that the counter culture has no history and no future is simply an expression of ignorance. Many historians would caution against the dangers of revolutionary leaders⁴ who have sought to create a history suitable to current political aims. If I were a revolutionary zealot seeking to rouse the faithful, I would assert that "the counter culture has a history of persistence and gathering strength in the face of adversity while the current establishment has no history or cultural vitality."

More realistically I accept that the history of the counter culture is a tenuous thread connecting us to the past but no more so than the thread which connects the cultural mainstream to its past.

4 Creative use of history in the late 19th century by revolutionary zealots to support Basque separatist and Jewish Zionist causes can be seen as contributing to the intractable nature of these long running ethnic conflicts.

Ironically today it is the political and cultural establishment which is constantly asserting its own traditions and history as a way of bolstering the crumbling faith of the general population in the notion that today's politics, technology and economy represent a "steady as she goes" progression from a familiar past⁵.

If Ben Chifley and Sir Robert Menzies were alive today to judge today's politicians they would probably have exercised bipartisan agreement that the likes of Paul Keating and John Howard should be put on trial for treason on the grounds that their economic policies have destroyed the national sovereignty of Australia. The merits of the various opinions on this massive gulf in values and action between mainstream politics and its historical antecedents are less interesting to me than the opportunities it provides for creative innovation from the fringe.

Never have the structures of establishment power exhibited so much hubris and superficial confidence and yet been so porous to corrosive influence, subversion and overturning. More than ever before, the task is to create the alternative possibilities rather than battering at the ramparts demanding change. The revolution in the mainstream is coming fast enough. The quality of that revolution will be determined by the diversity of living and working models that we have the energy and vision to create. The action is at the edge.

⁵ The success of the current Australian prime minister John Howard is in part due to his ability to convey this "steady as she goes" cultural continuity while accelerating the dismantling of the economic foundations of national democracy and culture.



THE ORIGINS OF PERMACULTURE AT THE EDGE

*This short article was written at the same time I was finalising the text of **Permaculture: Principles and Pathways Beyond Sustainability**. It was a contribution to an anthology by writer Carol Patterson about Tasmania's distinctive status in Australian culture with pieces by notable Tasmanians. The book project did not proceed.*

*As well as interpreting aspects of the origins of permaculture, in this piece I apply the principles **Use Edges and Value the Margins and Use Small and Slow Solutions** to explain the remarkable upwelling of creative innovation from an isolated island population of less and half a million people.*



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The environmental crisis, is one for the whole of civilisation, especially the current centres of power in the global cities¹. There are good reasons to believe that we will only succeed in dealing with the environmental crisis when we do so in large cities. However, I believe the inspiration, examples and wisdom for the solutions comes not from the centre, but from the margins, where people live at the edge between culture and nature, between modernity and tradition. The idea that the hinterland provides a wellspring of human biological vigour, values and renewal for civilisation is an old one, but I believe the ways in which this is happening are diversifying and intensifying as we approach the end of the fossil fuel era.

THE ACTION IS AT THE EDGE

The permaculture concept emerged in Tasmania in the mid 1970's from a brief working relationship between Bill Mollison and myself². It has since developed into a world wide movement designing and demonstrating sustainable land use and living.

I am sometimes asked (generally by North Americans and Europeans) why I think permaculture emerged from somewhere like Tasmania. (My answer is that) Tasmania is a place where modernity and nature collide, both destructively and creatively. It is far enough away from the sources of the dominant paradigms of global society, but where the benefits of a democratic society, modern education and relative affluence have been available for as long as in anywhere else in the world. It is a place where the inspiration and lessons of nature and rural culture can be infused into urban and intellectual culture.

Hobart, capital of Australia's second oldest and most decentralised state, is not set within a cultivated landscape but clings to the foot of the wild slopes of Mt Wellington. For me it symbolises a proximity between civilisation and wilderness. From the property on the lower slopes of Mt Wellington where the permaculture concept was born, it was possible to drive (or catch a bus) 5 km in one direction to the city centre, state parliament or university. Five kms in the opposite direction on walking tracks put you above the treeline on the south west face of the mountain with nothing more man-made than a fire trail between you and the great wilderness of SW Tasmania.

I was attracted to Tasmania by both the natural and intellectual environment. More specifically, I came to study at the Environment Design School, led by Hobart architect and educator Barry McNeil. E.D. This school was³ the most radical experiment in tertiary education in Australia and attracted design students and staff from around Australia as well as overseas. In this intellectual hot house, I met Bill Mollison, whose life and ideas epitomised a creative bridge between nature and civilization, and between tradition and modernity. As the fisherman/ bushman who left school at fourteen, he went on to become a wildlife researcher, university academic, environmental activist, co-originator and teacher of permaculture around the world.

¹ It has been argued that Sydney is Australia's only global city

² The results were published in Mollison, B. & Holmgren, D. **Permaculture One** Corgi 1978

³ For 10 years from 1970 to 1980 before it was academically emasculated.

The physical and cultural environment that gave rise to permaculture also produced the world's first green political party and was the first place in Australia where the organic agriculture grew from isolated individual farmers to a vibrant network⁴. This upwelling of intellectual and creative action at the edge of civilisation illustrates the permaculture design principle *Use Edges and Value the Marginal*⁵. Based on observation of both nature and managed landscapes, this principle suggests the edges between adjacent systems are the most biologically productive and active. It helps us overcome our cultural bias toward the centre, rather than the edge, in land use and society. Tasmania represents both a geographic and a conceptual edge or margin. This extension of the application of the principle of edge, draws on the value of “marginal” land and farming methods articulated by American organic farmer, environmentalist and author, Wendell Berry⁶. Marginal systems are ones which provide a space for diversity to survive and innovation to emerge.

SMALL IS BEAUTIFUL

Another reason for intellectual innovation in Tasmania is the more human scale of its social and political institutions. With a democratic federal state representing only half a million people, it is possible for innovation at the fringe to directly influence the mainstream of Tasmania politics⁷. In the big cities of the great nations, the massive scale of establishment culture and institutions makes for an apathy and acceptance that the world is a bad place that cannot be changed.

New Zealand, being an affluent and democratic sovereign nation of only two million people has similarly fostered remarkable social and environmental innovation. While teaching permaculture in Europe in 1994, I saw many inspiring examples of environmental innovation. However, after visiting 8 countries over six months, it was only in Denmark, a nation of three million, where I had the sense that the vitality and relative scale of the various “sustainable alternatives” was comparable or greater than what I was familiar with in Tasmania and New Zealand. While Britain and Germany, like the USA, continue to generate a great mass of innovation and action, the influence on the average citizen, mainstream media or political institutions seems negligible.

A more human scale model for the nation state than the economies of scale demanded by fossil fuel based capitalism reflects another permaculture design principle, *Use Small and Slow Solutions*. Permaculture is based on the assumption that a sustainable low energy future will require us to overturn most of our current cultural assumptions. It's natural that Tasmania should play a significant role in this process.

⁴ The Organic Gardeners and Farmers Association founded in 1972.

⁵ For a full exploration and reinterpretation of permaculture principles see Holmgren, D. ***Permaculture: Principles and Pathways Beyond Sustainability***, Holmgren Design Services [in press 2002]

⁶ Berry, W. ***The Unsettling of America: Culture and Agriculture*** 1977 Sierra Book Club

⁷ The current resistance of Tasmania to the onslaught by the multinationals' genetically engineered crops is an other example of how small scale fosters divergent possibilities.



NEED FOR FOCUS ON REGROWTH

This 2002 letter to the local newspaper addresses the future of the local public forests and the timber industry following the massive reduction in sawlog allocation by the Victorian state government. In it, I attempt to draw together some very diverse contributions and perspectives presented in previous letters with my own views on this controversial issue.

LETTER PUBLISHED IN 'HEPBURN SHIRE ADVOCATE' 3/4/2002

To The Editor,

The recent forest policy and management changes by the Bracks government mark a sad but historic turning point for the Wombat Forest and our community. The radical revision downwards of the projected "sustainable annual yield" of sawlogs from the early nineties peak of 79,000 tonnes to the announced 8,600 tonnes is a massive indictment of the deception and/or incompetence of a string of professional foresters who presided over this second rape of the Wombat in the short history of European settlement. Whether those responsible will be brought to book by the government remains to be seen but I think history will highlight Tim Anderson and Loris Duclos (of the Wombat Forest Society) for their tireless and complex work in extracting and analysing the numbers which allowed politicians to move against the professional foresters responsible for this rape.

The proposals from both DNRE and many conservation groups to fast track the development of sawlog plantations on farmland shows all the signs of being an environmental, economic and social disaster for our region. Pete O'Mara (Advocate 13/3/02) pointed out some unrealistic production figures and ignored environmental hazards of large scale monocultural plantations in the CAWFAG Forest Transition Plan.

Norman Endacot (Advocate 13/3/02) has pointed to the conservative principles the forestry profession generally apply to any large scale establishment of new forest resources, especially where they require public money.

As someone who has promoted a more sustainable model of farm forestry, I applaud the idea of establishing a greater and more diverse sawlog resource in our region, but to do so as a knee jerk response to the state of our public forests, will create more problems than it prevents.

Of course, the support of some conservation groups for gung-ho chemical plantation monocultures is the flip side of their plan to see the Wombat and other state forests, turned into national parks at exactly the time in their history when they most need sensitive and sensible forestry.

The Wombat Forest Society's call for more scrutiny of wood chipping (Advocate 13/3/02) in the Wombat under the new regime is timely, especially when it has been repeatedly shown that small sawmills can recover useful sawn timber from these so called "residual logs".

Gary McIntosh (also Advocate 13/3/02) shows that the local knowledge and evidence does exist of forest management alternatives to the, euphoristically titled, "Shelterwood System", which involves intense and damaging regeneration burns. We can learn from both the limitations of "individual tree selection" of earlier times which Norman Endacot recalls (Advocate 20/2/02) and the mistakes of the last three decades.



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While the relatively smaller areas of more mature forest will remain a touchstone of debate and measure of forest management, it is the dense regrowth stands, created by heavy logging and intense regeneration burning, which desperately need our attention.

What is required is a new regime of regrowth thinning to give the best young trees the space to grow. Thinning in the Wombat Forest can create mature forest with high amenity, environmental and sawlog values in less than a lifetime. We know this because it was done 100 years ago in the post gold rush regrowth. Back then, the predominant use for the thinnings was firewood, today it would be pulpwood although opportunities exist to develop the post and pole market using new low toxicity preservatives. These opportunities have never been properly considered for our forests in the past because DNRE used to have a conflict of interest as a grower of pine plantations which supplied the treated pine pole market. That is no longer the case.

Gary McIntosh, in his letter, referred to the delegation to Minister Coleman eight years ago in which we both gave presentations. Another member of that delegation, Vernon Howell was at the time somewhat provocatively pointing out that there was plenty of pulpwood available from the Wombat forest in the form of thinnings and that the state should pay (if necessary) to have it removed in a way which did not damage the retained trees.

This transformation of the pulpwood industry is urgently needed. The skills and equipment needed for the thinning task are the same ones required for sensible management of farm forestry plantations but very different from those currently used to harvest mature trees from devastated shelterwood coupes or clear felled Blue Gum pulpwood plantations.

Thinning of regrowth for multiple, current and future values is one of the cornerstones of sustainable forest management around the world. One hundred years ago we used these methods to create the Wombat forest we have been fighting over for the last thirty.

The Bracks government's actions in recognising the state of our forests is a good first step. What is now required is the vision and strength to reform the management of our native forests from resource destruction and regrowth to resource husbandry. For our community, the careful and sensitive thinning of the Wombat Forest regrowth is a task that has the potential to draw together the best of our forest heritage and culture, provide employment and forest products, improve amenity while creating another wonderful and productive forest to pass on to the next generation. There is a practical and positive alternative to a modern wilderness of abandoned dense and fire prone regrowth surrounded by vast farm monocultures of short rotation chemically sustained eucalypts.

David Holmgren
Hepburn Springs



WHAT IS SUSTAINABILITY?

**PLENARY SESSION 14TH JULY 2003
STUDENTS OF SUSTAINABILITY CONFERENCE
FLINDERS UNIVERSITY ADELAIDE**

*The presentation that accompanied this article was part of a series of talks to promote **Permaculture: Principles and Pathways Beyond Sustainability** but in the process I go further in unpacking the sustainability concept, its limitations and new ways of thinking which can revive it. This keynote presentation was the only one at the conference that addressed oil peak directly or indirectly. It was a sobering experience to get the feedback from colleagues that my message went straight over the heads of the majority of the young environmental activists in the audience, reinforcing my point that even the vanguard of sustainability had failed to recognise the signs and symptoms of global oil peak that I had mentioned in the introduction to PPPBS. At the 2004 SOS conference in Melbourne, a well attended forum on peak oil with Sheila Newman, Chris Mardon and myself was organised by peak oil and permaculture activist Adam Fenderson. The acceleration in awareness of peak oil is continuing and it is drawing more people to permaculture, as bottom up solutions, in the face of continuing inaction from governments.*

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INTRODUCTION

It seems that my role in this plenary is to be the iconoclast, a kicker of sacred cows. This is a role I enjoy, but most especially when it involves breaking icons that I have helped create.

The title of my new book, **Permaculture: Principles and Pathways Beyond Sustainability**¹ implies a serious problem with the Sustainability concept. I hope that the substance behind the title will stir up the sustainability debate in positive ways. In the workshop on Wednesday I will look more closely at the design principles from the new book which I believe provide a framework for adapting to ecological realities.

THIRD WAVE ENVIRONMENTALISM

A resurgence of environmentalism in recent years has occurred despite the diversionary politics of fear and hatred which dominate the mainstream political discourse. This environmentalism has involved both oppositional and developmental activism. By *oppositional activism* I mean that which aims to stop, ameliorate or mitigate adverse environmental impacts, especially of corporations and governments. The anti (corporate) globalisation movement integrates the experience of oppositional activists on both the environmental and social fronts.

By *developmental activism* I mean the process of constructing the systems which produce positive environmental and social outcomes. These most typically operate at the personal and household level but include community and entrepreneurial processes. In a recent speaking tour to promote the new book², I characterised this side of environmental activism as the “third wave” of environmental solutions.

The “first wave” of environmental solutions of the post W.W.II era developed in the late 1970’s. The permaculture concept and movement were milestones of that “first wave” but permaculture action increased dramatically both nationally and internationally during the “second wave” in the late 80’s & early 90’s. What happens to permaculture during this “third wave” is hard to say, but in calling the ideas in my book “Permaculture” I obviously want to build on, rather than break, that heritage. Although I am vigilant against the development of permaculture dogma, I still believe the concept, and the extraordinary positive influence it has had over the last 25 years, are foundations for further influence and action.

SUSTAINABILITY AS VIRTUE

The word “sustainability” is most broadly used to mean the collection of ideas, processes and elements in society which are currently seen as progressive, enlightened or even

¹ D. Holmgren **Permaculture: Principles & Pathways Beyond Sustainability** Holmgren Design Services 2002

² **Permaculture and the Third Wave of Environmental Solutions** www.holmgren.com.au

simply good. Sustainability has become a virtue by its perceived scarcity. But what is this virtue beyond current socially progressive ideas and fashions, and what is its relationship to Permaculture?

PERMACULTURE AND SUSTAINABILITY

Permaculture is a *design system for sustainable landuse and living* that emerged out of a brief working relationship between Bill Mollison and myself in mid 1970’s³ (we used the term permanent rather than sustainable). It predates most of the sustainability literature which came to the fore as part of the “second wave” environmentalism.

Permaculture was, in part, a response to the evidence of the unsustainability of continuing extraction of non renewable resources and the industrialised exploitation of biological resources. The Club of Rome’s seminal report⁴ *The Limits To Growth*, and the first and second oil shocks of 1973 & 1979 were obvious influences. Less well known, to this day is the systems ecology, energy circuit language and energy accounting work of Howard Odum, first described in his difficult but pivotal book *Environment Power and Society*⁵. It was the first reference listed in *Permaculture One*, and his work since has continued to inform my development of the concept over the decades⁶.

Permaculture, like other sustainability concepts, has focused on the creative and positive actions that are practical and appropriate, without necessarily attempting to understand how it all adds up in the long term. This is a reasonable response to rapid change and uncertainty about the future. However it also reflects the difficulty of discussing the future in terms other than a good and evil polarity between growth and development on the one hand and decay and destruction on the other.

ENERGY DESCENT

In addressing the question, What is sustainability?, I want to indicate how an understanding of global energy peak and resultant energy descent defines and reshapes both environmental concepts and strategies. I use the term “*descent*” as the least loaded word which honestly conveys the inevitable radical reduction of material consumption and/or human numbers which will characterise the declining decades and centuries of fossil fuel availability. I believe the “third wave” of environmental solutions will be a response to both the realisation of the limits to consumption from the “first wave” combined with realisation of the limits to pollution (global warming) from the “second wave”. Permaculture is the whole hearted engagement with energy descent as the opportunity for a better world where less is better.

3 Mollison & Holmgren *Permaculture One* Corgi 1978

4 Meadows et al *The Limits To Growth* 1972

5 Odum, H.T. *Environment Power & Society* John Wiley 1971

6 See various articles in *David Holmgren Collected Writings 1978-2000* Holmgren Design Services 2000

SUSTAINABILITY: A SYSTEMS VIEW

Beginning with “sustain” as the provision of the necessities of life , sustainability could be defined as the ability to continually provide the necessities of life.

A systems perspective is useful to take this definition further.

Self organising systems (such as those found in nature and society) all collect net energy from their surrounding environment.

As well as nourishing their constitute parts, sustainable systems maintain and renew themselves over time without exponential growth, major collapse or massive internal restructuring.

TIMES SCALES FOR ASSESSING SUSTAINABILITY

Time scales for assessing sustainability are proportional to the physical scale or territory of influence of the system in question. Thus the sustainability of a household, business or community might be considered over years or decades while that of a nation state or culture might be considered over centuries or even millennia.

These abstract systemic principles were once understood as common sense.

For example large powerful institutions such as the Catholic Church are long lived while small and local ones come and go more quickly. Corporations have never been long lived, averaging less than a human life time but as they have become more global and powerful, average life expectancy has shrunk to a few decades. This suggests that global capitalism is set for radical change rather than a long lived golden age.

MAINTENANCE OF LARGER SCALE SUPPORT SYSTEMS

As well as nurturing its constituent parts and self regulating growth, a sustainable system also contributes to the maintenance of larger scale environmental support systems.

For households and businesses, there must be contribution to the larger systems of community, government and economy.

In nature, local ecosystems contribute to maintenance of climate and landscapes.

In indigenous societies, use of resources helped maintain the whole of nature.

Large scale human systems of empire have declined throughout history when they fail to make that contribution or tithe to back to nature. Thus the idea of ecological sustainability is based on this expectation that modern human systems must contribute rather than simply take from nature.

ARE BIOLOGICAL SUPPORT SYSTEMS REALLY NECESSARY?

Despite the evidence, and propaganda, over several decades from scientists and environmentalists about the importance of biological support systems, the view persists that nature is an optional appendage to modern industrial societies rather than the foundation. We must ask why this view persists. One of the reasons, is that there is not much evidence that the state of biological systems have determined the course of human affairs in recent times especially in the richer nations.

For example without wanting to underestimate the problems, the parlous state of the Murray River has hardly brought the city of Adelaide to its knees. There is much greater concern about its “viability” as a modern city due to decline of manufacturing and the ageing of its population.

Two important factors have contributed to ameliorating the impact of environmental degradation:

1. Bypassing local negative feedback controls
2. The fossil and non-renewable resource base

1. Bypassing local negative feedback controls

In small, relatively autonomous economies and societies dependant on surrounding nature, failure in local ecosystem function leads to unavoidable economic, social and even cultural impacts if not societal collapse.

Over the last 6,000 years, warfare, slavery and the resultant power of city states and empires has allowed the capture of foreign resources, mostly as capital assets to be mined.

These densely settled pre industrial societies also staved off the impacts of local ecological failure by migration of surplus population and to some extent, export of pollution. For example the great rivers on which most ancient cities were located not only delivered fertility but took away and purified pollution.

In modern, migratory, large scale and globally connected human systems, local degradation of nature may not lead to collapse or even dramatic impacts. Without this negative feedback at the economic, social and personal level , ecological impacts tend to accumulate up the geographic hierarchy to a global scale where they are remote from any direct cause. For example acid rain, global warming and biodiversity loss are all processes which have large scale impacts often remote from the place and time of the cause.

Thus, our global industrial systems are still underpinned by global ecological processes but the connection between the ecological sustainability of households, communities, businesses, or nations, and the condition of global nature is abstract, complex and remote.

2. The fossil and mineral resource base

But renewable biological resources have not been the primary driving force behind modern societies at least since the 1930's Depression. Mineral resources, most notably oil and increasingly gas are the biggest forms of net energy sustaining humanity. The degree of this dependence is consistently underestimated by economists, decision makers and even scientists and environmentalists. The greatest mistake is to consider these resources as simply commodities rather than looking at their contribution of net energy to supporting all other human systems and processes.

In pre-industrial settled societies, agriculture was the primary process of obtaining net energy from the environment. At the end of the industrial era it has become a major net energy consumer, highlighting the degree to which we live from the oil well.

During a visit to Israel in the mid 1990's, after seeing the feeding of broad acre irrigated crops to shed raised dairy cows I remarked that the Israeli glass of milk must be 80% oil. As a comparison I suggested Australian milk from cows grazing rain fed (albeit fertilised) pastures might be 20% oil, and European milk from shed raised cows, fed broad acre, but rain fed crops, might be 50% oil.

This use of technology and innovation, based on resource depletion, to expand (at least temporarily) agricultural productivity reinforces the idea that agriculture is an appendage, rather than the foundation of the economy.

Although these facts have been understood for thirty years, the situation has become far worse over that time.

More shocking is the realisation that most environmental policies, strategies and action for protecting and maintaining local biological systems, both in the countryside and in the city are generally at a cost of depletion of non renewable resources elsewhere.

This use of technology and innovation to reduce local environmental degradation pushes the problems elsewhere and reinforces the idea that nature is an appendage of society. This rebound effect has been noted by systems theorists and permaculture practitioners.

For example, the financial savings from living in an energy efficient and passive solar house might be spent on a more resource expensive and greenhouse gas generating overseas holiday.

GLOBAL ENERGY PEAK AND CHANGE CULTURES

The above other factors reduce the usefulness of sustainability concepts in explaining real world processes. Without a serious attempt to understand the energy basis of nature and society, and the key issue of global energy peak, sustainability concepts and the action which they inform maybe counterproductive.

Although the oil crisis of the 1970's triggered the first wave of modern environmental solutions including Permaculture, the response and adjustments by global elites have had the effect of inoculating affluent society against the Limits to Growth argument. That is, a small dose made us resistant to the influence of more powerful doses.

In a similar way I have long argued⁷ that the over promotion of permaculture in the early 1980's "inoculated" people against a more serious consideration of permaculture because of the perceived failure of the concept to have effected powerful changes in landuse and society.

With global oil peak now unfolding all around us, the failure to recognise and understand its signs and symptoms pervades not only the anti-environmental reactionaries but much of the vanguard of sustainability. I think a workshop to enable environmental activists to get up to speed on the evidence of global energy peak and to discuss and debate the implications, would be a useful element in this conference.

SUSTAINABILITY OF CHANGE CULTURES

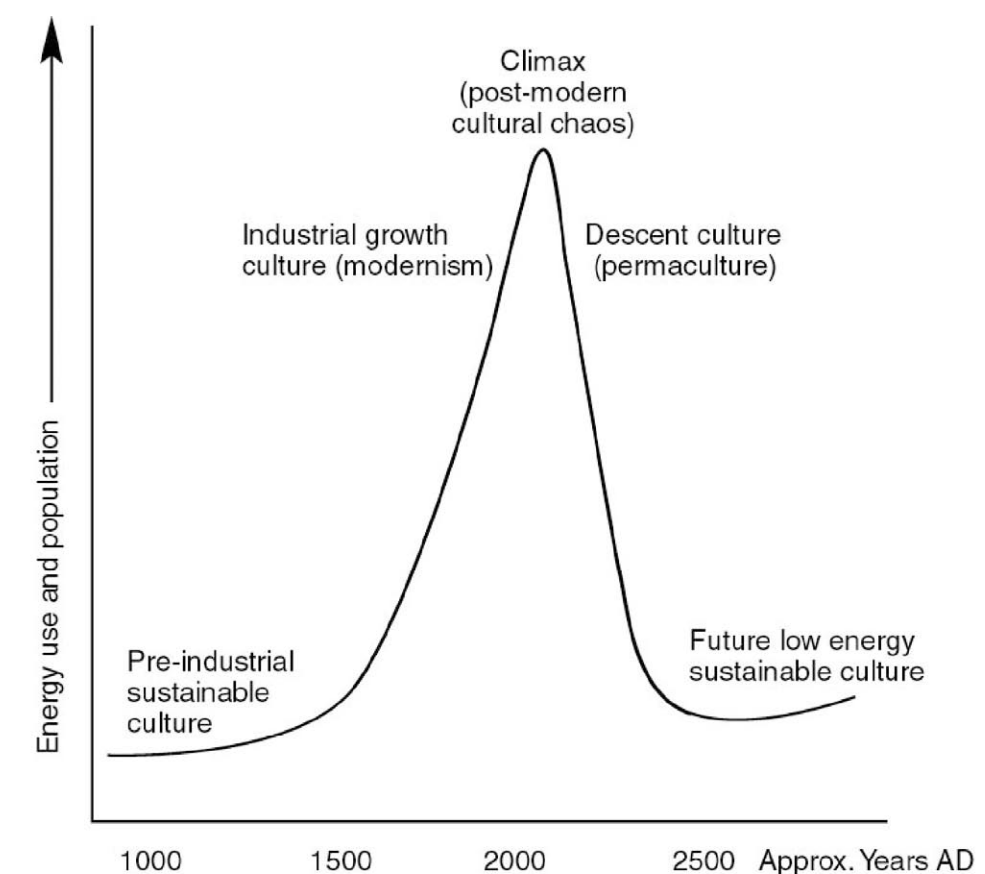
One of the consequences of understanding the larger scale dynamics of energy peak is that within a single human lifetime, we are witnessing simultaneous transformative change in systems at many scales. In these conditions, steady state models of sustainability are of limited use, other than to acknowledge that the bulk of human history is well described by such models. Unless the pathway back to a low energy future is particularly catastrophic and abrupt, the future will deliver continuous change and novelty for hundreds of years.

Both our cultural inheritance, and any legacy we might leave for future generations, can be thought of as continuous change cultures. How can we resolve the apparent contradictions inherent in stable, permanent and sustainable cultures and those involving continuous change? Many sustainability thinkers have recognised the need to encompass continuous change but few acknowledge the key issue of directionality of change at the largest scales. While both our cultural inheritance and our legacy could be characterised as change cultures, the difference is in the directionality of the supporting energy base (energy descent vs energy ascent) as graphically illustrated by this energy peak diagram .

Although only conceptual, the rough time scales show the continuity of the energy ascent culture for hundreds if not thousands of years. Similarly it suggests continuity of the descent culture over many generations.

Most sustainability concepts and advocates, by implication are based on a plateau model for transition beyond fossil fuel peak. The ecological and historical models for establishment of this steady state energy base are very dubious but are little discussed as most of the arguments focus on the potential of this or that technology, in isolation from the systems "top down" perspective.

⁷ See The Development of The Permaculture Concept 1991 in *David Holmgren Collected Writings 1978-2000* CD Holmgren Design Services 2001



from *Permaculture: Principles and Pathways Beyond Sustainability* 2003

PERMACULTURE AS DESIGN FOR ENERGY DESCENT

Permaculture could be seen (somewhat cynically) as just my (and many other people's) version of enlightened ideas and action that others gathered under the sustainability rubric. While there is some truth in this view, I would characterise those enlightened ideas and actions as all informed by ethical principles, and reflecting a set of system design principles, which will be of enduring value over the long run of energy descent. This does not mean that the ideas and actions (or strategies and techniques) which are useful in the one context or time will necessarily have enduring value, but that the underlying principles will.

Further, Permaculture is the wholehearted and positive acceptance of energy descent, as not only inevitable, but a desirable reality. Energy descent delivered by a continuous global recession has the potential to bring to fruition many environmental solutions and processes which have languished during the delusional decades since the evidence about global resource depletion was available. These positive aspects will exist side by side with negative expressions of energy descent such as techno-fascism which is emerging through larger scale economic and political processes.

Permaculture can be thought of as a hopeful orienteering map for the pathways down from the energy mountain. Reflecting the multiple function concept of permaculture, this map is designed to generate new pathways as we move down and even to work as an emergency parachute for rapid energy descent.

THE POSITIVE VIEW OF OUR CULTURE INHERITANCE

The European enlightenment, industrialisation and modernity are all aspects of the culture of energy ascent which have persisted over the several hundred years of net energy growth. Despite the novel technological, economic and social conditions over that time, the underlying concepts and design principles of our culture have changed little. That a consistent set of design principles can generate such diverse phenomena, is normal to the systems thinker, even if it is counter intuitive to most people. If we can see the unity, strength and continuity of our shared culture, despite the novel outcomes in each generation, then we have part of the answer to a new model of cultural sustainability.

In the same way that we might consider the culture of growth to have been sustainable for hundreds of years, any designed and evolved culture adapted to energy descent might similarly be “sustainable” if its underlying values and design principles were to remain intact over a similar period of human history.

To cope with the energy descent future we will have to discard most of the cultural baggage of our continuous energy ascent, but the greatest asset we can take with us is our intimate familiarity with continuous change and our capacity for creative response.

This positive message gives hope that we can map out the pathways, follow where they lead, backtrack when needed and continuously reshape our activity and culture as we descend the energy mountain over, not one or two, but a dozen or more generations.

Thus the apparent contradiction between stability and change at the core of sustainability concepts, including permaculture, can be understood and used as a tool in designing and creating a positive future.

David Holmgren July 2003



DO WE NEED NATURE?

*This article was written as an entry in the 2003 Shell Economist Future Thinking international writing competition. Needless to say it didn't win but it is probably one of the more well crafted pieces of writing I have done, in keeping with the substantial nature of the competition. The lack of direct reference to permaculture was intentional to keep necessary anonymity of the author. I took the title as an opportunity to expand the energy mountain analogy to explain the reality of recent human history and the likely energy descent future that I more briefly discussed in the introduction to **Permaculture: Principles and Pathways Beyond Sustainability**. Perhaps more polemic than most of my writings, this essay also reflects the increase in public lectures connecting permaculture and peak oil.*

SYNOPSIS

It is as though humanity has been climbing a mountain for so long that we believe climbing goes on for ever. One of the conceptual tools we developed on the climb up this energy mountain was the idea that humanity was separate from, and increasingly independent of nature. The most rapid and spectacular final phases of this climb have been punctuated by questioning, doubts and rejection of the whole project. But nothing in the human psyche has done much to stop or even slow the climb. In fact, every culture on the planet, from the most ancient indigenous people to the enduring “middle kingdom” of ancient China, and that font of spiritual sages, India, have all been overrun by the power and hubris of fossil fueled materialism, and its offspring, consumer hedonism.

The Maximum Power Principle suggests that the systems that collect the most energy and use it effectively for growth tend to prevail by natural selection. But the same laws of nature reinforce the proverb “Don't throw good money after bad”. As the vast stores of energy begin to decline, and efforts to harvest more energy yield less of real value, but generate more dysfunction and evil, then an inevitable reconciliation with nature's limits is imminent. In this context the answers to the question; Do we need nature? will be very different.

THE ENERGY MOUNTAIN

Driven ever upward by hubris, the techno-optimists claim to have seen in the mists the next face of the mountain and are preparing tools and equipment for the assault, to which they look forward with dedicated passion. The pessimists survey the cliffs below and, looking out to the horizon, see gathering storms and shout warnings about needing to secure our position. The traditionalists ignore this confused argument about what is above and beyond. They are disgusted with the fraternising with “the Other” on this crowded mountain and recall the purity of life in the ancestral home. They hold together their replica of that past against the mountain storms.

A smaller band of realists ignores the calls forward, those for retreat and the shouts of alarm. The view from above brings fresh insights as they draw in the mountain air, savouring experiences that none of the ancestors could have known. As they take in the grand designs, their eyes search for the pathways down from the peak - pathways that our descendants will follow to find new homes in the valleys beyond the mountain. The paths down will be rough and uncertain with many false leads, as challenging as the climb up. These realists also survey our collective baggage for useful tools, independent of who happens to be carrying them. The rest they ignore, accepting that most of what we have accumulated on the mountain must be left behind.



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THE LONG VIEW

Although humanity’s climb up the energy mountain may be unmatched in the history of the earth, nothing we have done is unnatural because none of our extraordinary achievements lie outside the laws of nature which govern all self organising systems from single cells to the whole earth and beyond. For a systems thinker, the question do we need nature? is absurd because human dependence on nature is analogous to the dependence of a cell or organ on the whole body.

Nature is best understood through the Gaia hypothesis¹ which considers the earth as a 4 billion year old organism. The atmosphere, oceans and the geological cycles of the crust are as much a part of that organism as all living things. Together these elements form a self organising and self regulating system powered by sunlight and tidal energy from above, and deep heat from below. Arguably the greatest internal threat to Gaia came from “pollution” of the atmosphere with highly corrosive oxygen 1.5 billion years ago - a threat she dealt with by an explosion of aerobic life that fed off the oxygen, while maintaining her primordial anaerobic life forms in the deep oceans.

The pulsing pattern of ice ages allowed Gaia to optimise the short lived but periodically explosive abundance of terrestrial life while the oceans continued to provide the base rhythm. About a billion years ago Gaia began to store some of this surplus organic abundance as fossil fuels. Curiously, this storage has gone on accumulating with only the smallest degree of recycling back into the biological and atmospheric domains until the final phase of the rise of homo sapiens.

The emergence of homo sapiens as a generalist species, able to take advantage of the changes from the glacial to interglacial phase, made us the dominant large animal on the planet. We reshaped whole regions and displaced a myriad of prey and predators. Development of agriculture in the most fertile regions of the latest interglacial paradise, and resultant organisation of cities, standing armies, and civilisation, allowed dominant tribes to capture the wealth of neighbours and so further aggregate power. After a series of failures due to ecological and cultural limits, European civilisation began to break its continental bonds early in the second Christian millennium. Colonisation of much of the planet provided the resources, organisational structures and culture necessary to trigger the industrial revolution, driven by the greatest source of humanly useful power, fossil fuels. This stepwise growth in energy has supported growth in human numbers from less than a billion to over 6 billion.

At the turn of the new millennium we are at the peak of global oil production and only decades from peak gas production. Expert independent geologists² agree that decline from

1 Lovelock, J. *The Ages of Gaia: A biography of our living Earth* Oxford Uni Press 1988
2 Heinberg, R. *The Party's Over: Oil, War and the Fate of Industrial Societies* New Society Publishers 2003. An overview of the issues and evidence including references to the principle sources.

peak will be as rapid as growth during the 20th century, irrespective of technology, market forces, government policies and human values.

ENERGETICS AND ENVIRONMENTAL AWARENESS

While the details of history are the result of human endeavour and chance events, the general patterns are shaped by energy availability. These patterns are best described by the science of systems ecology, and especially the work of Howard Odum³ and colleagues. However, controversy and debate in academia over the validity of the science have stifled any wider consideration of its implications for land management, technological development, economic prospects, public policy and emergent culture.

Despite thirty years of environmental advocacy and literacy, the idea of human independence from nature appears as strong as ever. The affluent and formally educated half a billion or so citizens of the planet to whom the environmental message has been directed have so far been cushioned from growing adverse environmental impacts. Impending global oil peak may break through that cushioning faster than the gathering clouds of climate change, but whether these impacts will be accepted as signs of our complete dependence on nature is not clear.

Active responses to the environmental imperative can be characterised as either oppositional campaigns to slow and stall destruction of nature, or designs to apply nature’s principles to create a green economy and culture. These efforts have both contributed useful understandings to how we depend on nature. However, we still lack a shared language and experience to ground these understandings and to get started in the reorganisation of society to live from nature’s continuing abundance before her limits further constrain our options and cut great swathes through our culture and civilisation.

While energy descent will spell an end to juvenile consumer materialism as a way of life, source of identity and meaning, the somewhat delayed onset of this reality is prefigured by a realisation of internal limits to affluence. The very success of consumer capitalism has given many people the repeated experience of both the addictive excitement and the lonely emptiness of over consumption⁴. This truth that all spiritual traditions speak of, is now common, if unspoken, knowledge. Thus the ecological and the psycho-social limits to materialism reinforce each other.

WORKING RELATIONSHIPS WITH NATURE

While clearly acknowledging both the internal and external limits, it is the provision of real human needs through working relationships with nature that should be our priority. For the poorest and most disadvantaged people on earth, the elemental needs of water, food and

3 Odum, H.T. *Environmental Accounting: Energy and Environmental Decision Making* Wiley 1996. The definitive explanation of the Emergy (embodied energy) concept and its diverse applications in earth science, ecology, geography, economics and public policy.
4 Hamilton, C. *Growth Fetish* Allen & Unwin 2003 A current critique of the psycho-social limits to economic growth.

shelter from simple ecological designs, have the potential to address basic security and family planning issues at remarkably little cost to the planet. Gardening and other simple self reliance activities can also reconnect the affluent with the abundance of nature and so rebuild confidence that life within the limits is both possible and desirable.

The same ecological design principles which inform the provision of material needs from nature can also be used to help evolve the personal, household and community systems which provide meaning, identity and values so lacking in affluent society. I believe it is this provision of nonmaterial needs, currently sought through relentless consumption, that provides the greatest hope that we can live within nature's limits. While nature's capacity for regeneration and abundance is wondrous, expecting an endless run of miracles of sustainable productivity from ecological design can degenerate into faith in yet another technological fix. Better we wake up to acknowledge the gift of fossil fuels and the resultant technology, culture, personal freedom and power, and use them wisely – use them to carefully rebuild the natural capital of water, soil and forests which will provide the daily bread and source of wonder and meaning for our descendents.

THE DARK SIDE OF ENERGY DESCENT

The evidence of energy descent is all around us, not just in the oil field data and the consensus of retired oil geologists. For nearly thirty years, systemic depression of commodity prices has prevented affluent nations receiving the market signals about the value of natural resources. Thatcherite policies and increasing disparity of wealth have driven the economic system faster with more short term gains, but increasing ecological and social debt. In the USA, the alternative measure of well being, the Genuine Progress Indicator peaked in the late 1970's while GDP has continued to climb to extraordinary heights. New technology is harnessed to generate an endless flow of slightly altered products to seduce consumers. Virtual services and a host of “bads and disservices” allow growth of last resort.

By the late 1990's the rapid rise of the anti-globalisation movement indicated the social limits were being stretched, while the onset of greenhouse weather events showed nature's predicted fever was beginning to bite. At the same time evidence of imminent global oil peak was breaking into the mainstream media and corruption of capitalism was threatening to pull down the economy and contaminate public affairs. The stage was set for a new politics of fear combined with bare fisted imperialism abroad to capture critical resources. These processes are reshaping public consciousness for a grim experience of energy descent without any acknowledgement of the energetic realities driving world leaders towards increasingly desperate solutions.

The debate over the importance of nature, the meaning of sustainability and value of prospective technologies is confused and mired by the climate of fear, corruption and denial as well as individual and systemic addiction. However, along with the confusion are

many insights and tools which, if gathered together, could provide a coherent vision of how we can step back from the brink of a catastrophic energy descent scenario to find the gentle pathway to an accommodation with nature.

The cultural and technological hubris about not needing nature, that is currently peaking along with the oil, is no more than a worn out pair of boots which we can discard to rot back into the cultural compost and so feed the rebirth of human values properly respectful of all powerful nature.



BIOMASS FUELS FROM SUSTAINABLE LAND USE: A PERMACULTURE PERSPECTIVE

This article was published in Solar Progress, journal of the Australian and New Zealand Solar Energy Society in November 2003. It uses net Emergy studies by Howard Odum and colleagues to support the permaculture strategy of planting and using trees and forests as a foundation of landuse rather than annual agricultural crops. In this it reflects earlier writings warning of the problems of sustainable biofuels from agriculture and the relatively ignored potential of forests. For example Article 4 - Response to Draft Preliminary Discussion Paper on the Biomass Potential Study of Victoria 1985, and Article 19 - Hemp as a Wood Paper Pulp Substitute: Environmental solution or diversion from sustainable forestry? (1996) .



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The increasing interest, research and promotion of renewable energy, driven by the Greenhouse imperative has included a vigorous debate over the role of biomass fuels in a more sustainable future. Imminent global oil peak and consequent rises in global energy prices are likely to accelerate the action and the debate on biomass options.

Biomass energy sources include industrial use of wood and charcoal fuels, methanol production from wood and ethanol production from agricultural crops such as sugar cane as well as oil seed crops such as canola for “biodiesel”.

The permaculture concept lends substantial support to the concept of plants as sources of sustainable energy. In many ways nature has already optimised the harvesting of solar energy, we just need to develop the most productive land use systems to use that abundance within nature’s limits. However, many of the proposals and projects to produce biomass fuels have had less than ideal environmental consequences.

Twenty years ago, the Solar Energy Council of Victoria (a predecessor to Sustainability Victoria) produced a plan for 20% of Victoria’s liquid fuel needs from biomass by 2000. The centre piece of the plan was a root crop Jerusalem artichoke to be grown in the northern Victorian irrigation district, for ethanol production from industrial scale regional plants. In a detailed submission to the draft plan I commended the choice of Jerusalem artichoke as probably superior to Sugar beet but questioned the sustainability of the scheme, and the claimed net energy yield ratio of 5.6:1. The proposed irrigation districts already suffered from salinity and compaction under dairy farming. A shift to broadacre root cropping would have been disastrous. Because the mash by product of ethanol is potential animal feed, dairy production in the region could have been maintained but it would have required cows in large feedlots clustered around the ethanol plants as well as longer distance transport of manure back to the artichoke crops. This suite of adverse environmental impacts was capped by doubts about the net energy yield figures. A similar proposal in NZ (using Sugar beet) had been evaluated in 1979¹ to have an embodied energy yield ratio of 0.9:1 (in other words a marginal net loss). The Solar Energy Council never replied to my questions and 20 years of cheap oil has made sure the scheme never came to fruition.

While current proposals may not be quite as environmentally naïve, the latest crop of grand proposals include optimistic claims of both energy productivity and environmental sustainability for energy crop monocultures. Like all renewable energies, the real sustainable yields are modest.

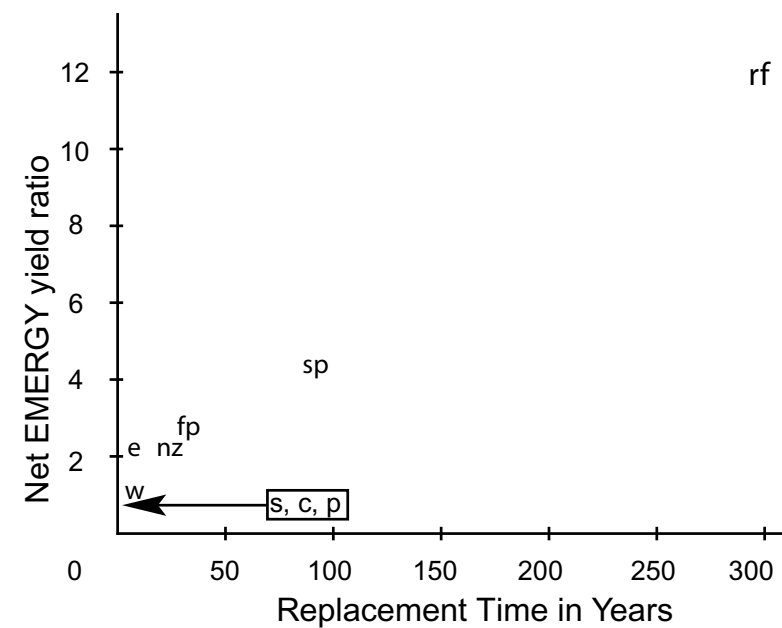
Reflecting the extensive work by Odum and colleges over several decades, permaculture design principles² suggest the following rules of thumb in thinking about sustainability and productivity of biomass crops.

¹ By Howard Odum, American system ecology and Emergy accounting guru. Emergy is short for (embodied energy) but the methodology is significantly different from more conventional methods. The main difference is that Emergy includes evaluation of the free services of nature and the human service inputs to a product or system rather than just the energy used in the economic inputs

² See *David Holmgren Permaculture: Principles & Pathways Beyond Sustainability* 2002 Holmgren Design Services

- Annual agricultural crops and short rotation perennials tend to give the greatest productivity per hectare per annum but have marginal or even negative returns on EMergy due to inputs for soil preparation, fertilising and harvesting.
- The challenges of making these systems sustainable are great while the land required has the greatest potential for human food production.
- Long rotation and low input plantation and natural forestry have lower productivity per hectare per annum but can more easily be managed sustainably and can be grown on land too poor for food production. These advantages show up in high EMergy yield ratios.

The results of several eMerger studies of biomass crops around the world show the pattern of rising net eMerger with longer rotation time.



	Biomass fuel	Replacement time (yrs)	EMERGY yield ratio
rf	Rainforest timber, Brazil	300	12.00
sp	Spruce	90	4.10
fp	Slash pine, Florida	25	2.40
e	Eucalypts, Brazil	7	2.20
nz	Radiata pine, New Zealand	24	2.10
w	Willow, Sweden	6	1.34
s	Sugar Cane Alcohol	1	1.10
c	Corn	1	1.10
p	Palm Oil	1	1.06

Figure 1: EMERGY yield ratios of biomass fuels as a function of frequency of harvest (after Odum 1996) from *Permaculture Principles & Pathways Beyond Sustainability* by David Holmgren 2002. Principle 3: Obtain a Yield.

For example, waste wood from logging operations in natural but managed Swedish conifer forests, have, for decades fuelled district heating plants. This makes energetic and environmental sense. On the other hand, more recent, short rotation willow biomass plantations on prime agricultural land feeding the same furnaces should be thought of as caretaker crops to help reduce Europe’s food production surpluses rather than a net source of energy.

In Australia, common sense should tell us that schemes to use wheat, sugar cane and oil seeds for biomass fuels are like burning books to keep warm. The existing unsustainability of these broadacre agricultural cropping systems compound the problems.

Much of the groundwork to seriously address the environmental, economic and social problems of rural Australia with multi functional reforestation has been done over the last 20 years. Biomass production is increasingly being recognised as part of the solution. For example, proposals to rehabilitate the salinity affected wheat belt in WA by growing mallee eucalypts for essential oil with wood biomass residue as a feedstock for renewable power³, more closely reflect permaculture design principles, albeit at an industrial scale. However such plantations need to include soil improving legumes, such as wattles, if they are to heal the very substantial soil degradation problems of this region.

On the other hand, schemes to harvest native forest waste in higher rainfall regions for renewable power production or methanol transport fuel have been the target of strong opposition from environmental groups⁴. The continuing failure to fundamentally reform public forest management in Australia gives good reason to believe biomass harvesting of native forests would follow the “maximum waste, minimum care” legacy of harvesting native forests for paper pulp over the last 30 years.

Without ignoring this terrible legacy, both native forests and mixed species plantations have huge potential to sustainably yield greenhouse gas neutral biomass fuels as a by product of management for high value timber and ecosystem services. Many small, but mostly undocumented examples of private management of regrowth forests exist⁵. From a permaculture perspective, these provide potential models for how we might fast track the nature based forestry practices and products which will be necessary to integrate sustainable biomass production as a normal part of our rural landscapes. If our grandchildren are not to curse us for consuming the fossil fuels while growing nothing to give them a modicum of the mobility we take for granted, then the potential of forestry to lead the way in broadacre sustainable landuse must be realised.

A century after the peaking of oil and Greenhouse, the tree rather than the PV panel may be the dominant symbol of the Solar Age.

3 See various press releases by the Oil Mallee Ass of WA <http://www.oilmallee.com.au/>

4 For example see campaign by Nature Conservation Council of New South Wales <http://www.nccnsw.org.au/>

5 For example Fryers Forest eco-village in central Victoria <http://www.holmgren.com.au/html/fryers/fryerstimber.html>



ESSENCE OF PERMACULTURE

VERSION 3

*An earlier version of this article was included in the first edition of **Collected Writings** published in 2000. This slightly amended version from April 2004 has been downloadable from the HDS website and has been widely distributed through permaculture networks as a summary of the principles format from **Permaculture: Principles and Pathways Beyond Sustainability** 2002. The permaculture flower graphic, principle icons and associated proverbs used in this article and the book have been central to my teaching and public presentation of permaculture in recent years. The **Principles Fridge Magnets** promote the icons and proverbs to a broader audience while the **Principles Teaching Kit** is aimed at wider use of these tools by permaculture teachers and other environmental educators. The flower concept was adapted as a model for feedback from workshops on permaculture networking and organization at the 8th National Permaculture Convergence held in Eltham, Victoria in April 2005.*

The word permaculture was coined by Bill Mollison and myself in the mid-1970's to describe an *integrated, evolving system of perennial or self-perpetuating plant and animal species useful to man*¹.

A more current definition of permaculture, which reflects the expansion of focus implicit in *Permaculture One*, is '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.' People, their buildings and the ways in which they organise themselves are central to permaculture. Thus the permaculture vision of permanent or sustainable agriculture has evolved to one of permanent or sustainable culture.

THE DESIGN SYSTEM

For many people, myself included, the above conception of permaculture is so global in its scope that its usefulness is reduced. More precisely, I see permaculture as the use of systems thinking and design principles that provide the organising framework for implementing the above vision. It draws together the diverse ideas, skills and ways of living which need to be rediscovered and developed in order to empower us to provide for our needs, while increasing the natural capital for future generations.

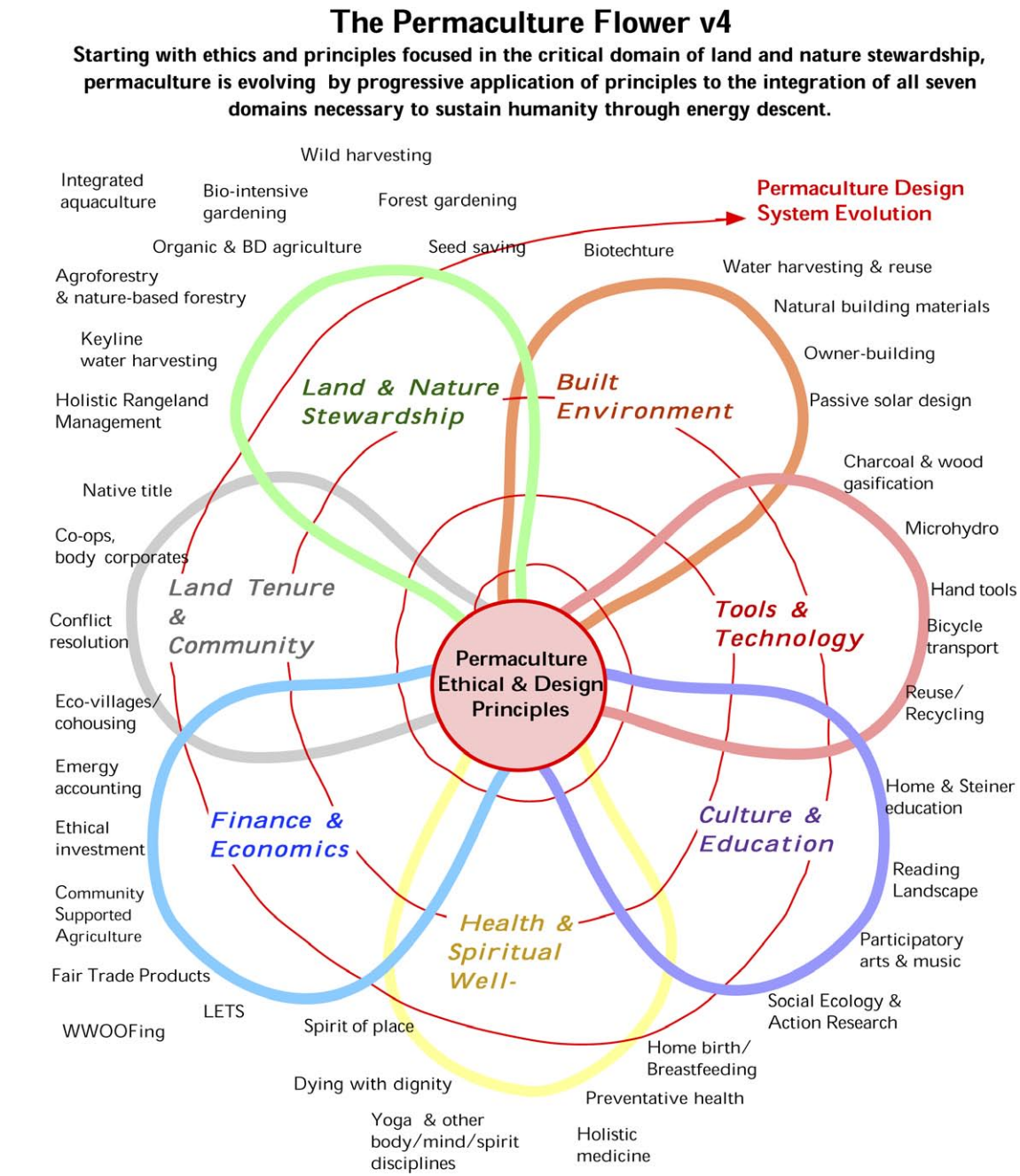
In this more limited but important sense, permaculture is not the landscape, or even the skills of organic gardening, sustainable farming, energy efficient building or eco-village development as such, but it can be used to design, establish, manage and improve these and all other efforts made by individuals, households and communities towards a sustainable future. The Permaculture Design System Flower shows the key domains that require transformation to create a sustainable culture. Historically, permaculture has focused on Land and Nature Stewardship as both a source for, and an application of, ethical and design principles. Those principles are now being applied to other domains dealing with physical and energetic resources, as well as human organization (often called invisible structures in permaculture teaching). Some of the specific fields, design systems and solutions that have been associated with this wider view of permaculture (at least in Australia) are shown around the periphery of the flower. The spiral evolutionary path beginning with ethics and principles suggests knitting together of these domains, initially at the personal and the local level, and then proceeding to the collective and global level. The spidery nature of that spiral suggests the uncertain and variable nature of that process of integration.

¹ B. Mollison, & D. Holmgren, *Permaculture One*, Corgi 1978 and since published in 5 languages (now out of print).



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THE NETWORK

Permaculture is also a network of individuals and groups spreading permaculture design solutions in both rich and poor countries on all continents. Largely unrecognised in academia, and unsupported by government or business, permaculture activists are contributing to a more sustainable future by reorganising their lives and work around permaculture design principles. In this way they are creating small local changes, but ones that are directly and indirectly influencing action in the fields of sustainable development, organic agriculture, appropriate technology and intentional community design.

THE PERMACULTURE DESIGN COURSE.

Most of the people involved in this network have completed a Permaculture Design Course (PDC), which for over 20 years has been the prime vehicle for permaculture inspiration and training worldwide. The inspiration aspect of the PDC has acted as a social glue bonding participants to an extent that the world-wide network could be described as a social movement. A curriculum was codified in 1984, but divergent evolution of both the form and content of these courses, as presented by different permaculture teachers, has produced very varied and localised experiences and understandings of permaculture.

IMPEDIMENTS TO THE SPREAD OF PERMACULTURE

There are many reasons why ecological development solutions that reflect permaculture design principles have not had a greater impact over the last few decades. Some of those reasons are:

- Prevailing scientific culture of reductionism that is cautious, if not hostile, to holistic methods of inquiry.
- The dominant culture of consumerism, driven by dysfunctional economic measures of well-being and progress.
- Political, economic and social elites (both global and local) which stand to lose influence and power through the adoption of local autonomy and self-reliance.

These and related impediments express themselves differently in different societies and contexts.

For the five billion or so majority for whom the cost of basic needs is high relative to real income, the opportunities to maintain or redevelop more self-reliant means of providing for needs are extremely limited. The depletion of local natural resources by population pressure, innovation in resource extraction technology, ethnic and migratory conflict, as well as government and corporate exploitation, have all reduced the productivity and viability of old co-evolved sustainable systems. At the same time, growth in the

monetary economy has provided more opportunities for farm and factory labour, thereby increasing measured income, but failing to take account of declining well-being. The lure of opportunities in the rapidly growing cities has been like the dangled carrot , enticing country folk to move to the city. This process follows a model as old as Charles Dickens’ character Dick Wittington, who believed the streets of early 19th century London were paved with gold. At the same time, government provision of health, education, and other services have all been slashed by IMF and World Bank imposed structural adjustment. This failed system of economic and social development is extraordinary in its ubiquity and repetition.

The same system of power that extracts and exploits the less powerful, soothes the billion or so middle-class people, mostly in the North, into complacency with low, and even falling costs relative to average incomes, of food, water, energy and other essential goods. This failure of global markets to transmit signals about resource depletion and environmental degradation has insulated consumers against the need for developing more self-reliant lifestyles, and disabled the drive for public policies which might assist these necessary adaptations. The flood of new and cheap consumer goods has stimulated consumption to a point of super-saturation, while at the same time measures of social capital and wellbeing continue to fall from peaks in the 1970’s.

The craven acceptance of economic growth at all costs, and the powerful established corporate and government interests, which stand to lose power from such a transition, makes clear the radical political nature of the permaculture agenda.

FOCUS ON OPPORTUNITIES RATHER THAN OBSTACLES

While permaculture activists are acutely aware of these impediments to what they do, permaculture strategies focus on the opportunities rather than the obstacles. In the context of helping the transition from ignorant consumption to responsible production, permaculture builds on the persistence of both a culture of self-reliance, community values, and the retention of a range of skills, both conceptual and practical, despite the ravages of affluence. The identification of these invisible resources is as important in any permaculture project as the evaluation of biophysical and material resources.

While sustainable “production” (of food and other resources) remains the prime objective of permaculture strategies, it can be argued that permaculture has been more effective at pioneering what has come to be called “sustainable consumption”. Rather than weak strategies to encourage green consumer purchasing, permaculture addresses the issues by reintegrating and contracting the production/consumption cycle around the focal point of the active individual nested within a household and a local community.

Although permaculture is a conceptual framework for sustainable development that has its roots in ecological science and systems thinking, its grassroots spread within many different cultures and contexts show its potential to contribute to the evolution of a popular culture of sustainability, through adoption of very practical and empowering solutions.

FUNDAMENTAL ASSUMPTIONS

Permaculture is founded on some fundamental assumptions that are critical to both understanding and evaluating it. The assumptions on which permaculture was originally based were implied in *Permaculture One*, and are worth repeating:

- Humans, although unusual within the natural world, are subject to the same scientific (energy) laws that govern the material universe, including the evolution of life.
- The tapping of fossil fuels during the industrial era was seen as the primary cause of the spectacular explosion in human numbers, technology and every other novel feature of modern society.
- The environmental crisis is real and of a magnitude that will certainly transform modern global industrial society beyond recognition. In the process, the well-being and even survival of the world’s expanding population is directly threatened.
- The ongoing and future impacts of global industrial society and human numbers on the world’s wondrous biodiversity are assumed to be far greater than the massive changes of the last few hundred years.
- Despite the inevitably unique nature of future realities, the depletion of fossil fuels within a few generations will see a gradual return of system design principles observable in nature and pre-industrial societies, and which are dependent on renewable energy and resources (even if the specific forms of those systems will reflect unique and local circumstances).

Thus permaculture is based on an assumption of progressively reducing energy and resource consumption, and an inevitable reduction in human numbers. I call this the “energy descent future” to emphasise the primacy of energy in human destiny, and the least negative but clear description of what some might call “decline”, “contraction,” “decay” or “dieoff”. This energy descent future can be visualised as the gentle descent after an exhilarating balloon flight that returns us to the Earth, our home. Of course that earth has been transformed by humanity’s “energy ascent”, making the future as challenging and as novel as any period in history. In openly accepting such a future as inevitable we have a choice between fearful acquisitiveness, cavalier disregard or creative adaption.

The conceptual underpinning of these assumptions arises from many sources, but I recognise a clear and special debt to the published work of American ecologist Howard Odum². The ongoing influence of Odum’s work on the evolution of my own ideas is made explicit in the dedication and extensive references to Odum in *Permaculture, Principles &*

2 H.T. Odum, *Environment, Power & Society*, John Wiley 1971 was a book which influenced many key environmental thinkers in the 1970s and was the first listed reference in *Permaculture One*. Odum’s prodigious published output over the three decades since, as well as the work of his students and colleagues, has continued to inform my work.

Pathways Beyond Sustainability, as well as articles in *David Holmgren: Collected Writings 1978-2000*³.

Among the recently published works on fossil energy peak and consequent descent, Richard Heinberg’s wonderfully titled book, *The Party’s Over*⁴, probably provides the best overview of the evidence and issues, with appropriate acknowledgement to Campbell, Leherrere and other retired and independent petroleum geologists who, in the mid 1990’s exposed the real facts about the world’s fossil fuel reserves, and the critical nature of peak as opposed to ultimate production of oil and gas.

PERMACULTURE PRINCIPLES

THE VALUE AND USE OF PRINCIPLES

The idea behind permaculture principles is that generalised principles can be derived from the study of both the natural world and pre-industrial sustainable societies, and that these will be universally applicable to fast-track the development of sustainable use of land and resources, whether that be in a context of ecological and material abundance or one of deprivation.

The process of providing for people’s needs within ecological limits requires a cultural revolution. Inevitably such a revolution is fraught with many confusions, false leads, risks and inefficiencies. We appear to have little time to achieve this revolution. In this historical context, the idea of a simple set of guiding principles that have wide, even universal application is attractive.

Permaculture principles are brief statements or slogans that can be remembered as a checklist when considering the inevitably complex options for design and evolution of ecological support systems. These principles are seen as universal, although the methods that express them will vary greatly according to place and situation. These principles are also applicable to our personal, economic, social and political reorganisation, as illustrated in the Permaculture Flower, although the range of strategies and techniques which reflect the principle in each domain is still evolving.

These principles can be divided into ethical principles and design principles.

3 See Article 11 *The Development of The Permaculture Concept* and Article 25 *Energy and EMERGY: Revaluing Our World* which are especially relevant in explaining the influence of Howard Odum’s work on permaculture. For a recent evaluation and comparison of Odum’s Emergy concept to other sustainability tools see ***Ecosystem Properties and Principles of Living Systems As Foundation for Sustainable Agriculture: Critical reviews of environmental assessment tools, key findings and questions from a course process*** by Steven Doherty and Torbjörn Rydberg [editors] Jan 2002.

4 Richard Heinberg *The Party’s Over: Oil, War and the Fate of Industrial Societies* New Society Publishers 2003.

ETHICAL PRINCIPLES OF PERMACULTURE

Ethics act as constraints on survival instincts and the other personal and social constructs of self-interest that tend to drive human behaviour in any society. They are culturally evolved mechanisms for more enlightened self-interest, a more inclusive view of who and what constitutes “us”, and a longer-term understanding of good and bad outcomes.

The greater the power of human civilisation (due to energy availability), and the greater the concentration and scale of power within society, the more critical ethics become in ensuring long-term cultural and even biological survival. This ecologically functional view of ethics makes them central in the development of a culture for energy descent.

Like design principles, ethical principles were not explicitly listed in early permaculture literature. Since the development of the Permaculture Design Course, ethics have generally been covered by three broad maxims or principles:

- Care for the earth (husband soil, forests and water)
- Care for people (look after self, kin and community)
- Fair share (set limits to consumption and reproduction, and redistribute surplus).

These principles were distilled from research into community ethics, as adopted by older religious cultures and modern cooperative groups. The third principle, and even the second, can be seen as derived from the first.

The ethical principles have been taught and used as simple and relatively unquestioned ethical foundations for permaculture design within the movement and within the wider “global nation” of like-minded people. More broadly, these principles can be seen as common to all traditional cultures of place, although their conception of “people” may have been more limited than the notion that has emerged in the last two millennia⁵.

This focus in permaculture on learning from indigenous, tribal and cultures of place is based on the evidence that these cultures have existed in relative balance with their environment, and survived for longer than any of our more recent experiments in civilisation.

Of course, in our attempt to live an ethical life, we should not ignore the teachings of the great spiritual and philosophical traditions of literate civilisations, or the great thinkers of the scientific enlightenment and since. But in the long transition to a sustainable low-energy culture we need to consider, and attempt to understand, a broader canvas of values and concepts than those delivered to us by recent cultural history⁶.

5 For an exploration of the evolutionary limitations of tribalism in the modern world see Article 29 *Tribal Conflict: Proven Pattern, Dysfunctional Inheritance*.

6 For a current articulation of the value of indigenous culture and value in a eco-spiritual response to energy descent see ***Last Hours of Ancient Sunlight: Waking up to personal and global transformation*** by Thom Hartmann 1999 Harmony Books.

DESIGN PRINCIPLES

The scientific foundation for permaculture design principles lies generally within the modern science of ecology, and more particularly within the branch of ecology called ‘systems ecology’. Other intellectual disciplines, most particularly landscape geography and ethno-biology, have contributed concepts that have been adapted to design principles.

Fundamentally, permaculture design principles arise from a way of perceiving the world that is often described as ‘systems thinking’ and ‘design thinking’ (See Principle 1: *Observe and interact*).

Other examples of systems and design thinking include:

- The Whole Earth Review, and its better-known offshoot the Whole Earth Catalogue, edited by Stewart Brand, did much to publicise systems and design thinking as a central tool in the cultural revolution to which permaculture is a contribution.
- The widely known and applied ideas of Edward De Bono⁷ fall under the broad rubric of systems and design thinking.
- As the academic discipline of cybernetics⁸, systems thinking has been an esoteric and difficult subject, closely associated with the emergence of computing and communication networks and many other technological applications.

Apart from the ecological energetics of Howard Odum, the influence of systems thinking in my development of permaculture and its design principles has not come through extensive study of the literature, but more through an osmotic absorption of ideas in the cultural ether which strike a chord with my own experience in permaculture design. Further, I believe many of the abstract insights of systems thinking have more easily understood parallels in the stories and myths of indigenous cultures, and to a lesser extent in the knowledge of all people still connected to land and nature.

Permaculture principles, both ethical and design, may be observed operating all around us. I argue that their absence, or apparent contradiction by modern industrial culture, does not invalidate their universal relevance to the descent into a low-energy future.

While reference to a toolkit of strategies, techniques and examples is the way most people will relate to and make use of permaculture, these are specific to the scale of systems involved, the cultural and ecological context, and the repertoire of skills and experience of those involved. If principles are to provide guidance in choosing and developing the useful applications, then they need to embody more general systems design concepts, while being expressed in language that is accessible to ordinary people and resonates with more traditional sources of wisdom and common sense.

⁷ Best known for coining the term “lateral thinking”.

⁸ Norbert Wiener, *Cybernetics: Control and Communication in the Animal and the Machine*, 1948, is the foundation text. John Gall, *General Systematics*, Harper & Row 1977, provides an accessible and useful guide for permaculture designers.

I organise the diversity of permaculture thinking under 12 design principles. My set of design principles varies significantly from those used by most other permaculture teachers. Some of this is simply a matter of emphasis and organisation; in a few cases it may indicate difference of substance. This is not surprising, given the new and still emerging nature of permaculture.

The format of each design principle is a positive action statement with an associated icon, which acts as a graphical reminder and encoding some fundamental aspect or example of the principle. Associated with each principle is a traditional proverb that emphasises the negative or cautionary aspect of the principle.

Each principle can be thought of as a door into the labyrinth of systems thinking. Any example used to illustrate one principle will also embody others, so the principles are simply thinking tools to assist us in identifying, designing and evolving design solutions.



PRINCIPLE 1: OBSERVE AND INTERACT
‘Beauty is in the eye of the beholder’

Good design depends on a free and harmonious relationship between nature and people, in which careful observation and thoughtful interaction provide the design inspiration, repertoire and patterns. It is not something that is generated in isolation, but through continuous and reciprocal interaction with the subject.

Permaculture uses these conditions to consciously and continuously evolve systems of land use and living that can sustain people through the era of energy descent.

In hunter-gatherer and low-density agricultural societies, the natural environment provided all material needs, with human effort mainly required for harvesting. In pre-industrial societies with high population densities, agricultural productivity depended on large and continuous input of human labour⁹.

Industrial society depends on large and continuous inputs of fossil fuel energy to provide its food and other goods and services. Permaculture designers use careful observation and thoughtful interaction to make more effective use of human capabilities, and reduce dependence on non-renewable energy and high technology.

Within more conservative and socially bonded agrarian communities, the ability of some individuals to stand back from, observe and interpret both traditional and modern methods of land use, is a powerful tool in evolving new and more appropriate systems.

⁹ See F. H. King, *Farmers of Forty Centuries* for a description of Chinese agriculture at the turn of the 20th century as an example of a sustainable society dependent on maximum use of human labour.

While complete change within communities is always more difficult for a host of reasons, the presence of locally evolved models, with its roots in the best of traditional and modern ecological design, is more likely to be successful than a pre-designed system introduced from outside. Further, a diversity of such local models would naturally generate innovative elements which can cross-fertilise similar innovations elsewhere.

Facilitating the generation of independent, even heretical, long-term thinking needed to design new solutions is more the focus of this principle than the adoption and replication of proven solutions. In the past it has been the academy and urban affluence that have tolerated and even supported such thinking, while traditional agrarian culture has ruthlessly suppressed it. In the final chaotic stages of post-modern affluent society the systems of authority of knowledge are less clear, and the opportunities for such independent and more systemic thinking are more diffusely spread across the social and geographic hierarchy. In this context we cannot rely on labels and demeanour as signs of authority and value when assessing any prospective design solutions. Thus at every level we must rely more and more on skills in observation and sensitive interaction to find the best path forward.

The proverb *'beauty is in the eye of the beholder'* reminds us that the process of observing influences reality, and that we must always be circumspect about absolute truths and values.



PRINCIPLE 2: CATCH AND STORE ENERGY

'Make hay while the sun shines.'

We live in a world of unprecedented wealth resulting from the harvesting of the enormous storages of fossil fuels created by the earth over billions of years. We have used some of this wealth to increase our harvest of the Earth's renewable resources to an unsustainable degree. Most of the adverse impacts of this over-harvesting will show up as available fossil fuels decline. In financial language, we have been living by consuming global capital in a reckless manner that would send any business bankrupt.

We need to learn how to save and reinvest most of the wealth that we are currently consuming or wasting, so that our children and descendants might have a reasonable life. The ethical foundation for this principle could hardly be clearer. Unfortunately, conventional notions of value, capital, investment and wealth are not useful in this task.

Inappropriate concepts of wealth have led us to ignore opportunities to capture local flows of both renewable and non-renewable forms of energy. Identifying and acting on these opportunities can provide the energy with which we can rebuild capital, as well as provide us with an "income" for our immediate needs.

Some of the sources of energy include:

- Sun, wind and runoff water flows
- Wasted resources from agricultural, industrial and commercial activities.

The most important storages of future value include:

- Fertile soil with high humus content
- Perennial vegetation systems, especially trees, yield food and other useful resources
- Water bodies and tanks
- Passive solar buildings

Designed ecological restoration is one of the most common expressions of environmental thinking in affluent countries, and is a valid element in permaculture design when it considers people as an integral part of the restored systems. Ironically, the abandonment of more marginal rural landscapes in many affluent and developing countries due to falling commodity prices, and substitution by intensive fossil fuel subsidised systems, has created "modern wildernesses" on a far larger scale than designed ecological restoration. This abandonment has some negative effects, such as the collapse of traditional water management and erosion control systems as well as an increase in wildfire, but in other places it has allowed nature to rebuild the biological capital of soil, forests and wildlife without input of non-renewable resources.

While low-cost and fossil fuel subsidised models for rebuilding natural capital are important expressions of this principle, we can also think of the collective experience, know-how and technology and software deriving from generations of industrial affluence, as a huge store of wealth which can be redeployed to help create new forms of capital appropriate for energy descent. Much of the optimism about sustainability relates to the application of technology and innovation. Permaculture strategies make use of these opportunities while maintaining a healthy scepticism based on the premise that technological innovation is often a "Trojan horse", recreating the problems in new forms. Apart from the need to discriminate in the use of technology to build new capital assets, technological innovation is itself a storage of wealth that will progressively depreciate during energy descent, albeit at a slower rate than physical assets and infrastructure.

The proverb *'make hay while the sun shines'* reminds us that we have limited time to catch and store energy before seasonal or episodic abundance dissipates.



PRINCIPLE 3: OBTAIN A YIELD

'You can't work on an empty stomach'.

The previous principle focused our attention on the need to use existing wealth to make long-term investments in natural capital. But there is no point in attempting to plant a forest for the grandchildren if we haven't got enough to eat today.

This principle reminds us that we should design any system to provide for self-reliance at all levels (including the personal), by using captured and stored energy effectively to maintain the system and capture more energy. More broadly, flexibility and creativity in finding new ways to obtain a yield will be critical in the transition from growth to descent.

Without immediate and truly useful yields, whatever we design and develop will tend to wither while elements that do generate immediate yield will proliferate. Whether we attribute it to nature, market forces or human greed, systems that most effectively obtain a yield, and use it most effectively to meet the needs of survival, tend to prevail over alternatives¹⁰.

A yield, profit, or income functions as a reward that encourages, maintains and/or replicates the system that generated the yield. In this way, successful systems spread. In systems language these rewards are called 'positive feedback loops' that amplify the original process or signal. If we are serious about sustainable design solutions, then we must be aiming for rewards that encourage success, growth and replication of those solutions.

While this may be self-evident to farmers and businesspersons, there is a consistent cross-cultural pattern where rising affluence leads to dysfunction and cosmetic environments replacing functional and productive ones. The original permaculture vision, promoted by Bill Mollison, of urban landscapes full of food and other useful plants rather than useless ornamentals, provides an antidote to this dysfunctional aspect of our culture. Even in poorer countries, the unexamined aim of the majority of development projects is to enable people to escape the need to maintain functional and productive environments, by full participation in the monetary economy where 'Obtaining a Yield' becomes a narrow and destructive process dictated by the forces of the global economy. The *nouveau riche* model of success, in which the functional and practical are banished, needs to be replaced with honest acknowledgement of sources of affluence and real measures of success. Generations of wage and salary culture in more developed countries under both capitalist and socialist models have led to an extraordinary dislocation between productive activity

¹⁰ This is a rephrasing of Lotka's Maximum Power Principle. Howard Odum has suggested the Maximum Power Principle (or at least his EMERGY-based version of it) should be recognised as the fourth Energy Law.

and the sources of our sustenance. In assisting middle class urban Australians facing the challenge of a more self-reliant rural lifestyle, I have explained that it's like becoming a businessperson. One of the fortuitous spin-offs of the largely dysfunctional and cynical "Economic Rationalism" of recent decades has been a partial revival of awareness about the need for all systems to be designed to be productive in some way.



PRINCIPLE 4: APPLY SELF-REGULATION AND ACCEPT FEEDBACK

'The sins of the fathers are visited on the children unto the seventh generation'

This principle deals with self-regulatory aspects of permaculture design that limit or discourage inappropriate growth or behaviour. With better understanding of how positive and negative feedbacks work in nature, we can design systems that are more self-regulating, thus reducing the work involved in repeated and harsh corrective management.

Feedback¹¹ is a systems concept that came into common use through electronic engineering. *Principle 3: Obtain a yield* described the feedback of energy from storages to help get more energy, an example of positive feedback. This can be thought of as an accelerator to push the system towards freely available energy. Similarly, negative feedback is the brake that prevents the system falling into holes of scarcity and instability from overuse or misuse of energy.

Self-maintaining and regulating systems might be said to be the 'Holy Grail' of permaculture: an ideal that we strive for but might never fully achieve. Much of this is achieved by application of the Integration and Diversity (Permaculture design principles 8 & 10) but it is also fostered by making each element within a system as self-reliant as is energy efficient. A system composed of self-reliant elements is more robust to disturbance. Use of tough, semi-wild and self-reproducing crop varieties and livestock breeds, instead of highly bred and dependent ones is a classic permaculture strategy that exemplifies this principle. On a larger scale, self-reliant farmers were once recognised as the basis of a strong and independent country. Today's globalised economies make for greater instability where effects cascade around the world. Rebuilding self-reliance at both the element and system level increases resilience. In the energy descent world, self-reliance will become more valued as capacity for high and continuous input declines and economies of scale and specialisation reduce.

Organisms and individuals also adapt to the negative feedback from large-scale systems of nature and community by developing self-regulation to pre-empt and avoid the harsher consequence of external negative feedback. Kangaroos and other marsupials abort the

¹¹ The return of part of an output of a circuit to the input in a way that affects its performance.

development of embryos if seasonal conditions appear unfavourable. This reduces the later stress on the population and the environment.

Traditional societies recognised that the effects of external negative feedback controls are often slow to emerge. People needed explanations and warnings, such as *the sins of the fathers are visited on the children unto the seventh generation* and *laws of karma* which operate in a world of reincarnated souls.

In modern society, we take for granted an enormous degree of dependence on large-scale, often remote, systems for provision of our needs, while expecting a huge degree of freedom in what we do without external control. In a sense, our whole society is like a teenager who wants to have it all, have it now, without consequences. Even in more traditional communities, older taboos and controls have lost much of their power, or are no longer ecologically functional due to changes in the environment, population density and technology.

The development of behaviour and culture that is more attuned to the feedback signals from nature to prevent overexploitation is one of the challenges of environmentalism. Negative feedback needs to be well targeted and strong enough to bring about corrective change, but not so strong that it damages further development of the system. For example, rainwater collection and use in a house brings awareness of limits to both yield and quality. If a wood stove flue produces a smoky taste to water, this negative feedback encourages corrective action. The common aim of designing sustainable systems with zero hazard from negative feedback is like trying to raise children without exposure to immunological and accident hazards; it leads to more serious hazards in the future. Clearly the open acceptance of hazards from negative feedback must be constrained by ethical principles and primarily applied to ourselves, families and communities (in that order), rather than externalised as is more typical through large-scale industrial economies.

The Gaia hypothesis¹² of the earth as a self-regulating system, analogous to a living organism, makes the Whole Earth a suitable image to represent this principle. Scientific evidence of the Earth's remarkable homeostasis over hundreds of millions of years highlights the Earth as the archetypical self-regulating whole system, which stimulated the evolution, and nurtures the continuity, of its constituent lifeforms and subsystems.

¹² See J. Lovelock, *Gaia: A New Look At Life*, Oxford University Press 1979.



PRINCIPLE 5: USE AND VALUE RENEWABLE RESOURCES & SERVICES

'Let nature take its course'

Renewable resources are those that are renewed and replaced by natural processes over reasonable periods, without the need for major non-renewable inputs. In the language of business, renewable resources should be seen as our sources of income, while non-renewable resources can be thought of as capital assets. Spending our capital assets for day-to-day living is unsustainable in anyone's language. Permaculture design should aim to make best use of renewable natural resources to manage and maintain yields, even if some use of non-renewable resources is needed in establishing systems.

The joke about the washing line being a solar clothes dryer is humorous because we recognise that we have been conned into using unnecessary and complex gadgets for simple tasks. While anyone would recognise line drying of clothes as miles ahead in the sustainability stakes compared to using an electric tumble drier, fewer people acknowledge wood as an environmentally appropriate fuel. All forests generate surplus low-value wood as a by-product of sustainable management which, when properly seasoned (more solar drying) can be used as a local source of heating and cooking in well designed stoves. In the same way that wood does not meet all criteria we might want from a fuel, herbal medicine might not provide a complete pharmacopeia, but we can, to a very great extent, successfully treat many ailments with locally grown and processed botanical medicines. By doing so, we avoid many adverse side effects both internal and external from centralised drug production, increase our respect for nature, and feel more confident in maintaining our own health.

Renewable services (or passive functions) are those we gain from plants, animals and living soil and water, without them being consumed. For example, when we use a tree for wood we are using a renewable resource, but when we use a tree for shade and shelter, we gain benefits from the living tree that are non-consuming and require no harvesting energy. This simple understanding is obvious and yet powerful in redesigning systems where many simple functions have become dependent on non-renewable and unsustainable resource use.

Classic permaculture designs using chickens or pigs to prepare ground for planting bypass the use of tractors and rotary hoes, as well as artificial fertiliser and pesticides. In these systems, a modicum of management and fencing allows a more sophisticated use of livestock for multiple functions.

Permaculture design should make best use of non-consuming natural services to minimise our consumptive demands on resources, and emphasise the harmonious possibilities of interaction between humans and nature. There is no more important example in history of human prosperity derived from non-consuming use of nature's services than our domestication and use of the horse and other animals for transport, soil cultivation and general power for a myriad of uses. Intimate relationships to domestic animals such as the horse also provide an empathetic context for the extension of human ethical concerns to include nature. On the other hand in cultures where livestock are still prevailing symbols of meaning and wealth, the more fundamental renewable services provided by plants and soil life need to be recognised, valued and used. In both rich and poor communities realising the value of human waste as a renewable source of fertility, made safe by the ecological service of microbes in a compost toilet, is one of the important and universal applications of this principle.

The proverb '*Let nature take its course*' reminds us of another aspect of this principle - that the pursuit of total control over nature through use of resources and technology is not only expensive, but can also lead to a spiral of intervention and degradation in biological systems and processes which already represent the best balance between productivity and diversity.



PRINCIPLE 6: PRODUCE NO WASTE

'Waste not, want not' 'A stitch in time saves nine'

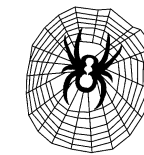
This principle brings together traditional values of frugality and care for material goods, the modern concern about pollution, and the more radical perspective that sees wastes as resources and opportunities. The earthworm is a suitable icon for this principle because it lives by consuming plant litter (wastes), which it converts into humus that improves the soil environment for itself, for soil micro-organisms, and for the plants. Thus the earthworm, like all living things, is a part of a web where the outputs of one are the inputs for another.

The industrial processes that support modern life can be characterised by an input-output model, in which the inputs are natural materials and energy, while the outputs are useful things and services. However, when we step back from this process and take a long-term view, we can see all these useful things end up as wastes (mostly in rubbish tips) and that even the most ethereal of services required the degradation of energy and resources to wastes. This model might therefore be better characterised as "consume/excrete". The view of people as simply consumers and excreters might be biological, but it is not ecological.

The proverb '*waste not, want not*' reminds us that it is easy to be wasteful when there is an abundance, but that this waste can be the cause of later hardship. This is highly relevant in a context of energy descent. The opportunities to reduce waste, and in fact live from waste, are historically unprecedented. In the past only the most destitute made a living from waste. Today we should acknowledge those who creatively reuse waste as the very essence of living lightly on the earth. Apart from household and industrial wastes, modernity has created new classes of living wastes (unwanted pest plants and animals) which proliferate in our minds as much as across the landscapes of the affluent nations.

Bill Mollison defined a pollutant as '*an output of any system component that is not being used productively by any other component of the system*'.¹³ This definition encourages us to look for ways to minimise pollution and waste through designing systems to make use of all outputs. In response to a question about plagues of snails in gardens dominated by perennials, Mollison was in the habit of replying that there was not an excess of snails but a deficiency of ducks. Similarly plagues of grass and forest trees lead to devastation by bushfire in some regions, while plagues of herbivores overgraze others. Innovative and creative ways to use these upwellings of abundance is one of the characteristics of permaculture design.

'*A stitch in time saves nine*', reminds us of the value of timely maintenance in preventing waste and work involved in major repair and restoration efforts. Although far less exciting than creative ways to use unwanted abundance, maintenance of what we already have is set to be a huge and ongoing issue in an energy descent world. All structures and systems depreciate in value and all ecological and sustainable human systems devote resources to timely maintenance.



PRINCIPLE 7: DESIGN FROM PATTERNS TO DETAILS

'Can't see the wood for the trees'

The first six principles tend to consider systems from the bottom-up perspective of elements, organisms, and individuals. The second six principles tend to emphasise the top-down perspective of the patterns and relationships that tend to emerge by system self-organisation and co-evolution. The commonality of patterns observable in nature and society allows us to not only make sense of what we see, but to use a pattern from one context and scale, to design in another. Pattern recognition is an outcome of the application of *Principle 1: Observe and interact*, and is the necessary precursor to the process of design.

¹³ B. Mollison, *Permaculture: A Designer's Manual*, Tagari 1988.

The spider on its web, with its concentric and radial design shows a clear pattern even though the details always vary. This icon evokes zone and sector site planning - the best known and perhaps most widely applied aspect of permaculture design.

Modernity has tended to scramble any systemic common sense or intuition that can order the jumble of design possibilities and options that confront us in all fields. This problem of focus on detail complexity leads to the design of white elephants that are large and impressive but do not work, or juggernauts that consume all our energy and resources while always threatening to run out of control. Complex systems that work tend to evolve from simple ones that work, so finding the appropriate pattern for that design is more important than understanding all the details of the elements in the system.

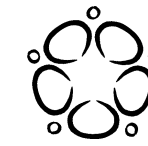
The idea which initiated permaculture was the forest as a model for agriculture. While not new, its lack of application and development across many bioregions and cultures was an opportunity to apply one of the most common ecosystem models to human landuse. Although many critiques and limitations to the forest model need to be acknowledged, it remains a powerful example of pattern thinking which continues to inform permaculture and related concepts, such as forest gardening, agroforestry and analogue forestry.

The use of zones of intensity of use around an activity centre such as a farmhouse to help in the placement of elements and subsystems is an example of working from pattern to details. Similarly environmental factors of sun, wind, flood, and fire can be arranged in sectors around the same focal point. These sectors have both a bioregional and a site specific character which the permaculture designer carries in their head to make sense of a site and help organize appropriate design elements into a workable system.

The use of swales and other earthworks to distribute and direct runoff water must be based on primary land patterns. In turn these earthworks then create moisture productivity zones that define planting and management systems.

While traditional land use systems provide many models of whole system design, people embedded in cultures of place often need experience which allows them to view their landscape and communities in new ways. In some of the pioneering Landcare projects in Australia in the 1980's, aerial over flights of their farms gave landholders both the picture and the motivation to begin serious work to address tree decline and associated land degradation problems. From the air, the patterns of land ownership were less visible, while the catchment patterns of nature stood out. Similarly the larger social and community context, rather than technical factors, can often determine whether a particular solution is a success. The list of overseas development projects that have failed due to ignorance of these larger-scale factors is extensive.

The proverb *'Can't see the wood (forest) for the trees'* reminds us that the details tend to distract our awareness of the nature of the system; the closer we get the less we are able to comprehend the larger picture.



PRINCIPLE 8: INTEGRATE RATHER THAN SEGREGATE

'Many hands make light work'

In every aspect of nature, from the internal workings of organisms to whole ecosystems, we find the connections between things are as important as the things themselves. Thus *the purpose of a functional and self-regulating design is to place elements in such a way that each serves the needs and accepts the products of other elements.*¹⁴

Our cultural bias toward focus on the complexity of details tends to ignore the complexity of relationships. We tend to opt for segregation of elements as a default design strategy for reducing relationship complexity. These solutions arise partly from our reductionist scientific method that separates elements to study them in isolation. Any consideration of how they work as parts of an integrated system is based on their nature in isolation.

This principle focuses more closely on the different types of relationships that draw elements together in more closely integrated systems, and on improved methods of designing communities of plants, animals and people to gain benefits from these relationships.

The ability of the designer to create systems that are closely integrated depends on a broad view of the range of jigsaw-like lock-and-key relationships that characterise ecological and social communities. As well as deliberate design, we need to foresee, and allow for, effective ecological and social relationships that develop from self-organisation and growth.

The icon of this principle can be seen as a top-down view of a circle of people or elements forming an integrated system. The apparently empty hole represents the abstract whole system that both arises from the organisation of the elements and also gives them form and character.

By correct placement of plants, animals, earthworks and other infrastructure it is possible to develop a higher degree of integration and self-regulation without the need for constant human input in corrective management. For example, the scratching of poultry under forage forests can be used to harvest litter to down slope garden systems by appropriate location. Herbaceous and woody weed species in animal pasture systems often contribute to soil improvement, biodiversity, medicinal and other special uses. Appropriate rotationally grazed livestock can often control these weedy species without eliminating them and their values completely.

¹⁴ B. Mollison, *Permaculture: A Designer's Manual*, Tagari 1988.

In developing an awareness of the importance of relationships in the design of self-reliant systems, two statements in permaculture literature and teaching have been central:

- Each element performs many functions.
- Each important function is supported by many elements.

The connections or relationships between elements of an integrated system can vary greatly. Some may be predatory or competitive; others are co-operative, or even symbiotic. All these types of relationships can be beneficial in building a strong integrated system or community, but permaculture strongly emphasises building mutually beneficial and symbiotic relationships. This is based on two beliefs:

- We have a cultural disposition to see and believe in predatory and competitive relationships, and discount co-operative and symbiotic relationships, in nature and culture.¹⁵
- Co-operative and symbiotic relationships will be more adaptive in a future of declining energy.

Permaculture can be seen as part of a long tradition of concepts that emphasise mutualistic and symbiotic relationships over competitive and predatory ones.

Declining energy availability will shift the general perception of these concepts from romantic idealism to practical necessity.



PRINCIPLE 9: USE SMALL AND SLOW SOLUTIONS

‘The bigger they are, the harder they fall’ ‘Slow and steady wins the race’

Systems should be designed to perform functions at the smallest scale that is practical and energy-efficient for that function. Human scale and capacity should be the yardstick for a humane, democratic and sustainable society. This principle is reasonably well understood as a result of the pioneering work of E. F. Schumacher.¹⁶ Whenever we do anything of a self-reliant nature - growing food, fixing a broken appliance, maintaining our health, we are making very powerful and effective use of this principle. Whenever we purchase from small, local businesses or contribute to local community and environmental

15 Charles Darwin's emphasis on competitive and predatory relationships in driving evolution was based on some excellent observations of wild nature, but he was also influenced by his observations of the society around him. Early industrial England was a rapidly changing society tapping new energy sources. Predatory and competitive economic relationships were overturning previous social norms and conventions. The social Darwinists used Darwin's work to explain and justify industrial capitalism and the free market. Peter Kropotkin was one of the first ecological critics of the social Darwinists. He provided extensive evidence from both nature and human history that co-operative and symbiotic relationships were at least as important as competition and predation. Kropotkin's work had a strong influence on my early thinking in developing the permaculture concept. See P. Kropotkin, *Mutual Aid*, 1902.

16 See E. F. Schumacher, *Small is Beautiful: A study of economics as if people mattered*. 1973

issues, we are also applying this principle. Despite the successes of intermediate and appropriate technology in addressing local needs in development projects, cheap energy has continued to provide a subsidy to large-scale systems in recent decades. The end of cheap energy will shift the natural economies of scale in favour of small systems, while relative differences in economies of scale between different functions will continue.

On the other hand, the idea that movement of materials, people (and other living things) should be a minor aspect of any system is a new idea to modernity. The convenience and power from increased mobility and information technology has been a “Trojan horse”, destroying community and increasing energy demands. Mobility and speed in affluent countries has become so dysfunctional that the ‘Slow Food’ and ‘Slow Cities’ movements are gaining much support. The communications and computer revolution has given new impetus to the ideas that speed is good, but again characteristic downsides are emerging such as the storms of spam which threaten the amenity of email.

Many practical examples provide a more balanced view to counter the natural attraction of both fast moving processes and large-scale systems. For instance, the fast response of crops to soluble fertilisers is often short lived. Manures, compost and natural rock minerals generally provide more sustained and balanced plant nutrition. A good result from a little fertilizer does not mean better results from more.

In forestry, fast grown trees are often short lived, while some apparently slow growing but more valuable species accelerate and even surpass the fast species in their second and third decades. A small plantation of thinned and pruned trees can yield more total value than a large plantation without management.

In animal nutrition, rapidly grown livestock fed concentrated nutrients are often subject to more disease and have a lower life expectancy than more naturally raised animals. Overstocking is one of the most widespread causes of land degradation, and yet small numbers of managed livestock are beneficial if not essential to sustainable agriculture.

In crowded cities the apparent speed and convenience of cars stalls movement and destroys amenity, while much smaller, slower, more energy efficient bicycles allow freer movement, without pollution and noise. Bicycles can also be more efficiently manufactured and assembled in smaller and more local factories than the economies of scale necessary for the automotive industry.

The proverb *‘the bigger they are, the harder they fall’* is a reminder of one of the disadvantages of size and excessive growth. While the proverb ‘slow and steady wins the race’ is one of many that encourages patience while reflecting a common truth in nature and society.



PRINCIPLE 10: USE AND VALUE DIVERSITY

'Don't put all your eggs in one basket'

The spinebill and the humming bird both have long beaks and the capacity to hover - perfect for sipping nectar from long, narrow flowers. This remarkable co-evolutionary adaptation symbolises the specialisation of form and function in nature.

The great diversity of forms, functions and interactions in nature and humanity are the source of evolved systemic complexity. The role and value of diversity in nature, culture and permaculture is itself complex, dynamic, and at times apparently contradictory. Diversity needs to be seen as a result of the balance and tension in nature between variety and possibility on the one hand, and productivity and power on the other.

It is now widely recognised that monoculture is a major cause of vulnerability to pests and diseases, and therefore of the widespread use of toxic chemicals and energy to control these. Polyculture¹⁷ is one of the most important and widely recognised applications of the use of diversity to reduce vulnerability to pests, adverse seasons and market fluctuations. Polyculture also reduces reliance on market systems, and bolsters household and community self-reliance by providing a wider range of goods and services.

However polyculture is by no means the only application of this principle.

Diversity of different cultivated systems reflects the unique nature of site, situation and cultural context. Diversity of structures, both living and built, is an important aspect of this principle, as is the diversity within species and populations, including human communities. The conservation of at least some of the great diversity of languages and cultures on the planet is arguably as important as the conservation of biodiversity. While inappropriate and destructive responses to energy descent will have knock on impacts on both human and biodiversity, in the longer-term, energy descent will slow the economic engine of diversity destruction, and stimulate new local and bioregional diversity. While many environmental and social movements only recognise prior biological and cultural diversity, permaculture is just as actively engaged in how to create new bioregional diversity from the melting pot of nature and culture we have inherited

The proverb *'don't put all your eggs in one basket'* embodies the common sense understanding that diversity provides insurance against the vagaries of nature and everyday life.

¹⁷ Polyculture is the cultivation of many plant and/or animal species and varieties within an integrated system.



PRINCIPLE 11: USE EDGES AND VALUE THE MARGINAL

'Don't think you are on the right track just because it is a well-beaten path'

The icon of the sun coming up over the horizon with a river in the foreground shows us a world composed of edges.

Tidal estuaries are a complex interface between land and sea that can be seen as a great ecological trade market between these two great domains of life. The shallow water allows penetration of sunlight for algae and plant growth, as well as providing forage areas for wading and other birds. The fresh water from catchment streams rides over the heavier saline water that pulses back and forth with the daily tides, redistributing nutrients and food for the teeming life.

Within every terrestrial ecosystem, the living soil, which may only be a few centimetres deep, is an edge or interface between non-living mineral earth and the atmosphere. For all terrestrial life, including humanity, this is the most important edge of all. Only a limited number of hardy species can thrive in shallow, compacted and poorly drained soil, which has insufficient interface. Deep, well-drained and aerated soil is like a sponge, a great interface that supports productive and healthy plant life.

Eastern spiritual traditions and martial arts regard peripheral vision as a critical sense that connects us to the world quite differently to focused vision. Whatever is the object of our attention, we need to remember that it is at the edge of anything - system or medium, that the most interesting events take place; design that sees edge as an opportunity rather than a problem is more likely to be successful and adaptable. In the process, we discard the negative connotations associated with the word "marginal" in order to see the value in elements that only peripherally contribute to a function or system.

In rural development work, the focus on staple crops, prime agricultural land and clearly articulated aims and values within communities frequently leads to undervaluing, ignorance and destruction of wild species, marginal spaces, along with the less visible needs of women, the disadvantaged and the landless. Similarly, in economic policy the focus of big business and thriving cities ignores the fact that these systems apply the fruits of past innovation, and that small business and smaller and less affluent places and systems are the sources of future innovation.

This principle works from the premise that the value and contribution of edges, and the marginal and invisible aspects of any system should not only be recognised and conserved, but that expansion of these aspects can increase system productivity and

stability. For example, increasing the edge between field and pond can increase the productivity of both. Alley farming and shelterbelt forestry can be seen as systems where increasing edge between field and forest has contributed to productivity.

The proverb *'don't think you are on the right track just because it is a well-beaten path'* reminds us that the most common, obvious and popular is not necessarily the most significant or influential.



PRINCIPLE 12: CREATIVELY USE AND RESPOND TO CHANGE

'Vision is not seeing things as they are but as they will be'

This principle has two threads: designing to make use of change in a deliberate and co-operative way, and creatively responding or adapting to large-scale system change which is beyond our control or influence. The acceleration of ecological succession within cultivated systems is the most common expression of this principle in permaculture literature and practice, and illustrates the first thread. For example, the use of fast growing nitrogen fixing trees to improve soil, and to provide shelter and shade for more valuable slow growing food trees, reflects an ecological succession process from pioneers to climax. The progressive removal of some or all of the nitrogen fixers for fodder and fuel as the tree crop system matures shows the success. The seed in the soil capable of regeneration after natural disaster or land use change (e.g. to an annual crop phase) provides the insurance to re-establish the system in the future.

These concepts have also been applied to understand how organisational and social change can be creatively encouraged. As well as using a broader range of ecological models to show how we might make use of succession, I now see this in the wider context of our use of, and response to, change.

The adoption of successful innovation in communities often follows a pattern similar to ecological succession in nature. Visionary and obsessive individuals often pioneer the solutions, but it generally requires more influential and established leaders to take up the innovation before it is widely seen as appropriate and desirable. Generational change is sometimes necessary for radical ideas to be adopted but this can be accelerated through the influence of school education on the home environment. For example, children bringing home trees they have grown in school nurseries can lead to successful establishment and care of valuable and long-lived trees, which might otherwise be neglected or eaten by livestock.

Permaculture is about the durability of natural living systems and human culture, but this durability paradoxically depends in large measure on flexibility and change. Many stories

and traditions have the theme that within the greatest stability lie the seeds of change. Science has shown us that the apparently solid and permanent is, at the cellular and atomic level, a seething mass of energy and change, similar to the descriptions in various spiritual traditions.

The butterfly, which is the transformation of a caterpillar, is a symbol for the idea of adaptive change that is uplifting rather than threatening.

While it is important to integrate this understanding of impermanence and continuous change into our daily consciousness, the apparent illusion of stability, permanence and sustainability is resolved by recognising the scale-dependent nature of change. In any particular system, the small-scale, fast, short-lived changes of the elements actually contribute to higher-order system stability. We live and design in a historical context of turnover and change in systems at multiple larger scales, and this generates a new illusion of endless change with no possibility of stability or sustainability. A contextual and systemic sense of the dynamic balance between stability and change contributes to design that is evolutionary rather than random.

The proverb *'vision is not seeing things as they are but as they will be'* emphasises that understanding change is much more than the projection of statistical trend lines. It also makes a cyclical link between this last design principle about change and the first about observation.

CONCLUSION

Sustainable development to provide for human needs, within ecological limits, requires a cultural revolution greater than any of the tumultuous changes of the last century. Permaculture design and action over the last quarter century, has shown that revolution to be complex and multi-faceted. While we continue to grapple with the lessons of past successes and failures, the emerging energy descent world will adopt many permaculture strategies and techniques as natural and obvious ways to live within ecological limits, once real wealth declines.

On the other hand, energy descent will demand real-time responses to novel situations and incremental adaption of existing inappropriate systems, as well as the best of creative innovation applied to the most ordinary and small design problems. All this needs to be done without the big budgets and kudos associated with current industrial design innovation.

Permaculture design principles can never be a substitute for relevant practical experience and technical knowledge. However, they may provide a framework for continuous generation and evaluation of the site and situation specific solutions necessary to move beyond the limited successes of sustainable development to a reunion of culture and nature.



PERMACULTURE IN JAPAN: FOREIGN IDEA OR INDIGENOUS DESIGN?

This extended essay was the distillation of my first (month long) trip to Japan in 2004. It provides an insight into Japanese expressions of permaculture and related sustainability concepts and movements for a western audience. It was “published” on our website in late 2005 along with a gallery of photos from that trip and a shorter return trip in 2005. The essay explores some themes found elsewhere in my writing; the connections between permaculture and related concepts; the function of forestry and wood as a renewable resource, high tech vs low tech solutions, preservationist and evolutionary approaches to ecology and landscape, and of course reading landscape.

See the full photo galley on line (high resolution or low resolution) at www.holmgren.com.au.

In early 2004, I accepted an invitation for a permaculture speaking tour in Japan. During the northern summer, my partner Su Dennett and I spent 4 weeks traveling (5,500km - mostly by rail), presenting the permaculture concept to a diverse range of audiences. The very good organisation and generosity of our permaculture hosts allowed us to experience traditional Japanese rural culture, as well as learn from modern sustainable solutions and networks which build on those traditions. These included Natural Farming (Japanese organics), Satoyama (Japanese Landcare), Teikei (Community Supported Agriculture) and Tsubu Tsubu food (modern cooking with the traditional food grains of millet, sorghum & buckwheat).

My impressions of the contribution of Japanese permaculture activism¹ over the last decade to a sustainable future are complex. Much of that complexity relates to that tension between the commitment to tradition and the modern tendency to emulate foreign, especially Western ideas. It appeared to me that traditions and modern sustainable design solutions developed in Japan, tend to be undervalued while the reverence for foreign ideas has sometimes led to inappropriate application of design solutions which do not suit either the natural or social environment.

Here are some of the Japanese sustainable design solutions that reflect permaculture principles and by contrast those that show difficulty in appropriately adapting foreign design solutions. Naturally what I say must be tempered with a sceptical recognition of how limited time and language (despite excellent translation) may have constrained the quality or depth of my observations.

NATURAL FARMING

Mention permaculture and Japan in the same breath and most permaculturists think of Masanobu Fukuoka and Natural Farming. The translation into English in 1979 of Fukuoka's *One Straw Revolution* had a profound influence on Bill Mollison, recorded in *Permaculture Two* published the same year. Put simply, Fukuoka had developed a system for grain cultivation which reflected the ecological design principles which we had outlined for perennial systems in *Permaculture One*.

Fukuoka's four principles of Natural Farming are: No cultivation, no fertilisers, no weeding, no pesticides. Many would view these as an *ideal* for ecological farming, something to work towards but not necessarily achieve, a kind of holy grail.

Fukuoka's work has gone on to influence ecological agriculture in western countries both through the agency of the permaculture network as well as independently. Prior to the visit I had a view of Natural Farming as developed largely by Fukuoka in the context informed by Japanese traditional agriculture, modern scientific agriculture, and the modern organic farming movements which began to emerge in the west in the 1930's. Within this

¹ The permaculture movement in Japan sprang from a Permaculture Design Course for Japanese participants taught by Bill Mollison in 1990 and the translation in 1993 into Japanese of the *Introduction to Permaculture* by Bill Mollison.



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historical perspective I saw it as a more recent branch of the tree of ecological agriculture, sprouting alongside and related (in conceptual terms) to the branch called permaculture.

Fukuoka is now 92 and unfortunately it was not possible for us to meet him during our visit but we saw other examples of Natural Farming. In Nagano prefecture while staying at Shalom Hutte guesthouse we ate food grown using Natural Farming methods which the practitioners distinguished somewhat from “Permaculture gardening” which they also practiced. But we were also taken on a tour of a nearby natural farming research station, complete with many employees, two storey office and laboratory centre where vegetable varieties suitable for Natural Farming were being bred. It was one of several such centres in Japan run by a religious organization Sekai Kyusei Kyo.

The main field trials shown to us consisted of neat long rows of crops between strips of winter grains, and other green manure crops which were cut as mulch. Although there was no deep cultivation, surface tilling was used to create seed beds and allow the plants to become established before mulching. It didn’t look like the image of natural farming conveyed by Fukuoka’s books. In another smaller trial area, seeds and fruit from vegetable varieties were scattered into weed stands, which were cut once the seed germinated. Intense competition allowed the strongest plants to dominate which were then thinned to breed varieties able to cope with competition. This looked more like Fukuoka’s methods.



Vegetable seed selection trial plots for commercial production using natural farming methods at Research centre in Nagano prefecture (green manure intercrops cut for mulch)

The literature our guides gave us (in Japanese and English) traced Natural Farming back to Mokichi Okada in the 1930’s, a pioneer thinker who’s works have not been translated to my knowledge.

So natural farming was not a branch off the tree of western ecological agriculture at all but a tree in its own right germinating in the same era (1930’s) during the industrial and imperial expansion of Japan. My analogy of western ecological agriculture being one tree is not strictly correct anyway, because Biodynamics which emerged from Steiner’s work in the 1920’s was somewhat parallel but independent of the English organic agriculture pioneers such as Sir Albert Howard and Lady Eve Balfour.

It certainly is not clear from Fukuoka’s work, or at least the English translations, that Natural Farming has a longer history than his own work, and the theory and practice are as diverse as nature or, organic farming. As far as I could tell from my limited observations at several sites described as natural farming, and what I was told about Natural Farming by our hosts and interpreters, the absence of deep cultivation does seem characteristic, but more important is the minor role of animals. Animals are integral elements of Organics, Biodynamics and Permaculture providing ecological services, and manure, and of course meat and other products.

In essence, natural farming could almost be described as vegan agriculture integrating soil, plants and humans although it was not explained in that way to me. It responds to the workload that this would demand of people (or machines) by attempting to work with natural plant/soil cycles. Rather than just looking at the theory or the practices of natural farming it is useful to understand its emergence in the ecological and cultural context of Japan, and more broadly of East Asia.. The rice and wheat-based cultures of east asia have sustainably supported some of the highest population densities in the world for many centuries. The geologically young alluvial and volcanic mineral base combined with reliable rainfall and highly evolved infrastructure for water distribution and nutrient capture and retention has created landscapes composed almost completely of high nutrient demanding human foods. Plants rather than animals provided the major source of protein. Humans rather than working animals provided the “horsepower”. Recycling of all human waste within the systems, even if not directly to food crops, was essential for fertility maintenance. These systems provided some of the historical evidence for the argument that animals were an unnecessary part of productive agriculture posed by Francis Moore Lapp in the influential book *Diet For A Small Planet*.

ANIMALS IN AGRICULTURE

In contrast to Japan, animals dominated early farming systems in Australia. Much of this can be attributed to European pastoral heritage but the paucity of the natural environment for crop growth² also reinforced the central place of grazing animals. Even today, where machines and artificial chemicals sustained by cheap fossil fuel energy have replaced working animals, livestock remain important, not just because Australians eat a lot of meat. Their role in converting fodder plants that are useless to people, providing manure

² Predominantly ancient, infertile soil, unreliable rainfall and water supply options

and natural pest control remains important, a practise and heritage which permaculture draws on in the design of systems to make better use of the ecological services.

The use of animals to control weeds and pests, while fertilising and cultivating the soil, is an agricultural example of the permaculture design principle “Integrate rather than segregate”. In the process of providing ecological services and replacing non-renewable inputs, domestic animals can be allowed to express their true nature rather than being confined in artificial and inhumane conditions. The classic example promoted in permaculture teaching is the chicken tractor in which hens are used in rotation with annual vegetable and/or grain crops to eat weeds and crop wastes and prepare ground for the next crop.



Beef cattle grazing in the Aso region, a rare site in most of Japan. (Local breed of cow specific to region)

The traditional segregation of livestock from crops in Japanese farming requires people to do the work of feeding the animals, removing wastes for composting and preparing crop fields, appearing to contradict this permaculture principle. Efforts to demonstrate the chicken tractor in Japan that I saw were at the garden scale and not well developed, even though I saw great potential for it to be used at a field scale in vegetable cropping systems. My suggestion, both in presentations and personally, of the potential to use pigs to control and manage bamboo and other invasive plants appeared a novel idea to many Japanese people including farmers used to the idea that animals live in sheds. Modern intensive livestock husbandry that has evolved from this tradition are some of the most wasteful, energy inefficient and polluting aspects of Japanese (and Western) industrial agriculture³.

³ In this regard Australian broadacre grazing systems are much more sustainable even allowing for the problems of land degradation due to less than ideal design and management of land.

Despite this history of segregation of animals from cropping in Japanese traditional and industrial agriculture, and difficulty in adopting permaculture examples of integration from Australia, the rice/duck farming system that we saw at several organic farms in Japan is one of the best examples of integration of animals with annual cropping. Unlike the chicken tractor systems which involve a sequential rotation of birds and crops, the ducklings in the rice paddies forage weeds and pests during the growth of the crop. This requires precision in the breeding and rearing of ducklings, protection from predators, supplementary feeding, and culling of mature birds for meat. Takao Furuno⁴ suggested (when we visited) that the system has not spread as far in Japan as in south east Asia and China because the Japanese don't eat much duck. I can also see that there are fewer reasons for Japanese farmers to adopt simple low tech solutions than there are for farmers in poorer Asian countries without the structure of subsidies for agriculture that Japanese farmers receive (directly or indirectly)



Aigamo ducks controlling weeds and pests and providing manure in rice paddy on organic Teikei farm in Chiba prefecture

So, is the rice-duck system of Japan an example of Japanese ecological innovation or another case of Japanese refinement of solutions developed elsewhere? My limited knowledge of the origins, variety and details of traditional use of ducks in Asian paddy rice production make it hard for me to make that judgement. In any case, the work of Furuno and others is amongst the best of Japanese “sustainable technology” exports which we could adopt in Australia to produce “permaculture rice”⁵.

⁴ See *Power of Duck* Tagari Publications

⁵ The high summer rainfall coastal river valleys of north NSW and SE Queensland are probably the ideal places where the water demands of paddy rice are more sustainable than in the traditional inland rice growing districts. In particular the decline in sugar cane growing provides the opportunity for rice growing

TSUBU-TSUBU CUISINE

With globalisation of the Japanese diet has come increased consumption of wheat flour and potatoes as staples competing with white rice which is generally understood to be the traditional staff of life in Japan. But it was not always so. In times past, a wider range of grains including the Tsubu-tsubu or small grains of millet, sorghum and buckwheat were important elements in agriculture, cuisine and nutrition. In the modern era, higher yielding rice and wheat dominated farming and the tsubu-tsubu grains became associated with peasant food. These changes along with increased sugar, dairy and meat consumption in recent decades, have seen a decline in the very healthy and balanced traditional Japanese diet with accelerating obesity and a string of other degenerative diseases. During our trip we never saw an obese older person but the problem was very noticeable in the under 20 year olds.

In English speaking countries, health food concepts have involved recognition of the value of neglected traditions (often of non-English speaking migrant cultures, including Japanese) and the design of new food combinations and habits in response to new opportunities created by modern food production and distribution. Like the West, Japan has a diversity of health food ideas and movements which have developed in reaction to modern industrialised diets. In Japan, the local traditions have provided a stronger foundation for similar responses. Macrobiotics is perhaps the best known outside of Japan⁶.

We spent our last week in Japan staying with Yumiko Otani and her family in rural Yamagata at her Ecological Lifestyle Study Centre. Yumiko has been a pioneer for nearly three decades in the revival of the cultivation and cuisine of millet and other tsubu-tsubu grains including brown rice. Through her books (16 published) of recipes as well as ideas, her restaurant and whole foods business in Tokyo, the International Life and Food Association (ILFA)⁷ and her courses, she has designed an extraordinarily diverse, largely



Tsubu-tsubu cuisine: Soba (buckwheat noodles), millet and sorghum fried dishes, wild vegetables and pickles.

6 Macrobiotics is a system of diet for health (integrated with ideas about agriculture and design) developed by George Ohsawa in the 1950's based on earlier work especially that of Sagen Ishizuka
7 See website www.ilfa.org

vegan⁸ cuisine based on these neglected grains. Her aim has been to lure Japanese, used to a modern high protein and fat diet, back to the traditional roots of Japanese culture and nutrition through creative food design.

In Australia, especially South Australia, seasonal and bioregional food design is creating new gastronomic culture by blending relevant migrant food cultures⁹ but most of this work focuses on animal protein, vegetables and fruits rather than grains. Tsubu-tsubu food is solidly grounded in traditional sustainable Japanese culture¹⁰ but involves a deep creative redesign of how to use the diverse culinary potential of these neglected grains which themselves have been the basis of many food cultures around the world. The diversity of textures and tastes from such simple ingredients was astonishing. The results were certainly very attractive to our senses and showed us ways of expanding our previously limited use of grains we already grow (buckwheat) or others that may be suited (millet).



Tsubu-tsubu cuisine: Soba (buckwheat noodles), millet and sorghum fried dishes, wild vegetables and pickles.

Helping to plant out the season's millet crop, collect wild vegetables in the mountains and in the kitchen partly fuelled by gas from a human waste methane digester provided further evidence that, in the Japanese context at least, a sustainable low energy culture without animals may be possible. I remain sceptical that sustainable low energy agriculture, nutrition and cuisine without the use and help of animals is as easy in Australia with its minerally depleted soils and erratic, unreliable seasons but Tsubu-Tsubu food is certainly relevant in decreasing Australian nutritional and culinary dependence on refined wheat flour, sugar and animal products (dairy and meat) for the sake of human and environmental health.

8 Vegan in the sense that it is based on plant foods but not Vegan in the sense that it involves any hard line moral rejection of limited use of animal products or even flesh food which is often associated with Vegan concepts in the West.
9 There are many more examples of nouvelle cuisine in Australia that are a mishmash of concentrated animal and plant proteins and out of season produce from all over the continent or globe. For those with a deeper connection to the seasons and their environment, such food is at best an occasional titillation, at worst an aesthetic abomination.
10 Especially of the inland mountain regions where there was minimal consumption of seafood except for seaweed which was very easily dried and transported from the coast.

TEIKEI (COMMUNITY SUPPORTED AGRICULTURE)

Permaculture principles can be used to critique commercial agriculture, including organic systems for their over dependence on fossil fuels, soil cultivation, annual crops and general lack of diversity, but in recent years the critique of what happens beyond the farm gate is more fundamental. Fresh food exported to the other side of the world is the most unsustainable food regardless of how it is produced¹¹. It was therefore very exciting to see how organic farming in Japan is more focused on producing a diversity of yields for local consumers through the Teikei systems. During our trip we visited several commercial organic and natural farms. In all cases the farmers have a close connection to their customers and in some, they sell a mixed box of vegetables and other produce direct to a group of regular customers or subscribers who pay in advance of each season. The customers are sometimes involved in helping with harvesting and other labour-intensive tasks on the farm. In the USA (and Australia) this is called subscription agriculture or community supported agriculture.

In Australia, interest in CSA's, box marketing and farmers markets is growing rapidly while in the USA there is over 1000 CSA's. The Americans got the idea from Japan. What struck me about the Teikei farmers we visited was their expertise in growing such a diversity of produce (40-70 varieties) and how they see that diversity as a measure of their success because the demand from customers is for as much variety (within seasonal limits) as



Rice paddy within Kyoto residential suburb with new house construction on ex food producing field.

¹¹ The concept of food miles is one of the most important measures of sustainability. Not only does it measure the massive amount of fossil energy used to transport (especially perishable) food, but is also a rough indicator of the degree of large scale control and ownership of production as well as exploitation of agricultural labour. The further the food travels the worse its total environmental record.

possible. In Australia pressure on a typical organic grower supplying central markets is the exact opposite; specialization to the point of monoculture and maximizing yield. Having seen these forces at work reducing diversity of production by producers otherwise highly committed to the permaculture principle of diversity, it was interesting to see the Teikei system driving farming towards polyculture.

During our visit I did not get a detailed explanation of Teikei. Like the community management of water for rice growing (see micro hydro story below) it appeared to be almost taken for granted, an old established idea. Its widespread influence (even domination) of the organic and natural farming scene in Japan means there is much less interest in, or importance attached to, organic certification in Japan than in Australia where most organic food is either sold through capital city markets or exported. Within the International Federation of Organic Agriculture Movement's member organizations (eg NASAA and BFA) certification of farms and produce appears to have become the purpose of their existence. Maybe Japan isn't such a large player in the international organic agriculture scene because "local food for local people" is the dominant idea rather than "serving the global marketplace". This counter flow within the organic movement is not restricted to Japan. The emergence of an Australian gastronomy in recent decades and the Slow Food¹² movement from Italy but now world wide are examples of ideas which reinforce this trend.

It was back in Australia, at a presentation by permaculture activist and CSA manager and facilitator, Robert Pekin, that I learnt that 5.5million households in Japan get their food directly from farmers. Why were the Japanese so advanced in this cutting edge aspect of sustainability? Another question I should have asked my Japanese hosts but maybe they would not have thought about this because it is just normal in Japan.

Here are some possible factors.

- The degree to which food production from vegetable fields and rice paddies were inter-threaded through the suburban and even urban landscapes was perhaps the first thing I noticed on the train from Osaka airport. Food production is very close to where people live. This encourages direct marketing while excellent transport infrastructure makes more remote areas accessible for urban consumers.
- During our visit, I was amazed and excited to see the degree to which rural self-reliant culture was alive and well. It seemed even stronger than what I had seen and known about in Italy¹³. Many urban Japanese families still have links to a home village where relatives farm on land owned by many extended family members. I got the impression that many people still get their food from their home village, even from their own land in the form of bags of rice as rent for use of the land.

¹² Founded in 1986 with 80,000 members world wide, see www.slowfood.com

¹³ Mainly from my partner Su Dennett who married into a Neopolitan family with rural roots.

- It is not only staples and vegetables which maintain links to home villages. We were exposed to the great diversity of regional and local foods and recipes, which have considerable status for affluent Japanese. If getting your food from relatives in your home village prepared by traditional methods has status rather than shame, then the incentive for other urbanites (who don't have those connections) to organize them through Teikei and similar organizations is logical.
- The very strong social and collective spirit and organisation of the Japanese probably makes the practical aspects of organizing Teikei systems an easy, even pleasurable process, while Australian's might think it's a lot of trouble compared with a visit to the supermarket any day of the week.

In the emerging and global energy descent future, food prices are likely to rise dramatically, while variety and quality of fresh food from central markets will decline. There will be an escalating need for people to get their food from local farmers and others with the skill and capacity to grow it. Despite Japan's manifold disadvantages in a low-energy future, its Teikei heritage will provide the Japanese with a head start.

SUSTAINABLE FORESTRY



*Above: Small sawmill in mountains of Kyushu with stock of Sugi posts and sawlogs
Right: Sugi logging coupe on very steep country with retained deciduous trees and slash laid on contour to prevent erosion*



Sustainable nature-based forestry around the world provides some of the best examples of permaculture principles. One of my main interests for the trip was to see Japanese forestry. For decades I had been aware that Japan had managed to maintain a balance between timber production and watershed protection in its predominantly mountain

forests. While the examples of agriculture that I saw were mostly organic and therefore alternative, the examples of forest management that I saw were more mainstream and therefore not restricted to small networks of alternative minded people.

Forests cover nearly 70% of Japan and most of that area is managed to some degree for timber production. About half is plantations of traditional conifers: Sugi, Hinoki, Larch and Pine, while most of the remainder is a complex mix of deciduous and (in the south) evergreen hardwoods as well as bamboo forest. Almost everywhere we travelled in Kyushu and Honshu, conifers, hardwoods and bamboo formed a carefully managed patchwork across the mountains on slopes that appeared to defy the possibility of access let alone logging. Management appears to be so pervasive and intensive (by Australian standards) that, during 4 weeks of travelling we saw very few old (or dead) trees other than those which mark temples, shrines and cemeteries.

In the heart of large scale timber production country in mountains behind Miyasaki, we saw cable logging of deciduous oak forest as well as softwood plantations at various ages up to 120 years old. In all cases, the size of coupes and proportion of the landscape harvested was small. Like many eucalypt forests in Australia, only a limited proportion of oak is good enough for sawlogs. While woodchips (much of it exported to Japan) is the major use of lower quality hardwoods in Australia, oak limb wood is used in very large quantities for growing shitake (the most popular Japanese mushroom) as well as charcoal, widely used as both a smokeless fuel and for water and air filtering.



Commercial shitake mushroom production using inoculated oak billets from local forests in Miyasaki

Wood, both hardwoods and softwoods, are central to Japanese traditional architecture, art and culture and the status of indigenous species for traditional uses is very high. Before visiting Japan I had the impression that only the rich could afford Sugi and other traditional timbers but the extensive and well managed forests of Japan actually supply a substantial proportion (about 2/3rds) of all wood used in Japan for durable goods and building construction. Many public building such as Onsen (bathhouses) make abundant, even extravagant use of wood. The wood from Japanese conifer plantations is very different from our Radiata pine plantations. Japanese plantations grow at moderate rates over relatively long rotations 40-120 years but produce wood which is moderate to high durability, fine grained, stable and suitable for joinery, panelling and furniture. Imported North American wood (eg Douglas Fir) which we recognise as superior to our locally grown Radiata pine is regarded as inferior to local wood in Japan.

While ecological diversity of these plantations is much less than that of Japanese deciduous forest, plantations do have much higher ecological values than conifer plantation in Australia for the following reasons;

- The long rotation reduces impact of harvesting and allows a more mature understorey and soil ecology
- The scale of plantation coupes is small, creating a patchwork of different forest ages
- The timber species are indigenous to Japan
- No apparent use of fertilisers or herbicides (or poisoning of wildlife) to establish trees.

The fact that local forests supply a large proportion of Japan's abundant use of wood for a population of 120 million while maintaining watershed and ecological values is in stark contrast to Australia where much more extensive forests yield less high quality timber for a population of only 20 million. In Japan there is 0.2ha of forest per person¹⁴ (including reserves and unharvestable areas), while in Australia there are about 8.5 ha of forest per person (including extensive woodlands, low forest and reserves which produce no timber yields). For a more realistic comparison, in Victoria there is more than 1ha per person of tall eucalypt forest (capable of some timber production, including reserves). If my impression that wood use for durable purposes in Japan is higher than in Victoria while imports are no higher than Victoria, that would make Japanese forests about 5 times more productive than Victorian forests.

Whatever the actual figures, the greater quality of Japanese timber and its widespread use in competition with imported timber was abundantly clear to me as a builder and woodworker. This productivity and quality is at least partly attributable to the labour intensive management of forests, especially in thinning and pruning but also in the care of harvesting and the diverse range of products and end uses to which wood of varying form

¹⁴ Earth Carrying Capacity Literature Reviews <http://home.alltel.net/bsundquist1/index.html>



Display house all made from local timber in Miasaki hinterland based on traditional forms combined with energy efficient design. Building design by regional planner and permaculture activist Osamu Matsushita

and quality can be directed. The diverse and highly skilled wood-using industries (from traditional crafts to high tech processing) is an important part of this equation.

It might be assumed that this combination of well paid, skilled labour, and sophisticated equipment and small scale production must only be possible because of government subsidies. As far as I could tell, forestry, unlike agriculture, appears to thrive without direct subsidies (although generous funding for rural development and infrastructure probably acts as an indirect subsidy). And my assumptions about the rarity and cost of Japanese wood were definitely wrong. In Miyasaki it was actually cheaper to build a traditional style house from local rather than from imported wood.

In Australia, after thirty years of trench warfare between environmentalists and the timber industry, maybe we could learn some lessons from the country that buys most of our woodchips. Many Australians (environmentalists and foresters included) seem to think that Japan is totally dependent on unsustainable logging from other countries because it either has no forest worth mentioning and/or they are all locked up for watershed protection. Maybe these false impressions derive from visitors who think Tokyo is Japan and those who have been to the countryside and not seen a logging coupe or recognised forest management.

While forests in Japan are intensively managed by Australian standards, it is ironic that country folk in Japan, see these same forests as in a relative state of abandonment compared with the manicured landscapes that existed when Japan was a more rural and frugal society. Today, many plantations established since WWII remain unthinned, most bamboo stands are neglected and hardwood forests have grown wild from lack of traditional coppice harvesting. Lack of labour, low wood prices, imported bamboo and wood products and substitution by plastics and other industrial products are some of the reasons for declines in forest management (in Japan, as well as other affluent countries).

SATOYAMA

This problem of landscape abandonment has been addressed by the Satoyama movement which could be described as “Japanese Landcare”. It involves people (often from the city) working in private and public forests to restore the natural and cultural values. One interpretation of the origin of the Satoyama concept is “the integrated system of rice paddy and fields with the mountain footslope forests and including the village typically nestled at the edge between cultivated and wild nature. Japanese permaculture teacher Koji Itonaga¹⁵ interprets Satoyama as a traditional expression of permaculture design.

We visited three Satoyama projects in different parts of Honshu. All involved volunteers working on private land restoring ecological and traditional productive values, mostly by cutting vegetation and in some cases by supplementary planting as well as restoration and maintenance of water management structures and rice paddies. Clearing bamboo forest from rice paddy terraces, thinning conifer plantations and patch felling oak forest to make charcoal and grow shitake mushroom might not sound like environmental restoration, to Australians, but they certainly are to the Japanese. That human management is not a part of nature is a modern environmental idea that appears to have made little impression on Japanese attitudes to their forests.



Satyoma project site near Nara recovering rice growing terraces from invading Moso bamboo and restoring coppice management in oak forest

We saw how

- in a few decades, Moso bamboo runners can destroy drystone terrace walls which have stood for 350 years, so maintaining the ancient boundary between paddy and bamboo is landcare.
- thinning conifer plantations ensures the next generation has an abundance of high quality Sugi and Hinoki essential to

15 Professor, College of Bioresource Science, Nihon University and president of Permaculture Centre of Japan. See *Permaculture In Japan: Suitable for the Natural and Cultural Conditions* of Japan by Itonaga et al in *Proceedings of the Sixth International Permaculture Conference and Convergence* PAWA 1996

maintain traditional buildings from family farmhouse to the most elaborate temple.

- the ecological diversity of wildflowers and wildlife is highest when oak forest includes a patchwork pattern of coppice regrowth and older forest.
- the revival of traditional charcoal making to use harvested bamboo and oak is the traditional use (similar to the revival of bender furniture made from hazel coppice in Britain) necessary to sustain the forest as a cultivated ecosystem.
- the harvesting of delicious bamboo shoots, growing of shitake in thinned forest glades from coppiced oak, and the collecting of wild vegetables are all a natural part of the rewards for volunteers helping to restore neglected forests and fields of rural Japan.

These examples show how Satoyama reflects an integrated understanding of people as part of nature.



Satoyama group members discussing age of Sugi tree cut as part of a thinning program to maintain timber and ecological values in private forest in Tokyo region

Landcare in Australia arose in response to land degradation due to excessive intervention (to clear land of perennial vegetation)¹⁶. However it has increasingly become characterised by vegetation removal (in high rainfall and urban areas at least) where undesired plants (weeds) have become the prime focus. While Satoyama projects might superficially look like Australian Landcare projects¹⁷ removing unwanted (weed) vegetation, the aim is always management, respect and appreciation for the abundance of nature rather than the typical attitude of Australians hoping to rid the landscape of pest plants and animals.

This raises the tricky issue of indigeneity. When questioned about whether a particular species of common tree was indigenous to Japan, permaculture activists, qualified foresters and farmers were often uncertain, even of the concept in some cases. Moso running bamboo,

one of the most pervasive elements of Japanese landscape and the economic resource base of a thousand traditional manufactures was apparently introduced from China

16 See “The Landcare Movement: Community Based Design and Action On A Scale To Match The Continent” 1995 in *David Holmgren Collected Writings 1978-2000* for my take on this history.

17 At least in high rainfall and urban landscapes where nature has been more successful in her own revegetation.

around 300 years ago, not that much longer than the arrival of many species to Australia via European colonisation. Several permie activists I spoke to were also unaware that the Black Locust (Robinia pseudoacacia) which is widespread and wild in some regions we visited, is from North America.

Maybe this lack of awareness about indigenous vs exotic is because surprisingly few plants from elsewhere seem to have naturalised in Japan. Apart from Moso and Black Locust, I saw almost no tree species in forest landscapes and few in amenity plantings that, as far as I knew, were modern migrants to Japan. Questions to foresters about whether any exotic species had been planted in plantations drew a definite no, as to whether there were forest arboretae where species had been trailed, they thought ‘maybe’ though they had never seen any. They concurred with my observation that planted Himalayan cedar trees were growing very fast but were sceptical about their potential value as a replacement for Japanese pine which has been adversely affected by disease. This conservatism about appropriate timber trees for Japan appears widespread but it has little to do with the anti-exotic attitudes which are common in Australia and other predominantly Anglo nations. Instead it seems part of a deep conservatism about land, nature and culture, which is in stark contrast to the eager adoption and refinement of technological innovation in Japan that has been so widely noted by western commentators.

Although it has its downsides from a permaculture perspective, this conservatism about land and forests has allowed Japan to maintain and increase its forest resource base during the era of cheap energy, while in Australia, we have, to a large extent, continued to degrade our own. Although the challenges of supplying the needs of 120 million people in a low energy future are serious, Japan has a head start over Australia in a sustainable forest resource base for future generations.

RENEWABLE ENERGY

Use of renewable energy and resources (in preference to non-renewable energy and resources) is a permaculture principle that many at the government, corporate, and community level also recognise. Traveling through Japan by train, we were struck by the number of houses with either solar hot water heaters and/or photovoltaic panels (presumably feeding into the national grid). While the numbers of solar hot water heaters seemed relatively normal by Australian standards, the number of photovoltaic arrays was a surprise especially given the lower sunshine levels in Japan. Despite my skepticism about the net energy yield of photovoltaic panels, the decision, by what must be hundreds of thousands of Japanese households, to become renewable energy producers in this way seemed commendable and put to shame Australians who, with abundant sunshine and green power premiums, still choose to support coal generated electricity. In reality, photovoltaics will never be a major source of energy in Japan once the era of cheap fossil fuel passes because the net energy gains are less than those achieved from spending



Photo voltaic grid feedback electric power array on rural house in Nagano prefecture

the same resources on higher yielding renewable sources such as micro-hydro power, forest biomass or even wind. Better still the same resources spent in saving energy (conservation) is the most profitable of all “new energy” sources, so called negawatts¹⁸.

I got the impression that incentives for grid feedback solar power were not particularly good. A series of possible explanations for the high incidence occurred to me; Japanese personal affluence; love of fashionable high technology; and/or environmental commitment to alternatives to the nuclear industry. The adverts on the Shinkansen¹⁹ boasting that Sanyo was the world’s largest photovoltaic producer reminded me that the profits from the solar revolution flowed back to Japanese industry. Maybe all of these factors play a part but it was only researching for this article that I discovered two important facts that underscored the importance of market forces. Electricity costs in Japan are the highest in the OECD, and three times higher than Australia. In addition to this incentive for saving energy, the Japanese government in the late 1990’s provided higher rebates on the installation of solar power than any other country including Germany.

Large wind turbines are more dramatic symbols of the renewable power revolution sweeping Europe, America and belatedly Australian, and New Zealand. While the net energy yields from wind power appear to be much better than for PV panels, this is very dependent on the consistency of the wind. Continental west coasts in the 30-40 latitudes are generally the best wind power environments. While I was told about good wind regimes in northern Japan, the wind turbines at the Kita-kyushu “Eco-town” industrial recycling site seemed more symbol than substance. Estimating wind fields is notoriously difficult but my reading of Kyushu coastal landscapes suggested on-shore winds were very mild. Trees growing right to the coast with no sign of wind pruning suggested a wonderful horticultural environment but not so good for wind farms.

18 While in Japan we were told, on more than one occasion, that the power to run all the vending machines in Japan requires more electricity than produced by one (or two!) nuclear power stations.
19 Electric powered “bullet” trains travelling at 250kph which form the main trunk rail system. This very convenient and comfortable network provides for major inter city travel over distances similar to the Australian east coast without the need for more energy demanding and inconvenient air travel.

MICRO-HYDRO

In contrast to the modest potential for sun and wind power in Japan, the untapped hydro-electric power potential of the hundreds of thousands of small rivulets, mountain streams, rice paddy channels, river drop structures and flood control dams, must be enormous. None of these uses would reduce the existing productive or environmental service uses of these water flows and in some cases they would reduce erosion of existing infrastructure. From almost the first day in the country, I found the abundance of water and the development of water management infrastructure, both traditional and modern, amazing, almost overwhelming. As we toured the countryside, the absence of any sign of micro or mini hydro power seemed strange, given the major contribution of large hydro-electric schemes to power production in Japan. Perhaps the adverse environmental impacts of large dams may have made hydro a less fashionable form of renewable energy than solar or wind. This has certainly been the case in western countries. My persistent questions in Japan drew many blank looks and, what appeared to me, some half thought through explanations. Gradually a plausible story fell into place. In the early years of the 20th century small hydro power plants were common but nationalisation of electric power generation and large scale hydro power supplying the national grid in the 1930's eliminated any alternatives. It has apparently remained difficult for autonomous, let alone grid connected micro-hydro, to get established because water is owned by the government.

River regulation structure in northern Kyushu with substantial potential for mini hydro electric power production



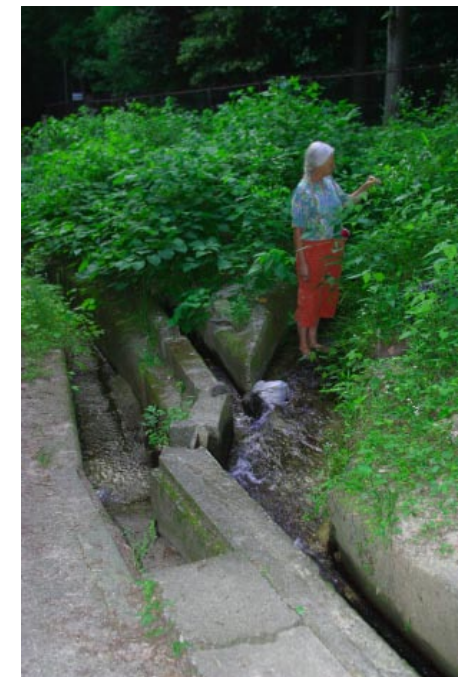
Finally my questioning paid off during a rest and recreation stay at Shalom Hutte permaculture guest house in Nagano prefecture, at the foot of the Japan Alps. With typical Japanese organisation and attention to detail, the local micro hydro and bio-diesel activist, complete with Powerpoint presentation, materialised to answer my questions and discuss the great opportunities for micro-hydro in Japan.

His NGO was running a test case for approval of a community run micro-hydro plant; a two year process as complex as that required for a major new public dam. Even if micro-hydro potential in Japan was only 20% of current hydroelectric production, that would represent

20GWhrs (about triple Australia's current hydro electric production. It would take about ten million typical rooftop domestic photovoltaic systems to generate this amount of power (at much greater financial and embodied energy cost).

I suggested to my permaculture colleagues that linking the micro-hydro potential of rural Japan to the traditional village systems of water management and distribution for rice farming was a rural development opportunity that reflected permaculture principles much better than photovoltaic panels on every house. The diversity of required turbine technology, infrastructure adaptation and stakeholder participation make these systems difficult for large corporate and government interests to plan, design, construct and manage. This same situation provides an ideal opportunity for farmers, local community organisations and small business to become significant contributors to renewable and socially sustainable power generation in Japan. The potential of micro hydro for rural electrification in many poor tropical countries is immense. Japanese industrial design and construction capacity combined with community organisation and rural development expertise could provide a model for overseas development aid.

COMMUNITY GOVERNANCE OF WATER?



Rice paddy water supply race infrastructure on outskirts of Kyoto with perennially flowing water suitable for micro hydro electric installation

I was left with more questions than I had answered about how the centuries old regulation and distribution of water to rice farming worked in today's Japan. Was the complex organisation involved invisible to the visitor because it was so deeply embedded in traditional village life and governance structures that the Japanese take for granted? It is tempting to think that the super abundance of water in Japan eliminates any difficult decisions or conflicts, but I suspect we could learn a lot from Japanese water management before we pat ourselves on the back too much about landmark agreements between Federal and State governments to sustainably manage the Murray Darling system.

Japan is an affluent country, so much so, that at times I actually felt like I came from a poor country. High wages are one of the measures of that affluence so I was surprised to see so many

examples suggesting a bias toward employment of people rather than capital, technology and resources which we take for granted in Australia as an inevitable byproduct of high wages. From workers manicuring parks and cleaning public places, to those in agriculture

pruning fruit trees or cutting grass on paddy field bunds, craftspersons and caterers who maintain labour intensive traditions in the face of factory and machine efficiency, petrol station attendants who swarm over your car attending to every possible need and service personnel in lifts and public transport, who intone information to customers; all these people apparently gainfully employed at profit to their employers. Much greater differences of this type are obvious elsewhere in Asia but very low wages relative to Australia is the easy explanation that cannot be applied to affluent Japan. Many individual explanations are also possible. Agriculture is highly subsidised, making labour intensive activities economically viable. Safety regulations prevent self-service in petrol stations, and the culture of personal service rather than self reliance bias management decisions everywhere towards employment of staff.

All of these factors and others are no doubt involved but I think the cost of energy - both transport fuel and electric power may be a big underlying driver in these differences. The difference in energy costs between countries like the USA and Australia on the one hand and Europe and Japan on the other is often recognised as a force driving energy efficiency and technological innovation in those latter countries but the general effect on the competitiveness of labour is rarely mentioned. With electric power prices triple Australia and petrol prices double ours, Japanese labour is more competitive in both traditional and modern parts of the economy than we might otherwise expect.

In Australia we see so many places and situations where the employment of manual and skilled labour could be employed with relatively little investment of capital to create a better environment and society. But so often we are told that the American solution (lower wages) is the only way to get more employment. Japan provides an example of other possibilities. Abundant high quality and cheap energy has been the historic basis for the replacement of labour with technology for hundreds of years in industrial economies. Increasing cost and declining supply of high quality energy will see a reversal of this trend. But if the habit of employment and the skills of working with pride and care have been lost, we are disadvantaged in the energy descent future. Japan appears to have maintained that work culture despite the ravages of affluence and technology, at least partly through the agency of progressive energy pricing policies.

ECOLOGICAL BUILDING

Appropriate building methods and design for energy efficiency using local and readily available natural materials are key issues in the permaculture network around the world. In Japan, the process of taking the best elements from traditional timber house construction (very good summer performance) and combining that with good insulation, thermal mass and solar gain for winter performance is an aim which ecological architects and builders have addressed. We saw some good examples but I also got the impression that the application of ecological principles to innovative building design in Japan still has a long way to go.



Recently constructed ecological office building Kitikyushu with simplified “OM Solar” roof mounted active air collector supplying thermal mass storage for heating and cooling.

In recent years, straw-bale has become popular (in ecological building networks in the USA and other countries) as a high insulation, cheap renewable material for house wall construction. While some of my most respected colleagues have been pioneers in developing straw-bale building, I have long been a straw-bale sceptic. Although I recognise it is an appropriate material in some climates and bioregions, in others it is more problematic. The problems from over enthusiastic adoption of ecological fashions are as great as those from conservative resistance to innovation. My observations of Japanese experiments in straw-bale building suggest my scepticism is particularly appropriate to restate.

The excellent insulation properties of thick straw-bale walls is well known but this potential value is only fully realised in very cold (and/or very hot) climates. Without comparable or superior roof insulation, even in very cold climates, the advantage of the very good wall insulation is substantially reduced.

The space occupied by the very thick straw-bale walls is not a serious problem in large buildings but for smaller houses and other buildings it is significant. Conventional concrete footings amplify the problem. The issue of limited space for building in Japan hardly needs emphasis.

In buildings, with a few large (or grouped) windows and doors, the material and labour costs in openings in the straw-bale are not excessive but where design requires a large number of separate windows and doors, the costs rise rapidly.

The risks of damp in straw-bale are significant even in many Australian climates but in Japan, very high rainfall and summer humidity amplify the risks.

However, the main problem with straw-bale in Japan is the apparent absence of any tradition of straw bale production in agriculture and the fact that the climate does not allow the growth, curing or harvesting of hard dry straw in high density bales necessary for durable straw-bale construction. One of the great ecological arguments for straw-bale is that it makes use of an abundant and cheap (even waste) agricultural product. The bales we saw were loose, poor quality and damp. Loose (very dry) straw can be used as an insulation material in cavity construction but this is not straw-bale construction.



*Partly constructed
“strawbale”
experimental
building at
Permaculture Centre
Japan garden site*

Permaculture design requires that we study and understand the sustainable traditions of the local region, recognise the limits or weaknesses in those traditions for current conditions, identify solutions from traditions in similar climates as well as the special opportunities to reduce and recycle wastes created by affluent, high-energy society.

After nearly three weeks of enjoying sleeping in traditional houses on a thin futon over tatami²⁰ I saw a truck loaded with old tatami, (probably headed for the district incinerator) and immediately realised a permaculture solution to insulating Japanese houses. How many slightly worn and soiled tatami are disposed of in Japan each year? The mind boggles thinking about all those mats being burnt that would make perfectly good insulation panels.

I wasn't in Japan for long enough to find out about tatami recycling and insulation ratings but I am sure that some innovative designer has already developed the tatami wall insulation system. But of course I couldn't stop myself mentally designing a walling system for weather protection, insulation and thermal mass based on traditional methods we had seen throughout rural Japan. Here are the results of my musings.

²⁰ The floor covering in a traditional house. It is a medium density straw board with woven covering manufactured in standard sizes which act as modules to define the size of rooms.



*Tatami floor mats
sample cross
section typical of
those widely used in
Japan with recycling
potential as wall
insulation*

The traditional post and beam construction could be set to the standard tatami module with an external wall cladding of timber vertical boards over a sarking. Horizontal bamboo spacers could be used to separate either 1 or 2 “retired tatami” insulation panels from the cladding and the lining. Further horizontal bamboo strips provide keying for an inside rendered earth/straw or lime mixture up to 50 mm thick and flush with the timber frame. This traditional (exterior) lathe and plaster (or wattle & daub) system would provide the thermal mass necessary to store some of the heat from appropriately sited, south facing windows. In less wet areas or under large eaves, good quality earth render over bamboo lath and plaster could be used as the exterior wall surface instead of timber.

RURAL RESETTLEMENT AND ECO-VILLAGES

Eco-villages and co-housing projects have been some of the most prominent application of permaculture design around the world. In the Japanese permaculture network, interest in eco-villages is strong and many of the Japanese permies we met had been to Crystal Waters eco-village in Queensland. On my third day in Japan, I was asked my opinion of the potential of a large, mostly forested site in Amakusa for an eco-village²¹. I naturally felt uneasy about assessing the biophysical potential of the site without any knowledge of the land use planning, social and other contexts for eco-villages in Japan.

Current and recent eco-village projects, especially in English-speaking countries, have developed in a context of many attempts at forming intentional communities since the 1970's. Most have been on rural “green-fields” sites but in some cases, including Crystal Waters, eco-villages have evolved directly from those previous communities. These efforts at planned rural resettlement are part of a much larger and sustained “back to the land” movement which has been very strong in countries such as Australia, New Zealand, Canada and the US, where access to cheap land has allowed (mostly young) people to use savings from work or modest inheritance to become independent land owners.

²¹ A campaign by environmentalists had stopped a proposed golf course and a unfinished and bankrupt development project had left the local government open to proposals from the community.

Organic farmer and environmental activist Shun Nakai overlooking potential eco-village site in Amaksa, Kyushu saved from golf course development



In Australia this availability of cheap land, combined with access to social welfare, has (until recently) made single family property development rather than communities, the norm of Australian rural resettlement. The great open spaces of Australia, with its distributed farm settlement pattern has also allowed new rural settlers to experiment with land use, building and lifestyle without adversely affecting, or being constrained by the norms of the local community. On the other hand, very few new settlers become successful farmers and many give up growing their own food. The marginal and unproductive nature of the land, combined with savage economic conditions for agriculture, including no government support, low prices and poor access to markets are some of the reasons. Much of the rural resettlement in Australia has created a type of super dispersed version of suburban life totally dependent on the motor car and outside income.

Intentional communities on the other hand have promised economies of scale in development of infrastructure and land use but (until recently at least) the lack of flexible land ownership structures and the challenges of cooperation and compromise, even with philosophically aligned co-owners has been difficult, if not overwhelming. Despite these problems more people are interested in eco-villages than ever before. Part of the interest in new eco-villages is due to more flexible ownership structures, realistic governance rules and better designed infrastructure. It is also true that land prices and stricter planning controls are making individual property development more difficult than ever before. Thirty years of collective experience has also made prospective rural settlers more realistic about how hard it is to build a house, develop a property, grow your own food all by yourself (or with a partner and young children). That collective experience has also exposed the problems for families with older children on isolated rural properties.

The situation in rural Japan for prospective new settlers is different in almost every respect. Rural-urban migration has left many of Japan's 140,000 villages with few, mostly aged residents. Given the extraordinary longevity and vitality of the elderly in rural

Japan, it is not unusual to see villages where farming, forestry, landscape and building maintenance is all done by people over 70²².

Excellent sealed roads, power, telephone and postal services are available in all but the most remote and rugged mountain settlement. Central government funding of rural infrastructure, agriculture and community facilities provide an extraordinary high standard of living in the villages but this has not been enough to stop the drift to the city. Current government policies to reduce support for agriculture and increase average farm size from an incredibly small 1.5ha to 20ha over the next decade threaten to accelerate the depopulation of rural Japan. From an Australian perspective, rural Japan offers a sense of space missing in the city (especially in larger traditional farm houses), close connection (often within 100 metres) to wild mountain forests and streams of stunning beauty, unimaginable soil fertility and abundance of water, combined with a level of transport, communication and community facilities that rural Australians can only dream of.



Elderly farmer heading to work (with brush cutter in trailer) along bitumen sealed access tracks between rice paddies.

So why isn't there a vibrant back to the land movement in Japan? Many reasons come to mind.

- the cost of land is definitely a factor but from what I could see the greatest factor is the difficulty in buying land at all. There appear to be no real estate agents in villages and even small towns. Ownership of land is typically fragmented and vested in extended family members, many of whom may live in the city.

²² In one remote village we were introduced to an 86 year old woman, the last remaining resident, who still works about a hectare, (with regular visits and presumably help from her son). She produces the vegetables for her family in town but her primary reason for holding on is that if she goes, the village is dead.

- these city dwellers may get a significant part of their food supply (including rice) as rent, directly from relatives who farm the family land. In addition to the economic and food security value of this connection, access to special local and wild foods with very high cultural status is often through ownership of land. Conservative values and culture, in which decisions rest with the older generation, respect for the ancestors (ever-present in the family or village cemetery) combine with a deep cultural intelligence which understands (at some level) that after the frenzy of fossil fuelled affluence has passed, the land, both rice paddy and mountain forest, will again be the source of enduring wealth.
- for those who might manage the change from city to rural life and ownership, the opportunities for independent action are heavily constrained. However it is not so much bureaucracy and regulation (as I imagined) that impedes rural resettlement. For example, planning controls on effluent disposal seem much more flexible in densely settled Japan than rural Australia. Maybe the tightly clustered pattern of villages and fragmented pattern of paddy ownership demands a much closer cooperation between landholders in both village living and land use decisions. While this is commendable it restricts innovation and experimentation far more than the distributed farm structure of rural Australia.
- the numbers of urbanites interested in the shift to the country may have been small because the pull of the city has been very strong, until recently. The explosive growth of urban affluence after the devastation of the Second World War made urban life so attractive to relative rural poverty. The common confidence about Japanese technological and economic achievement overwhelmed doubts about sustainability that characterised the western return to the land.
- lastly the rugged individualism required to swim against the social tide may have been more difficult given the Japanese tendency to collective thinking and action.

While rural resettlement in Australia is not well documented or understood, perhaps the process in Japan is even more unacknowledged, subtle and almost invisible. For those with family and land ownership ties to the country, the conservative nature of village life probably suppresses interest in returning to the land. Nevertheless, the minority of young people who do return to their home villages after education, travel and residence in the city or abroad may bring with them ideas and values from elsewhere including a post-modern respect for many aspects of traditional life. We stayed with folk who had made that transition. The opportunity to buy (through family connections) a 400 year old farm house, a livelihood from organic farming and home-based, globally connected work and the old folks, relatives and ancestors all close by, were all elements in their success.



Cemetery behind houses on land owned by the same families for centuries in Aso region Kyushu. A common sight throughout Japan

Young urbanites without connections wanting to return to the land often rent run down houses and (typically separated) small fields for growing vegetables and maybe a rice paddy that has been neglected. Large numbers of older and affluent Japanese are also making the reconnection to nature and traditional culture through rural tourism, craft classes and other activities after a lifetime of city work. A more limited number, disillusioned with mainstream values and society, are moving to rural areas, in part to escape the consumer madness of their peers and children.

So how else can permaculture design thinking and activism facilitate an acceleration in rural resettlement and what role might eco-villages play in that process?

The large numbers of young Japanese who have travelled and experienced Western efforts at sustainable living through WWOOFing, permaculture courses and similar experiences, provide a pool of people more likely to recognise the extraordinary value of the still living sustainable culture of village Japan. It seems likely that this contribution to rural resettlement in Japan will continue and maybe increase so long as air travel is cheap. Australian permaculture education centres and eco-villages in Queensland, and to a lesser extent other states, are already involved and there is opportunity to expand to, range of options especially in cool climate southern Australia. What is needed is a diversity of options from the “toe in the water” eco-tourist experience to the serious internships which allow genuine exchange so we can be sure that visitors are gaining worthwhile experience and that we can learn from Japanese people especially those with rural and traditional knowledge.

The rarity of large contiguous parcels of land, which have low intensity land use (pasture or forest) and are even remotely suitable for Australian style eco-village development, is striking for a Australian permaculture designer. The site I looked at in Amakusa seemed to be a relatively uncommon example. By Australian standards, this site was not remote and had good access to services but it might still be hard to attract substantial



Koji Itonga Regional planner, professor at Nihon University and president of Permaculture Centre of Japan

numbers of people to a site so distant from centres of employment and with no immediate infrastructure for farming. It seems likely that “green-fields” eco -villages will inevitably come to Japan in some form and it is possible that the Japanese tendency to favour the group identity and values over that of the individual may lead to greater success in co-operative decision making and action than has been the case in Western eco-villages. Maybe another case of success through refining and improving on a foreign idea.

While in Japan I was impressed by the examples I saw of rural community and economic development influenced by permaculture thinking and supported by government and academia. In particular the work of permaculture activists Osamu Matsushita in Kyushu²³ and Koji Itonaga at Nihon University²⁴ demonstrated many aspects of ecological thinking that

reinforced local traditional systems and values. Such projects can contribute to a dialogue between conservative rural folk and predominately urban permaculture activists that builds trust, mutual respect and exchange. They may also provide “a foot in the door” so to speak for permaculture activists to find employment in rural areas and therefore the feasibility of living, locally and lay the groundwork for re-invigoration of existing villages by co-ordinated in-migration of groups of new settlers.

Satoyama projects linking city people to land owners with neglected land in need of restoration is one obvious model for learning relevant skills and social connection with landholders which could grow towards some closer integration. Similarly Teikei systems offer the potential for close links and relationships between established organic farmers and prospective new settlers taking up opportunities to become farmers on rented land in the same locality.

Rural development projects, Satoyama groups and Teikei systems, all have potential to act as “carrots” to open local communities to innovative solutions from outside. At the same time, the reality of abandonment of houses, and rice paddies to advancing Moso and Kudzu may act as “sticks” driving local communities to accept and encourage any

²³ Two examples:

- a display home bringing together traditional wood craft, modern manufacturing & with convenient and energy efficient design to support the local timber industry.
- a botanical garden of traditional medicinal plants as an eco-tourist project.

²⁴ Two examples:

- a rural local currency system called Rivers sponsored by the local government.
- a charcoal making kiln to produce a traditional and valued product using wood from Satoyama projects managing coppice oak forest

newcomers. If reduction in central government funding for agriculture and infrastructure eventuate, then the opportunities for newcomers should grow.

A co-operative or similar organisation formed by prospective rural settlers could search for and identify villages with the right mix of land use, ownership structure, housing stock and social profile. Some of the primary filtering could be done systematically using public data bases and geographic information systems but the real work to achieve significant rural resettlement will come from a more organic process of developing trust between people

Once new settlers are established as residents in a village, opportunities to become house and land owners may emerge. One model from overseas which might be relevant to formalising a beneficial exchange between older village residents and young newcomers comes from Austria. Carers looking after aging owners in their homes for the rest of their lives gain eventual title to the home after the owners pass away. A legal contract specifies rights and responsibilities of both parties.

My aim in floating these ideas in another version of this article was to stimulate discussion within the Japanese permaculture network about creative strategies to tap these emergent opportunities for renewal of village life and culture by allowing young people from the city to gain a stake in a sustainable future.

The rapid emergence of the energy descent future will demand models for substantial and rapid ruralisation of Japanese society and economy. Flexible models allowing for organic evolution such as I am suggesting may have a much better chance of working than the formal planning, design and development of eco-villages on green-fields sites. For the permaculture network in Australia with its strong connections to the three decades-old rural resettlement movement, they may give food for thought about how we might grasp the opportunities of the energy descent future.

The existing village model of rural resettlement also has some relevance to Australia where land prices are restricting access to land in locations close to cities, the coast and other desirable cosmopolitan rural growth areas. This is not a new idea. In 1979 when Bill Mollison and a group of permaculture inspired prospective rural settlers formed the Tagari community, they bought houses in the small Tasmania port village of Stanley and secured access to farm land within walking distance of the houses. For various reasons the community broke up after a few years but the idea of beginning a community within the bounds of an existing traditional community using existing housing stock rather than pioneering on “green fields” sites still has merit.

Similarly the idea of developing relationships between existing rural land owners and non-owning newcomers has application in Australia. Many older rural settlers are wondering how they can stay on the land or at least in their community while young people are wondering how they will ever get secure access to land. WW00Fing has acted like a “toe in the water” for Australian individualists to experiment with how they might share land and resources for mutual benefit.

CONCLUSION

While cultural contact between Australia and Japan has been strongly based in the world of trade and business for many decades, as well as academia and popular culture in more recent times, the permaculture movement is generating a cultural exchange at a new level which promises to help inform and stimulate the further development of ecologically robust and socially flexible solutions in both countries during the era of energy descent.

Apart from the Japanese innovations such as Teikei, Satoyama, Natural farming, Rice-duck farming and Tsubu Tsubu food that I have discussed, or its whole forestry and timber industry, there are more general aspects of Japanese culture from which we Australians could learn. The view of people as part of nature rather than apart from nature which is better understood and expressed in Japan is an important lesson for Australians. The reality of older people leading healthy productive lives within extended families and local communities is a badly needed example in Australia. Perhaps most fundamentally the Japanese can show us that co-operation with one another is possible. If we can learn that lesson then we may be better placed to take advantage of the wonderful opportunities in a continent with only 20 million people and avoid totally fragmented lives beholden to media illusions and corporate agendas.

David Holmgren August 2004



BOOK REVIEW OF “INVASION BIOLOGY: CRITIQUE OF A PSEUDOSCIENCE”

AUTHOR DAVID I. THEODOROPOULOS
AVVAR BOOKS 2003
SOFT COVER 236 PAGES US \$14.50

This extended book review was first published in the Permaculture Activist magazine no54, 2004/05 and followed an earlier review and discussion in the pages of the magazine. Apart from my clear endorsement of this book as essential reading for anyone seriously interested in understanding the value of naturalised plants and animals, this review provides a broader insight into my views, in the absence of my own promised book on the subject.



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For nearly thirty years (all of my adult life), I have watched the increasingly negative view of naturalised plant and animal species take over environmental discourse, policy and action. Some of that negative view has been focused on the permaculture concept and its practitioners for eclectic use of hardy plant species. As early as 1978 a few indigenous revegetation activists were publicly criticising permaculture as a serious threat to the natural environment. At the time I found this situation reminiscent of sectarian splits between the various communist groups of my parents' era and refused to entertain the silly idea that permaculture was inimical to indigenous biodiversity conservation.

Over the next two decades the influence of the permaculture concept and movement has grown to the extent that it is defined in the Macquarie dictionary and has spread to over 100 countries. However, over the same time, the status of indigenous revegetation and the concurrent war on so-called “environmental weeds” has gone from fringe idea to environmental orthodoxy and government policy.

In the last decade I have been reluctantly drawn into an (inevitably negative) critique of this orthodoxy and the science which lies behind it. In the process I have continued to research and study the evidence for the more positive view of naturalised plants and animals as a foundation for co-evolved systems able to provide both ecosystem services and renewable resources in a low energy future.

Inevitably the discussion and response to my recent book *Permaculture: Principles and Pathways Beyond Sustainability* has found me increasingly embroiled in this debate partly because of the apparent scarcity of cogent ecological critiques of this orthodoxy outside the permaculture movement. So it was with some excitement that I received a review copy of *Invasion Biology: Critique of A Pseudoscience* by David Theodoropoulos.

Theodoropoulos attempts a very large project in this book. He reviews a great number of scientific papers from the rapidly growing field of invasion biology, provides a psycho-social analysis of the rise of nativist ideology in recent decades and lays out an alternative framework for global biodiversity conservation within a broad environmental sustainability agenda. The author puts a very strong case that Invasion biology is a pseudoscience and that nativist ideology is a danger to environmental thinking and society at large as well as a direct threat to biodiversity conservation.

The evidence provided of beneficial effects of naturalised plants and animals, is drawn from the author's own observations and a significant number of peer reviewed scientific papers supporting his case. However he makes even greater reference to scientific papers and reports, which draw conclusions of great and varied harm from human spread of plants animals and microorganisms. In other words, Theodoropoulos uses evidence from the Invasive biology literature to support his own conclusions.

In my more limited reading of both scientific papers and more popular presentations of the nativist ideology, I have been struck by how much of the evidence that is typically used to

describe ecological harm, can in fact be equally interpreted to indicate ecological benefits. For example after reading Tim Low's polemical attacks on naturalising exotic species in Australia (*Feral Future*) and the movement of Australian species beyond their pre-European ranges (*The New Nature*), my reaction was that Tim Low had collected together a wonderful and diverse range of examples to support the ecosynthesis hypothesis¹ for which I was very grateful even though I rejected most of his conclusions.

While Theodoropoulos' discussion and references are naturally focused on plants (his prime area of expertise and interest) he does consider many important cases of naturalised animals, micro-organisms and marine life forms. Similarly the American focus is complemented by many examples from across the globe including Australia.

I would have loved to hear more about some of the examples of ecosynthesis, which Theodoropoulos identifies (although he doesn't use that term). He does enlarge somewhat with a few case studies such as the ecological role and reaction to *Eucalyptus* (presumably *E. globulus*) in California. It is interesting that the prime evidence cited for the role of eucalypts in supporting colonies of the apparently iconic Monarch butterfly comes, not from some eucalypt enthusiast, but a Monarch enthusiast (Marriott, D 1997 *Where to see the Monarchs in California* **Monarch News** p 6-9). Similarly, as Tim Low acknowledges in *The New Nature*, all the bird watchers know that sewerage effluent treatment ponds in Australia are some of the best places to see rare and diverse water bird populations including threatened migratory species.

Theodoropoulos's discussion of the demonisation and widespread destruction of *Eucalyptus* stands after the disastrous Californian fires of 1991 reminded me of similar attitudes to pines (from California) in Australia. However his argument that eucalypts may have helped rather than hindered in the bush fires is not all that convincing (at least for Australian bushfire aware readers) because, in our experience, oaks including Californian species are reasonable fire retardants while eucalypts in general (and *E. globulus* in particular) are among the most combustible of trees in both indigenous and naturalised stands. I have previously heard the argument that fire prone litter accumulation under stands of *E. globulus* in California is much greater than in Australia because of a lack of soil microorganisms adapted to breaking down toxic *Eucalyptus* oil and phenols. This led me to speculate that a more complete eucalyptus symbiotic micro ecology would solve this problem and assist a wider range of native understorey species to thrive. The author's observations and cited references suggest (to me) that maybe the beneficial soil microbes native or exotic are already doing the job. The evidence that "understorey cover and abundance was correlated with moisture availability not tree density" accords with my own refutation of the commonly stated view that nothing grows under pine trees in Australia.

¹ that "weedsclapes" of colonising indigenous, Australian and exotic plants and animals represent new ecosystems that will establish self replicating dynamic stability over remarkably short periods of time

This and other case studies in the book provide an insight into the huge field of ecological research waiting to be done on the symbiotic and beneficial interactions between indigenous and naturalised species. While I would have liked more case study information, the author would no doubt have been criticised for being selective in his choice of evidence if he had focused on case studies about which there was detailed research and evidence.

In part 2 of the book, the author shows how the demonising of naturalised plants and animals has striking similarities to the methods used by racist, xenophobic and fascist groups to demonise other people. Further he refers to historical evidence that "cleansing the homeland of foreign plants" was an element of the Nazi domestic propaganda and program. While I and many others who dare to point out the benefits of naturalised plants and animals have certainly felt the wrath of believers of the nativist orthodoxy, I remain cautious about Theodoropoulos' claim that recognised sociological methods prove that nativism is part of the same pathology as these more universally condemned ideologies. Cautious perhaps because I know nothing of this field of study and am somewhat sceptical that any taxonomy can be used to classify psycho-social phenomena with much certainty. But I certainly support his suggestion that sociologists and psychologists (without strong emotional connection to either perspective) should study the Invasion biology literature and the behaviour of its followers. To indulge in a biological metaphor, maybe we can hope that nativism is a sign of how xenophobia is being transformed into less pernicious forms prior to its final extinction from the human psyche rather the beginning of a new virulent strain.

Theodoropoulos notes the fact that nativist ideology has its strongest hold in the USA, Australia, New Zealand and South Africa, all countries where there is huge guilt in the dominant white culture about dispossession of indigenous peoples.

I remain doubtful that Theodoropoulos successfully proves Invasion biology is a pseudoscience, simply because I can see how the same methods can be and are frequently used to discredit many ideas outside of the scientific mainstream which may nevertheless contain some value and truth. However I think it is clear that if scientists outside of Invasion biology were to look closely at the literature they may be shocked by the lack of scientific rigor and definitions, circular reasoning and emotion laden conclusions. Theodoropoulos' strong polemical style is reasonable in a book of this nature but at times it does tend to undermine his criticism of inappropriate emotive language in the Invasion biology literature.

Although the author acknowledges the very serious impact of nativism on the development of sustainable resources to provide for human needs, his prime focus and passion is global biodiversity conservation for its own sake. Theodoropoulos points out how land management informed by Invasion biology is now destroying threatened and endangered species which naturalise outside their original range. In this way Invasion biology has become a real threat to biodiversity conservation.

In the third part of the book Theodoropoulos goes beyond pointing out the contradictions to suggest an alternative framework for biodiversity conservation. He gives evidence that spreading plants and, to some extent animals, are actually ways to conserve global biodiversity in a world of climate change and other human impacts. I believe the case Theodoropoulos presents is interesting and has at least as much validity as the orthodox notion that we corral indigenous species in their “original” habitat. However, the fact that the framework is almost a mirror opposite of the orthodox approach to conservation feels a little too simple. This alternative framework is the least well supported part of the book but this may reflect that *Invasion Biology: Critique of A Pseudoscience* is really three books in one, a huge effort to fill the vacuum of cogent ecological arguments in favour of human caused spread of plants and animals.

For many years I have felt the need to articulate a strong positive view of naturalised plants and animals to counter the extremes of nativism. Without an articulation of this case, a real debate about the best biodiversity conservation strategies is not possible. Theodoropoulos has done a great service to the conservation debate by providing a counter case to challenge the manifold errors being perpetrated on environmental thinking and action by Invasion biology. Any shortcomings of this book probably reflect the author’s understanding of the urgent need for a real debate. In a rapidly changing world all ideas are works in progress, in need of constant review, addition and update. It will be interesting to see over the next few years, if as a result of this book, there is an increase in the trickle of research papers published in peer reviewed journals of ecology and conservation biology which do reflect a more positive view of naturalised plants and animals. It will be even more interesting if this triggers a full blown debate leading to a paradigm shift or if the orthodoxy of Invasion biology prevails without much more than murmurings in the official scientific ranks.

In my own discussion and teaching about this subject, I have already been recommending this book as essential reading for anyone seriously interested in biodiversity conservation as an integral part of the permaculture agenda.

David Holmgren
Hepburn, Victoria, Australia
August 2004



ACCREDITED PERMACULTURE TRAINING: A CRITIQUE

This article was a contribution to discussions between permaculture teachers about the then recently established Accredited Permaculture Training (APT) by Permaculture International Limited (PIL). This “industry training package” was developed by permaculture teachers and accredited by the Australian government, allowing students undergoing training to be eligible for government support. This system has continued to grow slowly as more established teachers become accredited. There has yet to be a radical revision of the system along the lines suggested in this article.

This article outlines my understanding of APT as it currently exists and suggests how it might be improved to better reflect permaculture concepts and principles. A decade ago I participated in the debate within permaculture networks about the future of permaculture education. In an extended article *Permaculture Movement and Education: Searching For Ways Forward* (Article 14) I outlined my position which included doubts that formal accreditation of permaculture education and practise was a good idea. Many of the ideas in that article are still very relevant to the current discussions but by 2002 I was persuaded to support moves towards accreditation for the following reasons:

- The competency-based national training system which had been put in place since 1996 offered significant advantages over previous state-based systems of technical education and the University systems. The advantage of combining knowledge with practice fits well with PC’s applied approach, compared to University’s research approach.¹
- The work towards accreditation was gaining support from a broader range of experienced permaculture teachers suggesting the possibility of a more collective approach.
- PIL’s initiative to accredit PC would prevent one of the state TAFE systems from “owning” accredited permaculture training. PIL’s ownership would allow people who had dedicated their working lives to permaculture education to secure their livelihood.
- The apparent ability of Hortus Australia to sensitively steer the process. The fact that APT exists and is owned and controlled by the Permaculture International Limited (PIL), the most representative organization of the wider Australian permaculture network, is a credit to Robyn Francis, Guy Rischmueller (from Hortus Australia) and the team of experienced permaculture teachers from several states who put the package together.

I had some indirect input, mostly via Ian Lillington, but feel that my ideas where not expressed in the final package perhaps as a result of limited time and resources for the consultation process.

I have not done the COW and CALF training course which is necessary for experienced teachers to become accredited trainers based on their prior experience. However, I have attended workshops run on APT and discussed the issue with many of the best informed players and advocates as well as critics and sceptics of accredited training in general, as well as this particular package.

¹ Many concerns remained for me about disadvantages and problems with the national system, especially whether P/c was big enough to be a part of this big system; and was CBT flexible enough to reflect permaculture as an agent for social change, or was it just workplace training that placed people in mainstream roles; and with rapidly emerging skills in the eclectic world of permaculture, is it ever possible to say that someone is competent in permaculture?



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The fact that Robin Clayfield's work has been adapted to provide the basis of the CALF is a very positive sign of the APT process contributing to recognition of the influence of Robin's work on permaculture education. It is also the perfect antidote to the stultifying 'bureau-speak' of the COW necessary to satisfy the system gatekeepers that we are complying.

My perspective on APT doesn't come from close up study of all the documentation or detailed knowledge of the government systems but more a macro permaculture design view (from patterns rather than details).

The current package appears to be:

- too strongly centred on horticulture and is weaker in the many other streams or domains of permaculture design and action.
- most of the non horticultural units and competencies are loaded into the upper certificate levels (4 & 5)
- competencies involving physical work are mostly confined to the lower levels (1-3) while designing, managing and communicating are concentrated in the upper levels.

I accept that by this package being not so different from horticulture and other existing approved packages in basic structure, it has been accepted by the bureaucratic gatekeepers but now that it exists we should use the requirement for regular reviews and changes to make it better reflect the best in permaculture education.

Without some very substantial changes there is a risk that APT will, over time, lose a lot of the best qualities in permaculture education. It will still be possible for permaculture teachers to run non-accredited PDCs unconstrained by this framework but subsidies and formal recognition of APT will be powerful economic forces leading to the displacement of these courses from the market place in all but the most exceptional cases.

Whether there is the will, resources and leeway to modify the package to the extent I believe is necessary remains to be seen.

Of course, APT is not a permaculture curriculum, something which people are slow to grasp, but a fact which I think is an advantage. Existing teachers can use their own established methods, local context and resources to teach in whatever way they see fit, but their students will be assessed by a common set of standards for each competency. Past attempts by educational institutions to writing curriculum materials which literally teach competencies step by step were mostly disastrous failures which we should avoid at all costs in implementing APT. While assessment of student competencies will inevitably lead to evaluation of the success of different teachers, their methods and formats in an organic way, the idea inherited from the original PDC concept that we must have a universal curriculum is at best unnecessary and potentially disastrous when linked to APT.

This shift from the unassessed participation of the PDC to the competency framework of APT results in rigid codification of competency, ignoring bioregional and cultural context. For APT we need to accept the reality that if a person can show competency then it doesn't matter what material or method the teacher/facilitator used to help them get there. On the other hand it is important that assessors are bioregionally and culturally literate of the context within which students are working so that we do not perpetuate the trap in mainstream culture and education that there are universal solutions which can be equally applied everywhere (the 'monoculture of mind').

Another issue is that the framework may work well to transform and adapt current PDC education into Cert 4 in APT, but that over time if the system is successful, there will be increasing demand for Cert 1-3 in schools, for WWOOFers etc. In fact I see the potential opportunities for permaculture training as basic life skills education as massive. If energy peak precipitates even half its potential effects we may see a scramble by governments and community organisations to implement self reliance training. APT is the perfect vehicle for this process. Once the primary and critical task of accrediting currently established permaculture teachers is achieved, ensuring the lower levels of the package effectively feed into the higher levels will be the next task.

In the current package it is possible to see the stepping stones from how to plant a tree to how to design an agroforestry system but it is not so clear that the steps which lead to building design or community design are present at all.

I suggest the following framework could address these issues:

Decide on a set of streams or domains which cover the whole gamut of permaculture action and solutions. This is not easy because permaculture has progressively evolved from a primarily land-based design system towards whole of society redesign. One option would be to use the seven domains of the permaculture flower² as streams within which competencies would be placed.

A simpler and less radical change from the current structure would be three broader domains:

- Nature (from the garden to the wilderness)
- Built environment and technology
- People and community (including invisible structures)

It would then be possible to work backwards from some complex competencies like designing a building or even a community to the lower levels. Some illustrative examples could be:

Cert 1 units in built environment might be concerned with very basic understanding and abilities in day to day management of buildings for seasonal comfort, opening and closing blinds, windows etc, how to use a wood heater etc.

² Land & Nature Stewardship, Buildings, Tools and Technology, Culture & Education, Health & Spiritual Wellbeing, Finance and Economics, Land Tenure & Community Governance. See 'The Permaculture Flower' in Article 36

Cert 2 could include basic energy auditing useful in identifying a rental house which is likely to be relatively comfortable and low cost to heat, or very basic retrofitting of plumbing for rain or grey water harvesting.

Cert 1 in community might require demonstration of basic competence in being a functional member of a household able to come to decisions about cleaning, food prep and purchase etc. or participation in some voluntary cooperative group process outside of institutional constraints.

These examples illustrate how permaculture at the lower levels is an integrated and sustainable approach to practical life skills in a way that many people may have taken for granted 50 years ago. Permaculture as common sense (which is no longer common) or how to effectively recreate the “jack of all trades”

I believe the framework for APT needs to define a set of activities or generic ‘types of competencies’ such as:

- physical action,
- observation,
- communication,
- design and planning

which should be involved to varying degrees in all units at all 5 levels. This would guard against the default assumption in the current package that levels 1-3 are about getting your hands dirty while levels 4-5 involve the “gift of the gab” and nice plans.

Permies, even at Cert 1, need to be innovators, problem solvers and thinkers even if the subjects and issues which they need to be able to tackle are relatively simple.

For example, a Cert 2 Nature unit might expect a student to be able to read a layout plan for a shelterbelt and plant provided trees in prepared ground accordingly. But if the ground includes a few rock outcrops or there is an imbalance in numbers of tree stock provided, then a modicum of design thinking might be required to adapt the design to the circumstances.

On the other hand a person with a degree in forestry, invited to contribute to a reforestation design unit in Cert 4 or 5, should be quizzed about their practical experience in what they are designing.

This raises the tricky issue of to what degree it is possible to have a firewall between private behaviour and permaculture training. While I don’t believe it is appropriate to assess personal behaviour, the use of appropriate personal behaviour unrelated to any job or other public role in society to support a claim of competency should be encouraged. (For example, growing and eating from a home garden over a number of years.)

And, conversely, someone with no experience of community living should have difficulty seeking qualification in eco-village design compared with someone who lives in one. Permaculture is not a profession at arms length from the rest of our lives, so APT should reflect that, while avoiding the need to openly challenge the job training foundation stones of nationally accredited training. We don’t want to bring in the bureaucratic hounds who could decide that this is all beyond the pail.

This more wholistic approach to assessment seem to fit in well with Recognition of Prior Learning (RPL) and recent discussions with some of the key players suggest that the process to RTO existing experienced permaculture teachers has reflected this. However most of those assessed so far are clearly well qualified. The status of personal activities in assessment will become more significant in more marginal cases.

Of greater concern is the possibility that students could pass through the whole APT system gaining competencies that they don’t practice or only do so in a workplace context. The idea of being competent in permaculture only when paid to do so is problematic. Secondly once there is a whole system of formal courses available at all levels, will getting RPLed get more difficult relative to those who go through courses by well established teachers. It could be argued that this structural discounting of informal experiential learning has been built into permaculture education by the history of only recognising PDC graduates as “real permies”. APT has the potential to give great recognition to experiential learning but only if we make sure that is built in and passed on through the assessment processes.

I have not even attempted to see how the current package could be adapted to take account of the framework suggested but present it as a design concept stimulated by the existing package and discussion with many permaculture colleagues with more experience of training systems than I have.

I want to acknowledge the central role of Hortus Australia as the Registered Training Organisation, and particularly Guy Rischmueller in getting APT up and running and the reasonable expectation that the entrepreneurial risk taken might eventually make a return for Hortus. From my limited observation I have been impressed by the way Guy uses his understanding of the “system” to interpret the rules to accommodate the needs of permaculture education. It would be difficult for someone less credentialed in the system to do so.

However, I think it is imperative that over time the monopoly role of Hortus as the RTO is re-evaluated once APT and PIL are on a stronger footing. In the meantime we should be prepared to take risks in quietly but deliberately bending the rules further to our collective ends rather than falling into fatalistic acceptance of APT’s current form is the best that can be managed. We should remember our radical social change agenda and use the system as a tool rather than being a tool of the system.

David Holmgren Summer Solstice Hepburn



RETROFITTING THE SUBURBS FOR SUSTAINABILITY

*This article is based on a public talk (with powerpoint slides) at the Aldinga Arts Eco village, South Australia in Jan 2005. A request from Elizabeth Heij, Aldinga resident and CSIRO Sustainability Network Co-ordinator for a text version for publication in the Network e-newsletter, led to this article drafted by Elizabeth based on her notes and my Powerpoint with editorial checking by me. After publication in issue 49 of the newsletter in March 2005, the article was added to the HDS website writings page and has since been reproduced in the **Organic Gardener** and on several Peak Oil websites.*

The public presentation has been repeated and evolved to better paint the picture of the suburban retrofit including the human dimension of household change in the energy descent future. The video interview (PC divx or Mac mp4) with Adam Fenderson recorded February 2004 explores this same theme.

*The pdf of the Powerpoint presentation **Retrofitting the Suburbs For Sustainability** (without animated graphics) tracing the past and possible evolution of a typical suburban street shows the application of the positive permaculture solutions that has been a theme of my response to the Peak Oil issue. This particular version was presented to an ECOV an organic fair and conference held in Bendigo in May 2006.*



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The suburbs of our Australian cities have, in the main, become sterile wastelands, lacking in any true spirit of community, impoverished of local resources, and filled with fearful people whose daily efforts are focussed elsewhere. What has happened to the Australian “suburban dream”?

To find the foundation of the so-called ‘suburban dream’ and the reasons why it has proved illusory, we need to look back to the post World War II economic boom of the 1950’s. At that time, Australia was riding high on the sheep’s back, with wool prices around \$2.40 per kg, and there was also cheap and abundant fossil fuel and timber. Furthermore, the government of the period provided widespread war-service housing, low-interest loans, and substantial public infrastructure such as roads and utilities to facilitate suburban growth.

The typical ‘baby-boom’ family of the 1950’s lived on a single income of around \$50-\$100 per week, with a housewife and three children at home. These home owners, who had grown up through the “Great Depression” and wartime hardships, had an ethos of proud self-reliance and domestic frugality, reinforced by their wartime experiences. Many suburban ‘back yards’ had an actively worked vegetable garden and one to a few productive fruit trees. Produce swapping and home preserving of seasonal surpluses were common. This was also the heyday of several great consumer icons – the FJ Holden car, the Victa lawnmower, and the Hills Hoist clothesline.

But there were problems with the suburban dream and the resulting rush of young families to “nappy valleys” on the city fringes, notably “urban sprawl”. As the suburbs spread, they displaced important agricultural activities such as the market gardening and dairy farming that formerly provided fresh foods with minimal need for transport. Not only did public infrastructure become increasingly poorly used, but the disproportionate rush to build roads and sell more Australian cars led to a general decline in the use of public transport – leading eventually to the phenomenon we see today, that our suburbs are designed for cars not people.

Along with “sprawl” has developed an increasingly dysfunctional economic situation. We see speculative inflation of land values, capital invested unproductively, declining household (non-monetary) production of food and “backyard industry”, and a massive rise of consumer addiction based on rising household debt.

Large areas of our cities have become “dormitory suburbs”. The average household size is declining while ever-larger homes are increasingly empty during the working day. Their blind windows look out onto streets empty of people (but all too often filled with cars). There is an alienating lack of community resulting, ultimately, in increased crime and fear.

The conventional responses to this situation are familiar to us all. The first is a change of planning regulations to encourage increasing density, promoting smaller housing blocks in new developments, dual occupancy infill development, and medium-density redevelopment of older areas.

Residents themselves have responded independently in various ways through their lifestyles. The renovation obsession is frequently directed at producing more high-value house space at the expense of the 'back yard'. Then there is a mobile lifestyle and semi-abandonment of home, when eating out and leisure activities elsewhere compound the daily absence during work hours. There is also the move to get rid of garden maintenance and commuting by moving to inner-city apartment living; and, at the other end of the scale is the "super-suburb" response of moving to a rural-residential or hobby-farm property beyond the new suburban fringe.

In recent years, as we have become more aware of the negative effects of our high-impact lifestyles, a number of environmental responses have also been introduced – such as building insulation, energy-efficiency requirements, improvements to public transport, conservation of urban green space, and more water-sensitive urban design. We have barely scratched the surface, however, of the profound improvements that the application of permaculture principles and strategies could deliver for the sustainability and liveability of today's suburbs – for example:

Food security based on gardening:

Food security through retention of horticultural production within and close to cities, has barely been on the agenda, while home gardening is largely ignored as irrelevant to the sustainability debate. For many of today's urban residents, where food comes from beyond the supermarket is barely on their radar. We are still fixated on the high-density European-style city that gets its food from somewhere else. Most are unaware of different patterns of urban living such as those of Japan, China and other Asian countries where cities have traditionally contained interspersed gardens and rice paddies. If food is produced in distant places, its supply is more vulnerable to risks (such as increased transport costs)

that we cannot control. For urban residents aware of the fragility of the food supply system, home gardening is a practical activity that can provide much of the fresh food of a family, and also bias the diet away from over-consumption of animal protein and towards vegetables and fruit. Even when the level of production is small, the seasonal garden maintains the skills necessary to produce food and passes those skills on to the next generation.

Better health through a culture of home food consumption:

Consumption of genuinely fresh fruits and vegetables from a local garden (Fig. 1) can



Figure 1

underpin good health and combat the current obesity epidemic. In the same way that wood warms you twice – once when you split it and once when you burn it – garden produce keeps you healthy when you grow it and also when you consume it.

Economy through home food production and food preservation:

Growing food at home and preserving seasonal surpluses bypasses the so-called "value-adding" processes of the commercial food chains, and means food is much less expensive – a principle readily understood by families of the Great Depression and WWII years.

Firewood for sustainable and ethical energy:

The permaculture strategy of burning waste wood from landscaping and building for space heating, water heating and cooking allows urban residents to be more energy self reliant, while keeping a valuable resource from going to landfill (to generate greenhouse-intensive methane) or into inefficient, noisy, fossil-fuel-driven chippers and mulchers. How many of us realise that our cities are actually big forests? The expanding areas of new plantations and natural regeneration within or near cities all need continuous thinning to reduce fire hazard and improve timber and ecological values. With careful management and better education, there is much valuable wood that could be saved for fuel. Wood has a high energy density, is greenhouse-gas neutral, and can readily be made available as smokeless charcoal for city use. With maximum pollution occurring through smoke emission right at the point of use (cf. distant coal-fired power stations), there is a useful negative feedback that controls user behaviour.

Passive solar design combined with thermally efficient natural materials:

Building with rammed earth, mud brick, recycled timber and salvaged joinery, for example, greatly reduces the embodied energy of a dwelling while providing 'character' to designs and thermal mass to control temperature fluctuations. This is in contrast to the conventional regulatory emphasis on energy efficiency through insulation alone. Unfortunately, this emphasis often leads to suppression of real innovation even while it "raises the floor" for lowest performance.

Retrofitting attached greenhouses to existing homes:

An attached greenhouse can help capture warmth from the sun while extending the garden growing season.

Water harvesting and natural wastewater treatment:

In many coastal areas of Australia (where the greatest proportion of us live), the rain that falls on the roof should, if used innovatively, be sufficient for at least the majority of home uses, including gardening. Rainwater harvesting can be supplemented by treatment

of greywater (from the bathroom, laundry, and kitchen) e.g. through gravel reed beds (Fig. 2), for subsequent use in the garden. Even blackwater (from the toilet) can be treated and re-used on site in some circumstances, or a waterless composting toilet can be installed to ensure water goes to more productive uses. Closing the nutrient cycle, from human waste to fertile, food-producing soil is, in the longer term, one of the most critical factors in the sustainability of urban populations.

Animals in productive garden ecosystems:

Hens and ducks are excellent components of a sustainable suburban garden system and can significantly expand the range and value of foods produced at home. They deal with various types of food waste and pests such as insects and slugs, while their manure adds natural fertiliser to the soil.



Figure 2



Figure 3



Figure 4

Reclaiming the streets:

Making greater use of our public space – most notably our streets for walking and cycling – reduces the costs of transport, enhances knowledge of the local area, and contributes to better community. The more we expand these uses, the more the destructive uses of public space (such as excessive car traffic and vandalism) are gradually displaced. It is high time residents reclaimed their suburban streets for people. They should again be available for children to play and safely learn their cycling skills (Fig. 3).

Creative recycling:

Making creative use of discarded goods and wastes is a classic

permaculture strategy that is far more innovative and productive than most industrial recycling systems, such as smashing and melting down bottles. At 16 years of age, my own son for example, built himself a fully functional recumbent bicycle from “rubbish” (Fig. 4). We have a shortage of innovative skills, not materials. Creative re-use and re-manufacture could greatly extend the lifecycle of many consumer goods.



Figure 5

City farms and community gardens:

Cooperative gardening and farming of city open spaces (Fig. 5) allows these productive activities to move beyond backyard scale, opening up a further range of possibilities for food production and community engagement.

New ways of trading:

Locally based trading systems retain the energy of participants within the local community, rather than draining it away to some different location. LETS systems¹ are a good example, some of which may also have associated local currency or tokens for ease of exchange. Local exchange systems allow citizens to wrest back some control of their economic wellbeing from the increasingly unstable, national and global monetary systems.



Figure 6

New ways of sharing land:

Traditionally Australia has acknowledged only two forms of land ownership – fully private and fully public. Recently, however, there has emerged a new option – that of commonly owned land – providing new opportunities for community formation and cultural innovation. Eco-villages and co-housing schemes are beginning to appear (Fig. 6) which combine ‘ecological’

¹ LETS is an acronym for Local Energy Transfer System, or Local Employment Trading System. It provides a simple mechanism for a group of people to exchange goods and services without needing conventional money to do so. LETS does not require a two-way barter-type trade. It records each one-way transaction, and leaves both participants to spend or earn enough to balance that trade another time.

building with common infrastructure and community governance. The actual housing lots and dwellings in the scheme can be part of the ‘commons’, or privately owned within a broader common title. As we in Australia take the first hesitant steps beyond “rugged individualism” and begin to re-learn the skills needed to govern ourselves in community, the private-within-commons system tends to sit more comfortably with many.

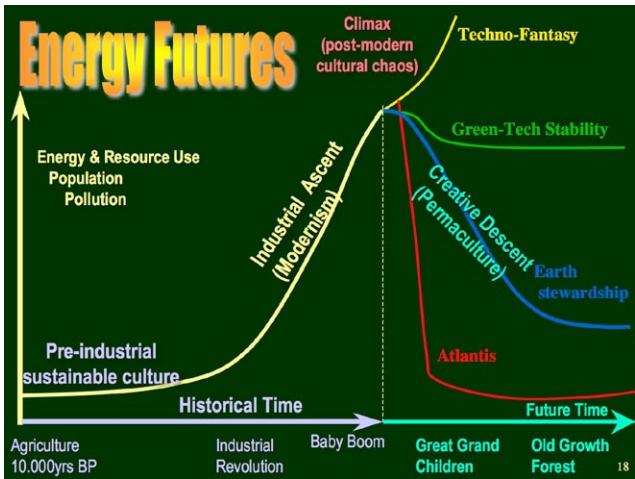


Figure 7

but frightening in its implications for humanity and the planet – to an “Atlantis-like” fate in which our culture “goes under”. Most of the sustainability debate is focused within the “green-tech stability” scenario in which we essentially maintain a steady (albeit somewhat reduced) level of energy usage by progressively moving to renewable sources such as wind, solar, tidal power, etc., as fossil fuel reserves are used up. While permaculture strategies mesh nicely with many of those directed towards this generally accepted desirable future, permaculture in fact defines a creative response to a fourth scenario that I call “Earth Stewardship” – a “creative descent” in which we progressively reduce our energy demands to return eventually to living within the natural energy and production budget of the land we occupy. Elements of all these scenarios can be found in the wide-ranging viewpoints and arguments of today’s “sustainability” debates.

In the Earth Stewardship “creative descent” scenario, which I consider to represent the only truly sustainable future, human society creatively descends the energy demand slope essentially as a ‘mirror image’ of the creative energy ascent that occurred between the onset of the industrial revolution and the present day. The actual sustainable plateau is a long way down from current energy demands, but also a long way ahead in time. If we begin our journey now, there is time to use our familiarity with continuous change and creative innovation to avoid bringing on “Atlantis”.

So, in an energy-descent future, what are the prospects close to home – here where we live in suburbia? Will it be the end of suburbia? What if we can no longer afford to commute to work by car? What if we are dependent on food and energy supplies that are transported long distances at increasing expense? What if the services and functionality

The importance of the above options becomes clear when we ask the question “What if energy availability declines?” Beyond the abundant availability of fossil fuels is an uncertain energy future (Fig. 7) that has been pictured in various scenarios that range from “techno-fantasy”, (e.g. unlimited nuclear cold fusion with no unforeseen negative impacts) – an absurdly optimistic scenario

of our communities decline further so that there is ever-diminishing support from local councils and police, for example?

There is a real and viable alternative to this seemingly alarming scenario – a retrofit of suburbia – a remodelling of local neighbourhoods and communities for the energy-descent future. The “refit manual” will bring together and integrate features such as:

- Home-based work, telecommuting, and cottage industries serving a local clientele;
- Extended families, lodgers and shared households;
- Recycling of storm water, waste water, and human waste;
- Soils of improved fertility, and the water supply and infrastructure for urban agriculture;
- City farms, cooperative gardening, Farmers’ Markets, and Community Supported Agriculture schemes [CSAs]².

Let’s paint a specific picture of how this might work. If we return briefly to the golden age of the suburban dream in the late 1950’s, a birds-eye view of our suburban neighbourhood might have looked something like Fig. 8, which shows four standard suburban blocks with productive backyards, including one supporting a small service enterprise.

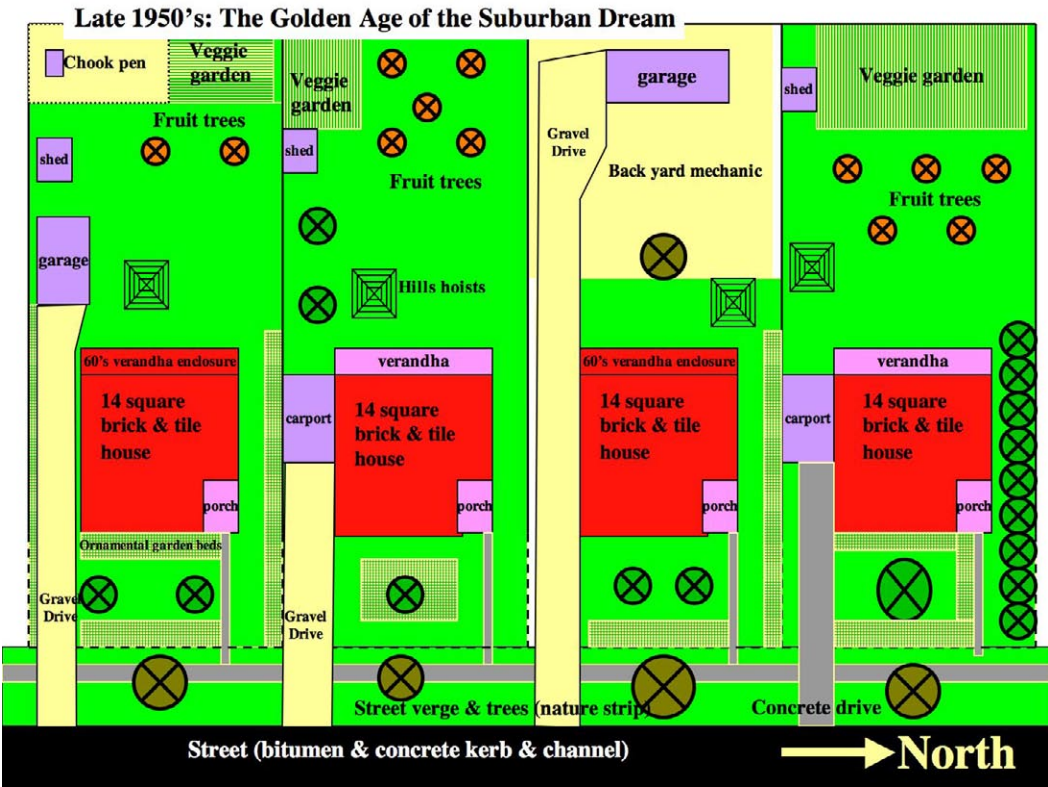


Figure 8

2 Community Supported Agriculture [CSA] is a scheme in which customers undertake to buy a regular box of in-season fruits, vegetables, eggs, etc. from one or more local producers, thus providing the latter with a secure income and the ability to diversify the types of produce they provide.

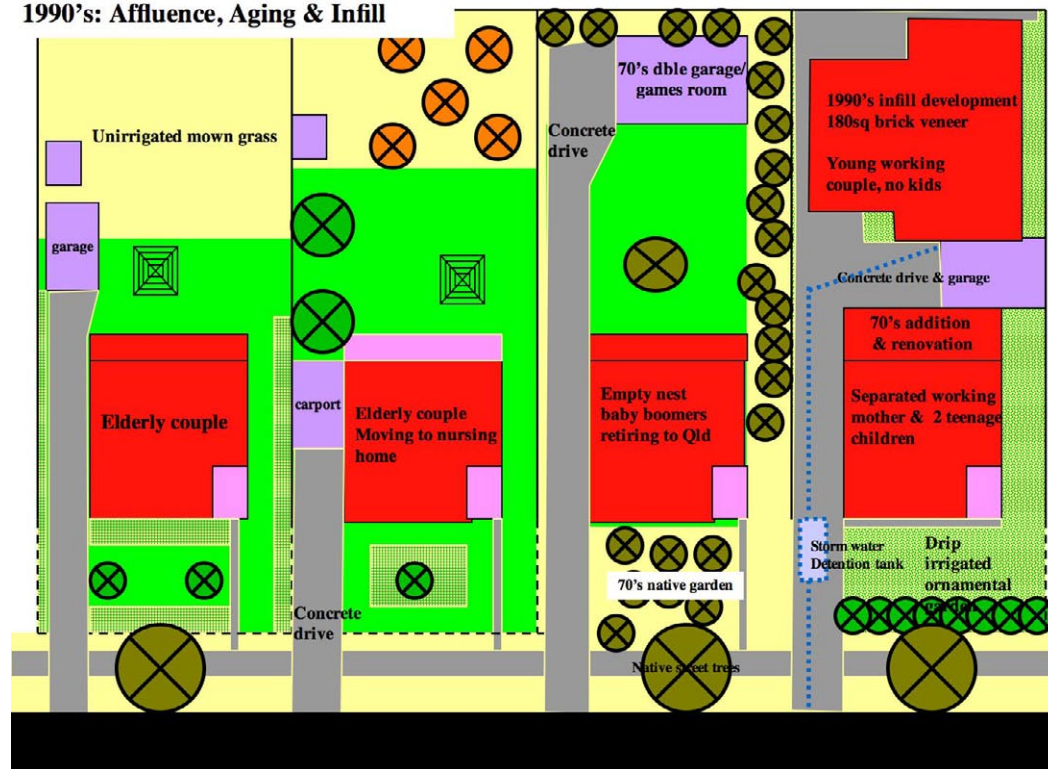
1990's: Affluence, Aging & Infill

Figure 9

If we move on in time and look at the same small neighbourhood in the 1990's, Fig. 9 shows the typical effects of affluence, aging and infill. The backyards are now all unproductive as aging original householders are no longer gardening or working at home. The cottage industry workshop has been renovated as an addition to the house space, and one property has been sold for speculative investment and the backyard filled with a second dwelling. How can this decline in productivity be turned around?

Let's leap a few years ahead into the late 2000's and imagine what might now have been done with the same four properties (Fig. 10). The catalyst has been the sale of the house second from left to an energetic young couple determined to "future-proof" themselves for the energy descent expected in their lifetime. Using permaculture principles, they have restructured their entire block, including its front garden, as an integrated food production system. Seeing this exciting new development on the other side of the fence, the empty-nest baby boomers in the property third from left have aborted their migration to Queensland and restructured their home and lifestyles along lines compatible with the initiatives of their neighbours. They have extended their home with an eco-addition and increased its occupancy with an additional family member plus a young boarder. The 1970's games room has been fitted with a solar PV array and returned to its original 'backyard-industry' purpose to house their son's small metal-working business. The fence between the two properties has been removed to allow the land of both blocks to be farmed cooperatively for the benefit of all the occupants. Shared water management facilities, including rainwater collection and greywater treatment, have been implemented,

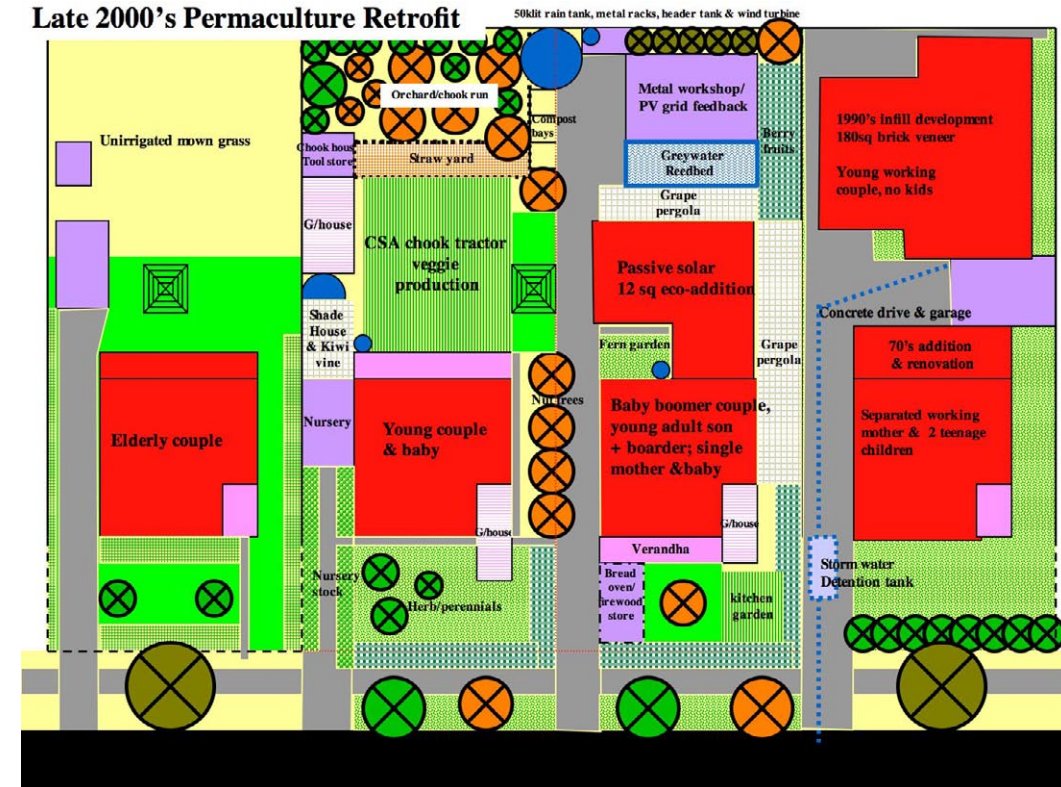
Late 2000's Permaculture Retrofit

Figure 10

and productive fruit trees have been planted on the nature strip in front of both houses. The complementary design relationship between the two households is characterised by horticultural skill and youthful energy but not much capital on the left, and more capital and more interest in the built environment and social strategies of permaculture on the right.

Seeing all these successful communal activities going on next door, the property owners on the left- and right-hand ends of the row are now looking for ways to contribute. The elderly couple on the left need home help (an opportunity for one of the young mothers) in exchange for use of their extensive backyard to expand the cooperative CSA vegetable-box garden. While the development and neighbours in the right may be slower and more difficult to connect, they have offered their unused back and front gardens to extend the farming system in return for a share of the produce, one of their teenagers is training to help in the metal-working enterprise, and their stormwater detention tank will shortly be refitted as part of the communal water management system. And so it grows..!

The bottom line here is that we do not need to wait for policies to change. We can choose today to do this – to create our own small neighbourhoods. 'Suburban sprawl' in fact gives us an advantage. Detached houses are easy to retrofit, and the space around them allows for solar access and space for food production. A water supply is already in place, our pampered, unproductive ornamental gardens have fertile soils and ready access to nutrients, and we live in ideal areas with mild climates, access to the sea, the city and inland country.

So what do we have to do to make it work? Basically, the answer is “Just do it!” Use whatever space is available and get producing. Involve the kids – and their friends. Make contact with neighbours and start to barter. Review your material needs and reduce consumption. Share your home – by bringing a family member back or taking in a lodger, for example. Creatively and positively work around regulatory impediments, aiming to help change them in the longer term. Pay off your debts. Work from home. And above all, retrofit your home for your own sustainable future, not for speculative monetary gain.

In an energy-descent world, self-reliance represents real opportunities for early adopters of a permaculture life style:

- Rises in oil prices will flow through to all natural products (food, timber, etc);
- Higher commodity prices will be a stimulus for self-reliance and organic farming;
- Local products will be more competitive than imports;
- Repair, retrofitting, and recycling will all be more competitive than new replacement;
- There will be rising demand for permaculture as life-skills education; and
- There will be a resurgence of community life, ethics and values.

There are, however, some real hazards for the greater community in the energy-descent scenario. For example, perverse subsidies and “head-in-the-sand” policies could distort necessary market adjustments (e.g. the end of fuel tax combined with production subsidies to agribusiness). There is a real danger that fascist-style politics could see minorities and those providing for themselves as being to blame for declining social conditions. Sudden economic and environmental shocks could conceivably lead to social collapse, removing even the security necessary for local food production. We need to understand the energy-descent pathway ahead, act to ensure our own longer-term resource security, and keep ourselves informed about the viewpoints and approaches of the greater national and global communities around us.

RESOURCES FOR UNDERSTANDING AND DEALING WITH ENERGY PEAK AND DESCENT:

Association for the Study of Peak Oil & Gas – **www.peakoil.net**

The Party's Over: Oil, War and the Fate of Industrial Societies by Richard Heinberg. New Society Publishers 2003. ISBN: 0865714827

Permaculture: Principles & Pathways Beyond Sustainability by David Holmgren. Holmgren Design Services 2002 – **www.holmgren.com.au** – ISBN: 0646418440

Video Interview of David Holmgren by Adam Fenderson – **www.globalpublicmedia.com/interviews/106**

Documentary Film: “The End of Suburbia: Oil Depletion and the Collapse of the American Dream.” **www.endofsuburbia.com**



FIREWOOD: SUSTAINABLE AND APPROPRIATE ENERGY SOURCE

*This letter was published in **Renew Magazine** issue 90, Jan 2005, by the Alternative Technology Association (Melbourne Australia) <http://www.ata.org.au/>*

It was in response to an article, by a contributing editor, Lance Turner, "Green Heating Options" in which firewood was rated as the least environmental heating option. The editorial response to my letter was essentially that evidence shows that wood users are not responsible in either their sources of fuel or management of heaters and so consumption of high quality fossil fuels (natural gas) supplied by centralized corporate monopolies is the most environmentally and ethically sound option.

*It is ironic that the stance by the editors in a cover story about greywater use for garden irrigation in Melbourne in the same issue of **Renew** was quite different from their attitude to wood. Survey results of the increasing use, despite its continuing "grey" legal status, were used to emphasise the need for user education to maintain soil fertility and avoid health risks rather than treating grey water as environmentally damaging and a health hazard. Surely the same flexibility should be applied to wood use which saves gas, a much more precious resource than water by most measures.*



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WOOD HEATING ENDORSED

I was impressed to read in issue 88 of **Renew** the broad range of articles and ads for products relating to renewable energy that are covered in the magazine these days. However I was dismayed by your anti firewood stance in "Keeping warm this winter"

Your assertion that most firewood in Australia comes from "old growth forests of ancient trees sometimes more than 1000 years old" gives the impression that firewood is coming from iconic tall wet public forests. In fact, half the firewood in Australia is harvested by private individuals mostly from private land¹. Riverine forest (mostly red gum) and Woodlands (mostly box-ironbark) are the major sources of commercial firewood but there is also significant harvesting as salvage after logging (in regrowth forests) and plantations².

The effects of firewood harvesting on those forests and woodlands ranges from very beneficial to very detrimental. In a general article about heating options written for a predominantly urban audience I wouldn't expect you to cover that complexity, but giving the impression that anyone using firewood is contributing to destruction of pristine forests is highly misleading to say the least.

Your reference to masonry heater technology as the most efficient and cleanest is useful but you could also have mentioned combustion cooking stoves providing hydronic heating (as well as hot water and cooking) as efficient use of fuel for multiple functions. For example our Bosky combustion stove has not needed a flue cleaning in over two years of continuous use, an indication of low pollution from moderately efficient technology, proper wood drying, and stove management.

You point out that the pollution created by wood burning varies greatly depending on fuel and heater management, but fail to mention that wood heating has lower greenhouse gas emissions than any other fuel heating³. Even poorly managed woodlands supplying wood heaters (60% efficient) up to 400 kms distant, have a net greenhouse gas production of one third that of natural gas and one tenth that of electricity⁴. The figures for sustainably managed regrowth native forest are one third that of woodland systems while new plantations managed for timber and firewood have no net carbon dioxide emissions and actually take 0.17kg of CO₂ out of the atmosphere for every kWhr of heat produced.

These figures from an authoritative and recent study by CSIRO, reinforce what we have been teaching for 15 years, in both Permaculture Design Courses and guided tours of Melliodora⁵, that wood is the most sustainable and environmentally sound form of heating

¹ Driscoll, D.A. et al **Impact and use of firewood in Australia** CSIRO Sustainable Ecosystems, 2000

² Eg. Sugar Gum in western Victoria

³ Keryn, P et al **Life Cycle Assessment of Greenhouse Gas Emissions from Domestic Woodheat** CSIRO Forestry and Forest Products for Australian Greenhouse Office October 2003

⁴ 0.11kg CO₂/kWhrs compared to 0.31 for gas and 1.00 for electricity from coal

⁵ See www.holmgren.com.au

(after behaviour change, conservation strategies and passive solar design, which you also mention).

Heating only requires low quality energies such as passive solar gain or firewood. If we use high quality energies such as electricity for space or water heating then this is wasteful (and therefore environmentally damaging in some way) whether that electricity is from coal or renewable sources. We should reserve electricity for lighting, communications and electric motors.

The orthodoxy that natural gas is the default environmentally sound source of heating, that you appear to endorse without even the need for a paragraph of explanation, ignores the fact that natural gas is also high quality energy, the ideal transportation fuel. Although gas heating is a step ahead of using electricity, it is still like using structural quality timber for firewood, in other words, a waste.

In a more enlightened sustainable and low energy future, the very real problems of localised air pollution from wood burning in cities needs to be addressed by better training of firewood users, better designed wood burning stoves and most importantly, use of cleaner burning charcoal produced in sustainably managed forests using modern wood gasifier technology which recovers the waste heat.

I look forward to more articles in **Renew** exploring both the practical options for wood heating and management as well as new and emerging technologies for using wood fuel.

David Holmgren

Co-originator of the Permaculture concept



PERMACULTURE: DO WE NEED PRINCIPLES?

*This essay on the role importance theory and design principles in permaculture education and activism was the basis of a keynote presentation at the Seventh International Permaculture Convergence held in Croatia in May 2005. An earlier version was published in the IPC7 newsletter in 2004 prior to the event. The nature of the audience gave me the opportunity to explore the reasons behind my focus on design principles in **Permaculture: Principles and Pathways Beyond Sustainability**. The presentation was my first to an International Permaculture Convergence since 1984. For most of the participants it was the first time they had heard me speak.*

*The themes raised in this essay reflect the systems thinking of P:P&PBS but also represent the evolution of ideas about the permaculture movement written more than a decade earlier in **Article 14 - Permaculture Education and Movement: Searching For Ways Forward**.*



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PERMACULTURE - PRACTICAL ENVIRONMENTALISM

Permaculture is a concept for changing how we live with and from nature. It involves strategies, techniques and practices necessary to benefit from nature's abundance and to work within her limits. It uses ethics and design principles to guide and test the diversity of possible solutions and systems. However, the value of the permaculture movement in society is not judged by its conceptual framework. The test of efficacy is the output of people and projects that carry the label permaculture and the success in extending those models to the point where they impact on large scale economic, social and environmental systems. In other words, the performance of the models and their reproducibility.

For something so dependent on practical outcomes, how useful is the on-going development of the conceptual framework beyond intellectual interest in the evolution of ideas?

For some of us wedded to the importance of ideas as a driving force in human history, these questions maybe ridiculous, even offensive. On the other hand, for many people involved, and potentially involved, in permaculture innovation and education, they are valid ones. Many people come to permaculture because they are impatient with endless analysis of the problems, grand top-down schemes to change the world and instead want to be involved in positive action that has immediate benefits.

Few people are motivated by intellectual and abstract ideas and, arguably, in a world of energy descent, people will become more focused on simple and immediate practical solutions to basic problems. If a diversity of locally relevant, working models were available, replication with (or without) any understanding of conceptual underpinnings becomes more viable and achievable. In this way, local solutions would become mainstreamed not by some global top-down process but by simple replication within a geographic community.

But the core of permaculture remains conceptual not practical. The old idea that our actions should be "principled" is a reminder of the need for a conceptual framework of enduring value. While reaffirming the importance of practical action, I want to advocate the value of theory, and specifically principles, in permaculture design and education as a balance to the dangers of poorly understood action that can fail to lead to effective and useful replication.

The importance of principles rests on two systemic arguments about the nature of change and the diversity of design solutions.

ADAPTATION TO CONTINUOUS CHANGE

Past conceptions of sustainability (and permaculture) drew on the steady-state, climax model of nature. Permaculture was conceived around a low energy steady-state future while more mainstream sustainability ideas imaged a high, but energy-efficient future.

More recent pulsing models of nature suggest dynamic understandings of sustainability that can deal with continuous change¹. Continuous change expands the scope of possible futures.

While this acceptance of continuous change is a substantial refinement of permaculture concepts, it should not be interpreted as an acceptance of trend line projections of the growth in affluence (for the global middle class at least) from the last half century. The evidence that energy descent will be a key driver of human history over the next half century is compelling, so low energy natural systems remain relevant models for the design of human systems. What we do know from the history of the last few hundred years of energy ascent is that continuous change constantly upsets the apple cart of success. What was progressive yesterday loses its utility tomorrow. After generations of dealing with continuous change we have internalised a set of systemic design principles that has allowed us, to varying degrees, to innovate rather than copy. These design principles such as “dog eat dog” and “get big or get out” are increasingly dysfunctional as energy available to humanity peaks and declines.

What is required is that we internalise a new set of systemic design principles that will allow us 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.

If sustainability is a search rather than an outcome, a continuous flow of innovation will be needed to sustain a continuous cascade of solutions. Success of models, in the current context should not automatically lead us to immediately try to maximise mainstream replication because future innovation will, almost certainly, allow us to leapfrog over past innovation. Incremental adoption may be more effective, with fewer adverse side effects, than mass adoption of what we currently think of as “best practice”.

THE CONTEXT SPECIFIC NATURE OF SOLUTIONS

The second argument for the importance of principles rests on the diversity and differences between low energy natural systems. In nature, the low and distributed energy base demands different design elements and solutions to make optimum use of varied local resources. Low energy societies follow similar patterns. High energy availability allows for growth and domination by single successful pattern of economic and social organisation such as emerged from western Europe in the last millennium. A growth in internal systemic complexity replaces geographic diversity. In this process of globalisation, a monoculture of industrial design solutions has been replicated everywhere with only slight geographic and cultural variation. Our common cultural inheritance tells us, there is one big solution to any problem, which, once discovered can be replicated everywhere. This is a false and destructive model of success in a world of declining energy.

¹ See Principle 12 in Holmgren, D. Permaculture: Principles & Pathways Beyond Sustainability 2002

In the future, copying dominant global systems will be less and less successful just as copying what was successful in the past has already proved to be dysfunctional. Instead we need appropriate abstract principles that are universally relevant to assist in creating and testing context specific solutions rather than simply replicating models. The repeated failure of standard economic policies to help poorer nations may be large-scale examples of how this is already the case.

UNDERSTANDING OUR SUCCESSES AND FAILURES

The above theoretical arguments for the importance of theory may be helpful but how can we integrate these apparently competing values of conceptual frameworks and practical models? What can we learn from the successes and failures in permaculture innovation and extension over the last quarter century.

An innovation or cluster of innovations which succeed in influencing society tend to pass through a number of phases from conceptual origins to working models which are refined and extended through both community networks and entrepreneurial action. The success of this stage leads to popularisation including interest from mainstream media. Eventually the innovation becomes codified and may be regulated to ensure complete adoption. This process could be summarised as follows.

Conception > Working Models > Popularisation > Regulation

While innovations as complex as permaculture inevitably involve all phases mixed together, different strategies and temperaments are needed in each phase². While all roles are valid and complementary, in Australia and some other countries there has been a history in the permaculture movement of successful promotion through media before community networks and entrepreneurial action or even before working models were established. In some cases this has had the effect of “innoculating” communities (both geographic and network) against permaculture because the first examples they came across were poorly articulated or applied. In answer to the perceived need to get the ideas out there as quickly as possible, my experience suggests that more effort in conceptual innovation, working models and careful local refinement are potent and spread rapidly once favourable social and economic conditions allow.

While many activists readily acknowledge the importance of working models and refinement to suit local conditions, the evolution and spread of permaculture has so far been decidedly global and post modern, garnering bits from everywhere. The spread of influence and action has been “network” in nature rather than geographic. Typically, permaculture innovators influence and are influenced by people on the other side of the world while their neighbours may ignore or even deride what is under their noses.

² This is a restatement of ideas presented by Robert Gilman from the Context Institute of California at the Australian Permaculture Convergence in Adelaide in 1995.

The undeniable success of this process in the rapid spread of permaculture ideas around the world has had some adverse side effects that continue to plague both permaculture education and extension; for example, the inappropriate replication of models of permaculture innovation combined with the ignorance of possible models that are not labelled permaculture. While these problems are to some extent inevitable, we need to optimise the adoption and replication of appropriate models as much as possible.

This reinforces the need for conceptual tools that help us to identify appropriate models independently of both geography and demeanour. While geographic proximity may be a cue to potential relevance, variation in soil type, microclimate, available skills and resources may nullify this relevance. In explaining the site and situation specific nature of permaculture solutions to visitors to Melliodora, I often point to the fact that we don't have a productive lemon tree but that our neighbour does (only 60 m away but 5m higher out of the frost hollow.)

Similarly just because a model is called permaculture by its designers or users does not mean it is the best or only model to which we should look. The label permaculture may be reason to show keen interest but the diversity of permaculture applications and variation in understanding and skill may nullify this relevance. At the same time, models with different labels³ or those espousing no particular conceptual framework, whether traditional or idiosyncratic, may provide highly relevant solutions.

Ethics can steer us in the right direction but design principles are our primary tools for assessing and filtering the diversity of possibly relevant information and models for the inevitably unique context in which we design and act. Thus the efforts to refine the tools, explain them and make better use of them are central issues for permaculture education. Arguably, to make those tools truly useful to a wide range of people, they need emotional and artistic expressions that work like indigenous knowledge; understandable and useful to a child but containing deeper levels of meaning that unfold with experience over time. This needs to be developed while at the same time guarding against the degradation into a rigid ideology that is closed to diverse sources and insights. The challenge for permaculture innovators and designers is to use observation of nature and pattern understanding to generate an expanding repertoire of working systems that can be tested against a robust set of design principles.

The strategies and techniques associated with permaculture are effective not only because of their technical veracity but due to their appropriate and timely application and adaptation. The challenge for permaculture educators is to find better ways to communicate abstract principles in ways that empower people to both understand the context of their actions and actively seek out and create technical solutions appropriate to that context.

³ Such as organic or biodynamic farming, wholistic management, analogue forestry, ecological architecture, biomimicry to name a few.

In countries where energy descent is a current reality, the urgency of implementing existing solutions can distract us from the need to use design principles constantly reassess what we doing. If the next decade continues to deliver a final economic boom in resource rich countries like Australia then keeping permaculture both currently relevant and of enduring value may be just as challenging. The more success we have, the greater the temptation to ignore principles in the excitement of action. Our actions should always be principled.

David Holmgren

Hepburn April 2005



PERMACULTURE: DESIGN FRAMEWORK FOR ORGANIC AGRICULTURE IN THE ENERGY DESCENT ERA

This paper was published in the digital proceedings of the 15th International Federation of Organic Agriculture Movements conference held in Adelaide South Australia in September 2005. The paper and the pdf of the Powerpoint presentation introduced the implications of the energy descent future as an threat and opportunity for organic agriculture in the process of explaining the relationship and relevance of permaculture to organic agriculture. The invitation to present (as one of several keynote speakers) reflected the actions of several activists wanting to see permaculture as a more effective agent of positive influence within the Organic agriculture movement. The importance of garden agriculture mentioned in the paper and presentation reflects an recurring theme in my work (see Article 8 - Gardening as Agriculture 1991).



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ABSTRACT

Permaculture as a design system for sustainable living and landuse (rather than an alternative production system) has the potential to reinvigorate and strengthen the role of organic agriculture in the transition to an ecological society based on stewardship of the renewable resources of soil, water, plants and animals.

Permaculture emerged out of the Tasmanian organic movement during the 1970's but its spread and influence around the world in both rich and poor countries over the last 25 years has been as much through community development, ecological building and alternative economics, as it has been through agriculture.

The peaking and permanent decline of global oil and gas extraction over the next decade and onset of climate change already affecting agriculture provide a new context in which organic agriculture may thrive or expire.

If the organic movement is to grasp the nettle presented by global energy peak as an opportunity to implement a more fundamental change agenda, then it will have to recognise that its flirtation with input substitution farming and globalised luxury markets reflect a necessary but short lived phase (little more than a decade) in the history of organics. But a retreat to some comfortable past conception of organics is equally unrealistic.

Instead, organic agriculture needs a reinvigorated conceptual and design framework that is

- founded on the provision of human needs through working relationships with nature,
- has a track record of bottom up personal and community based change, and
- can accelerate the mutual reinforcement of the diverse range of concepts, strategies and techniques in the natural, technological and human domains, necessary for organic agriculture to achieve its true potential.

Permaculture has the potential to make a substantial contribution to that reinvigoration if it is understood as an open ended design system rather than a prescriptive set of land use techniques.

HISTORICAL CONTEXT

Ecological agriculture arose in Britain, USA, Germany and Japan in the 1930's as a response to the early signs of unsustainability of conventional "industrial agriculture".

Permaculture was part of the second great wave of sustainable landuse and living concepts in the 1970's, when the limits to industrial agriculture became more evident.

At its origin¹ permaculture can be seen as a branch from the "tree" of ecological agriculture. Its phenomenal spread around the world has been facilitated by charismatic

¹ Mollison, B. & Holmgren, D. *Permaculture One* Corgi 1978

leadership by Bill Mollison, an intensive training course, typically taught in a 2 week residential format, and more recently, the internet. In the process it has evolved both as a concept and as a world wide movement in all continents². Inevitably this rapid spread has been characterised by lots of steady ground work, some brilliant successes, as well its share of failures. At times the over promotion of Permaculture has seen it lose credibility as eco-fashion. In other situations, it has been a refuge for the severely alienated. Within a larger historical perspective, rising affluence and falling food and commodity prices for the global middle class, have seen many permaculture strategies fail to realise their potential. This also explains why some of the most effective permaculture activism and projects have been in poorer countries.

ORGANICS: THREATS AND OPPORTUNITIES AT THE ENERGY PEAK

Organic agriculture has a well established position in the public mind and increasingly in land use and health policy circles as ecologically and socially benign landuse. It has the potential to revolutionise modern food production and consumption systems.

However this potential is under continuous challenge, most especially by corporate interests that supply industrial agriculture inputs. Because organic agriculture relies more on developing the non monetary, internal and natural economy of the farm it may also yield less measurable economic activity and tax for governments.

These same powerful interests have set up systems of environmental accreditation which threaten to undermine the status of organic certification. These systems rely on a suite of environmental management strategies, including minimum tillage, genetic engineering, indigenous revegetation, quality assurance management and other systems that do not challenge the basic structure of conventional agriculture or society.

The extension of organics beyond the ideologically committed producers has (somewhat inevitably) seen certified purchased nutrients and other inputs used instead of internal farm resources.

Similarly certification has seen organic food follow market premiums to centralised and globalised markets dominated by corporate logistics.

These shifts and compromises in mainstreaming organic production have seen organic agriculture criticised from a deep green perspective, as not taking adequate account of biodiversity and animal welfare, over dependence on annual crops, cultivation, as well as long distance transport, high energy processing, and over marketing.

The stark choice which is typically debated in the organic movement is one between sticking to organic traditions and in the process, risking a luddite fundamentalism which

2 *Permaculture: A Designers Manual* by Bill Mollison 1988 provided the scope and foundation for permaculture teaching and inspiration of innovative permaculture strategies and methods.
Permaculture: Principles and Pathways beyond Sustainability by David Holmgren 2002 provides an evolved explanation of the universal permaculture design principles.

is irrelevant to the modern world, and the alternative of progressive and continuous co-option by government and corporate systems away from the ethical and ecological heritage of organics.

While this debate has been framed by a context of economic globalisation and falling commodity prices, the peaking and permanent decline of global oil and gas extraction over the next decade, and onset of climate change already affecting agriculture, provide a new context in which organic agriculture may thrive or expire.

The historically momentous global peak in the extraction of conventional oil and the peak of natural gas supply in North America is already causing shock waves throughout the world economy and reshaping geopolitics³. The peak of global extraction of all high quality fossil fuels within a decade will precipitate far greater changes. Barely recognised by the public, policy makers or even environmental activists, this event will precipitate a cascade of environmental, economic, political and cultural changes for which society is totally unprepared.

While these changes will be seen as a threat, global energy peak has the potential to quickly eclipse climate change as the driving force behind the sustainability imperative. For organic agriculture these changes present enormous challenges and opportunities. The implications for the debate about global production for global markets vs local food for local people are fundamental.

For over 25 years permaculture has provided a coherent design framework for a broad range of empowering strategies for landuse and livelihood with less and less energy. While the understanding and adoption of these strategies has been slow in an era of expanding energy, the emerging energy descent era will make many radical permaculture solutions natural and obvious.

THE CONTRIBUTION OF PERMACULTURE

Although permaculture is at its heart a design system not a production system, it is best known for experimentation, and demonstrating and advocating a range of strategies and techniques for more ecological production.

Some examples which illustrate the scope directly relevant to organic agriculture include;

- Economic botanical research, culture of new tree and other perennial crops, “bush tucker”, fungi, native and alternative livestock to reduce our dietary and land use dependence on the dominant annual field crops and livestock.
- Soil improvement techniques such as mulching, worm farms, zero tillage natural farming of grains.

3 The most authoritative source is The Association for Study of Peak Oil & Gas, www.peakoil.net. One of the best of many books on the subject is *The Party's Over: Oil, War and the Fate of Industrial Societies* by Richard Heinberg New Society Publishers 2003

- Animal management systems such as chicken and pig tractors for low input market gardening.
- Edible landscaping, forest gardens, alley farming and agroforestry to better integrate tree crops in agricultural landscapes.
- Complementary ecological landuses such as mixed species nature-based forestry and aquatic polyculture.
- Rainfall and water runoff harvesting methods including keyline, swales etc.
- Whole farm planning and biodiversity management strategies which are more compatible with organic philosophy and practice, than concepts and approaches promoted by governments.

Permaculture is often recognised as being relevant at the domestic and garden scale but failing to make much impact in commercial agriculture. What is less commonly understood is that some of the permaculture inspired experimentation at the domestic and garden scale has functioned as low cost organically evolving research and development, to create new agricultural enterprises⁴.

Sometimes production for household and exchange, acts as a stepping stone to becoming a commercial producer. In other cases, radical production methods or new crops are experimented with at a small scale (by existing farmers) before refinement and scaling up to commercial production. This refinement and change of scale often makes the commercially successful system unrecognisable as permaculture. Sometimes the innovator will see their own permaculture idealism discarded as they evolved more commercially viable systems.

In perhaps more cases, people inspired by permaculture to grow their own food have found the process difficult and, in a society where food has been cheap relative to wages, have given up gardening, let alone becoming farmers. But in the process most have become willing and ideal clients of commercial organic producers especially through CSAs.

The importance of these processes in past and future development of organic agriculture is poorly understood or documented. The self reliant culture and invisible economies of households and farms have been seen as remnants of past “subsistence” societies.

I believe that a robust culture of self reliance include widespread “garden agriculture” providing for household needs is one of the necessary preconditions to the societal respect and support for farmers as the providers of our “staff of life” as well as the stewards of the natural inheritance of future generations.

While permaculture can continue to pioneer innovative ecological farming strategies and techniques, I believe its greatest contribution is beyond the farm gate in developing ecologically designed household and community systems which complement and support organic agriculture.

⁴ See Article 8 - *Gardening As Agriculture*

Some of the strategies which reflect design to retain and reinvigorate household and farm self reliance and practical connection to our sources of sustenance include.

- Integration of ecological building, water harvesting, treatment and nutrient (including human) recycling in both garden and commercial agriculture.
- Marketing strategies and community involvement, focused on local food for local people, such as CSAs, farmers markets, WWOOFing, environmental education and skills training, and city farms.
- Local and regional currencies to prevent leakage of economic benefits out of rural communities.
- Successional land use development such as eco-villages (including the associated ethical investment) which allow more people to live on the farm and fund the infrastructure and capital investment needed to diversify land use, support value added enterprises, and provide an expanded internal market.
- Development projects in the ‘two-thirds’ world which foster innovative and integrated systems of ecological agriculture, water management and harvesting using empowering education and community development processes as well as building more direct and fair trade links to consumers of high value export crops.

Several papers and some of the site visits at this conference reflect the direct influence of permaculture concepts and teaching in developing some of the most progressive examples of organic agriculture. Most notably the Food Forest permaculture demonstration farm⁵ has received an award as one of the best organic farms in Australia.

If the organic movement is to grasp the nettle presented by global energy peak as an opportunity to implement a more fundamental change agenda then it will have to recognise its flirtation with input substitution farming, “clean food”, and globalised luxury markets, reflects a necessary but short lived phase (little more than a decade) in the history of organics. But a retreat to some comfortable past conception of organics is equally unrealistic.

Instead organic farming needs a conceptual and design framework which is

- founded on the provision of human needs through working relationships to nature,
- has a track record of bottom up personal and community based change and
- can accelerate the mutual reinforcement of the diverse range of concepts strategies and techniques in the natural, technological and human domains necessary for organic farming to achieve its true potential.

⁵ The Food Forest Gawler South Australia, permaculture demonstration and teaching centre and NASAA certified producers of pistachios and other crops run by Graham and Annemarie Brookman. See website <http://www.foodforest.com.au/>

IFOAM and its member organisations should support the adoption of permaculture education as a fundamental part of academic and technical training in organic agriculture. The place of permaculture should not be as an “alternative production system” but as an open ended “design framework”.

One of the reasons permaculture strategies will be particularly adaptive in the energy descent future is that it is informed by systems ecology concepts and Emergy accounting developed by Howard Odum⁶ and colleagues as a language for understanding complex natural and human systems, especially agriculture. While Emergy accounting is still not well recognised or understood in sustainability research and policy circles, it has great potential to provide a holistic and quantitative evaluation of organic food production consumption systems that can;

- Predict likely long term economic success including of different organic production systems
- Inform the development of minimum and best practise standards
- Promote organic agriculture at a sustainability policy level.

Better understood and more easily applied environmental evaluation tools such as Ecological Footprint and Natural Step have also influenced the development of permaculture strategies but the more fundamental nature of Emergy accounting suggests it could contribute more to the future development and success of organic agriculture and its recognition as ecologically and socially benign landuse which should be supported by public policies.

IFOAM should support the allocation of research funding for Emergy evaluations of innovative and traditional organic systems of production as well as the wider food supply chain.

VISION

The critical first few decades of energy descent could precipitate such fundamental changes that organic agriculture serving revived localised markets and nurtured by a culture of self reliance, becomes **the** conventional agriculture. But this process will not happen without the adoption of the best of ecological thinking tools and strategies. If we are successful, the terms Organic and Permaculture could both become redundant like colourful orange skins returned to the earth by our grandchildren enjoying the fruits of our endeavours.

⁶ Odum, H.T. *Environmental Accounting: Emergy and Environmental Decision Making*, Wiley 1996



PERMACULTURE AS RELOCALISATION

*This short piece was written late 2005 for the book **Relocalise** Now by Julian Darley and others, published by New Society Publishers in press July 2006. It followed my return from teaching on the west coast of North America where Relocalisation had become the buzz word in the peak oil and permaculture activist networks as an idea that could encompass many of our strategies and appeal to a very broad audience. It continues the theme of widening the popular understanding of permaculture and the design principles as universal ones for the energy descent era.*

The imminent peaking of global oil supply suggests a permanent decline in the energy available to support humanity. This energy descent future will demand ways of thinking and organisation that are fundamentally different from those that guided the continuous energy ascent era since European cultures conquered the Americas and began to tap fossil fuels. Peak oil promises to make “living with less”, a non-negotiable reality faster than the alarming evidence of emerging climatic catastrophe.

Most people who have seriously considered the energy descent future recognise that it will lead to, amongst other fundamental changes, the faltering and reversal of globalisation. A revitalisation, in some form, of local economy, community and politics should follow. This structural change reflects a deeper level of thinking and action than imagining which fuel source or sources we will use in the future.

Permaculture is a design system for living and land use in the energy descent era. It emerged during the first oil shock era [1970's]¹ and has steadily grown into a worldwide movement of practitioners, designers and activists. Permaculture strategies range from using local organic wastes to create fertile food gardens, or making use of microclimate to grow a greater diversity of crops, to natural buildings heated by the sun, or collecting rainwater and reusing grey water, as well as local currencies and community supported agriculture. All of these examples can all be thought of as localisation strategies².

Permaculture design starts with getting our own house (and especially garden) in order, then making the connections across the back fence, around the neighbourhood and throughout our networks. Instead of a focus on what is wrong with the world and what “they” should do, permaculture design and activism focuses on what we can do to live more self reliant lives, with less dependence on distant and centralised sources of water, food and fuel. Rather than a survivalist strategy for holding onto essential resources, permaculture harvests wastes and generates renewable abundance that will support the modest needs of self, kin and community.

Systems theory suggests that these micro scale solutions that grow to modest economies of scale, but spread like weeds, are more likely pathways to successful relocalisation than the contraction and breakup of mega systems although that may also make a contribution.

While permaculture solutions vary greatly depending on the conditions and culture, they are all informed by universal design principles that collectively generate localised solutions to ecologic, economic and social needs. For example, the design principle **Use Small and Slow Solutions** demands we look to resources and opportunities which tend to be localised and distributed rather than global and centralised. The principle **Use and Value Diversity** encourages a variety of solutions from place to place. The principle **Apply Self Regulation and Accept Feedback** demands a move to more self reliant ways of living that take account of natural limitations. The principle **Obtain A Yield** requires us to extend

¹ Mollison, B. & Holmgren, D. **Permaculture One** Corgi 1978

² For the scope of permaculture design solutions see Mollison, B. **Permaculture: A Designers Manual** Tagari 1988



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financial literacy to energy literacy so we know which parts of a system are providing the goods. Permaculture design principles combine the common sense of our grandparents with the latest understandings from systems ecology³.

Oil has been the quintessential global energy solution and the design thinking developed in the energy ascent era leads us to believe in the next singular and global energy solution and to dismiss solutions that, by their nature, cannot be applied on such a scale. This apparently self evident truth from the passing era is now a dangerous mindset that blinds us to the myriad of small local solutions and how they fit together to make for a prosperous way down from the peak of fossil energy. Permaculture helps us find and create those local solutions. At the same time it provides the thinking tools to detect the red herrings, false paths, dead ends and “Trojan horses” we will face while charting our descent of the energy mountain over the next few decades.

David Holmgren

Meliadora

Summer Solstice 2005

³ For an explanation of systems thinking and design principles of permaculture see Holmgren, D ***Permaculture: Principles and Pathways Beyond Sustainability*** Holmgren Design Services 2002. For a summary of the book see Article 36.



ENVIRONMENTAL VISIONARY CHALLENGES LANDCARE

*This press release represented an increase in my public advocacy on the value of naturalised vegetation, especially willows in response to the widespread and now local, willow destruction programs. The angry and evangelistic tone of this piece is unusual in my writing but reflects the fact that I tend to get worked up about issues that others ignore while I have little enthusiasm for outrage when many others are adequately articulating the case. Apart from a few letters in the local paper and some informal discussions with the Catchment Management Authority, there was no public response to my challenge for a debate at the time. As a result of these events we added the **Spring Creek Community Forest page** to our website and more recently my views on the value of wild willows were aired on ABC TV's Landline (25th June 2006) in a program that mostly shed the rosy glow of a human interest story on the subject of willow removal. The reissue of **Trees On The Treeless Plains: A revegetation manual for the Volcanic Landscapes of Central Victoria** as an eBook in July 2006 is significant in that it includes a section on willow management. Originally published in 1994 and based on research and design work in the mid 1980's it*



provides the more balanced valuing of indigenous and naturalised biodiversity, before the extreme domination of the biodiversity debate by nativist ideology forced me to more strongly advocate the value of naturalised vegetation. This tendency to play the devil's advocate and a deep distrust of populist dogmas is a recurring theme in my work.



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Why is David Holmgren, a well-known environmentalist and co-originator of the Permaculture concept¹ angry about local stream restoration programs? He is challenging those paid to manage our streams, locally or Statewide, to a public debate on the willow destruction programs.

Holmgren believes taxpayer's money has been used to degrade streams in the name of ecological restoration for many years, but it is only now that this twisted form of "nativist" environment ideology has arrived in Daylesford and Hepburn on a large scale. Major new works by excavators at the Breakneck Gorge confluence of Spring and Wombat Creeks are destroying sites of high scientific and community value and follow similar destruction below Excelsior Bridge, Shepherds Flat and at other localities in the Hepburn Shire.

If forest logging contractors were to disturb stream banks in this way, they would be banned from the forest. But this issue is not about reckless contractors. It is the advocates and bureaucrats trained in Natural Resource Management who need to be held accountable for this misuse of taxpayer's money. These publicly funded willow destruction programs are proceeding without having to undergo any independent environmental impact assessment or significant monitoring or evaluation of the results. Holmgren says they are driven by a "nativist" ideology that sees the presence of non-native species as both the primary indicator and cause of land degradation. "It is hard to resist the nativist ideology which has progressively captured the biodiversity conservation agenda over recent decades".

Facts about willows, such as that they are the most effective streamside trees in controlling erosion and absorbing sediment and nutrients, are ignored. The shading out of blackberries to create a low fire hazard shaded corridor that is an excellent barrier to grass and even forest fire is ignored. The value of willows for drought livestock fodder and potential for management to gain even greater productive and ecological values are ignored. The history of quiet unfunded management work by community volunteers in Spring Creek over two decades, and offers of consultancy input to develop win-win funded management of willows, have been ignored. The role of these willow forests in slowing and filtering the increasing urban storm water from Hepburn and Daylesford is ignored. The principles of catchment management, water sensitive urban design, and the precautionary principle have all been ignored.

Local landcare groups have been persuaded by evangelistic "experts", a flow of glossy propaganda, combined with funding offers and contractors with accelerating capacity and precision in stream makeovers.

The burning of the willow debris piles leaves soluble ash to be washed back into streams while the decay of the poisoned willow stumps releases phosphorus and sediment back into the water previously trapped in the massive rootmats. The misguided idea that replanting with wattle and gum trees, more lashings of herbicide, and fencing off

¹ See website www.holmgren.com.au

the stream corridor, recreates a functional ecosystem is irresponsible nonsense which inevitably results in reinvasion by blackberries and a huge increase in fire hazard as these dense unmanaged trees strands mature in their second decade.

It is interesting that this new work is on show for the statewide gathering of the Victorian Landcare Network this week at Bellinzona Grange. This closed-shop forum hosted by the local instigators of these programs from the North Central Catchment Management Authority will no doubt provide reinforcement to the fervent belief that this is "environmental best practice".

This affront to common sense and scientific evidence would not be so bad if it were simply a farmer or two experimenting with their section of streamside. The fact that public money is wasted to massively damage catchment and ecological values, and that it is promoted as landcare makes a mockery of the work of the visionary farmers and environmentalists who founded the Landcare movement in central Victoria 25 years ago.

During the 1990's the Spring Creek willow forest was extensively studied and managed by an informal group of local residents. Many more people experienced and heard about the value of the forest through study courses and tours while more locals began to make use of the tracks which have been maintained over the years at no cost to the taxpayer. This latest desecration on the edge of this valuable research site rings alarm bells for many who have spent time track making, tree planting or simply enjoying this little known part of the Hepburn Regional Park.

To put the ideology behind this assault, to the test, David Holmgren offers a challenge to any of those paid to manage our streams, locally or State-wide, to a public debate on the willow destruction programs, in the Daylesford Town Hall, or other appropriate venue. Tours of the willow forest and its desecration for the media and interested parties can be arranged.

Contact Su Dennett (03) 5348 3636 info@holmgren.com.au



SAWMILLS IN THE ENERGY DESCENT FUTURE

This letter to the editor of the local newspaper marks another turning point after four years of the Community Forest Management process instituted by the government (referred to in the 2002 letter, Article 31). As in many recent writings I use the opportunity to highlight how the energy descent future will change our perspectives about forests and forestry. These letters and the earlier Wombat Forest Submission (1995 Article 17) reflect my sense of responsibility to at least contribute to the possibility of more positive outcomes in the management of public forests but without a great deal of hope that they are forthcoming. Perhaps there is also an evolution from the more individual “expert submission” approach in 1995 to a more collaborative perspective, hoping for a community consensus, especially in the most recent letter.

Pat Liffman's suggestion (letter to editor Advocate 8th March) that if “experts of this caliber (referring to me) could be integrated into the Wood Working Group, timber production from the Wombat State Forest would soon become a niche product”. I appreciate recognition that our community includes the expertise and the vision to manage the forest and agree that community based management is a historic opportunity. However I have no more idea than anyone else how to solve the complex political and bureaucratic impasse that prevents resolution of the forest management issues.

I feel somewhat uncomfortable even discussing what form of timber management and harvesting might succeed the current system in the light of the news of closure of Dwyer's mill. While the management of the forest has been disastrous, I have always supported the small local mills as the best part of the whole forest management, harvesting, processing and marketing chain. The skill of local millers in producing timber from species (gum) with severe limitations, serving a wide range of customers and end uses, deserves recognition, as does the incredible deal we all got buying messmate as F8 green hardwood. As an occasional customer of both Boase and Dwyer over 20 years and an advocate of the local mills as one of the best sources for the socially and ecologically aware timber buyer, I feel a great sadness about this loss to our local community.

The frustrating irony in the loss of local mills, is that within a decade, the peak and permanent decline of global oil and gas supply will be driving a massive, if ad hoc relocalisation of economies everywhere in the world. The local mills represented one of the best assets we had for the “energy descent future” that has been the focus of my permaculture work for 30 years. Thirty years from now, the forest management controversies of the 1990's and early 2000's will look ridiculous in a world transformed by expensive and unreliable energy supplies and climatic instability. Hopefully there is still time, and the community capacity to nurture (amongst other urgent needs), a catchment forest ecology and economy that can sustainably yield water, energy and building materials for our children and grandchildren adapting to life without cheap and reliable access to the wealth we took for granted.

David Holmgren
Hepburn
March 2006



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PHOTOGRAPHIC ARCHIVE

**THE PHOTOS IN THIS COLLECTION PROVIDE
AUTOBIOGRAPHICAL LINKS TO THE ARTICLES IN
THE COLLECTED WRITINGS**



Photo One: Bill Mollison Tasmania during a plant stock collecting trip in 1975.

My close and intense working relationship with Bill during 1974-1976 brought together the ideas and the practice which we came to call permaculture [Ref 13]. It was almost two decades before I was able to stand back enough from my relationship with Bill to see him in a broader historical context of radical pioneers of sustainable land use in Australia mentioned in *Creating a History of the Australian Search for Sustainable Land Use*

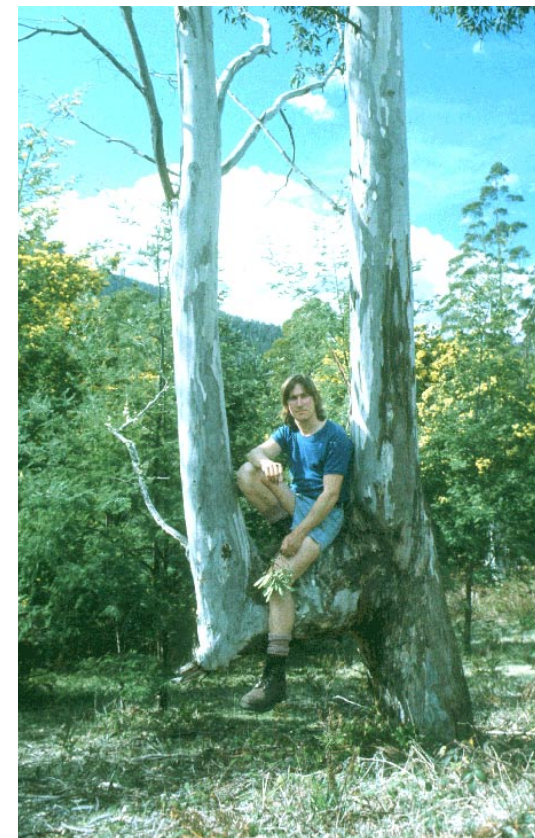


Photo Two: David Holmgren, Jacky's Marsh Tasmania 1978.

This photo by Bruce Hedge, permaculture activist and radio gardening show host, was taken during a visit to interview me the year *Permaculture One* [Ref 13] was published and about the time *Article One - Permaculture: Design for Cultivating Ecosystems* was written. The yellow spring blossom in the background is the prolific silver wattles referred to in the article. The apparently dead vegetation at my feet is the other two plants which feature in the article, Bracken and Blackberry. Although dormant from winter frosts they will both spring to life with the season change.



Photo Three: David Holmgren, Tasmania 1979.

This self portrait was taken during a break during a walk in a Myrtle Beech rainforest following my return from the very influential working trip to NZ reflected in Article Two. The photos and notes I took in the bush around this time were part of a very deliberate personal quest over several years to increase my reading landscape skills which lead to *Article Three: An Eclectic Approach to the Skills of Reading Landscape and their Application to Permaculture Consultancy*.



Photo Four: Jason Alexandra with bushfire salvaged Cypress sawlogs, Mt. Macedon central Victoria 1983.

In the aftermath of the Ash Wednesday fires, I developed a close working relationship with permaculture nurseryman, turned fire salvage logging entrepreneur, Jason Alexandra. For both of us that time had a profound influence in deepening our shared commitment to the role of farm and urban forestry as an important part of the vision of an abundant sustainable society. Some of abundance of salvaged cypress shelterbelt sawlogs which dwarf Jason (lower centre) in the photo built our house. (Ref 14).

Some of the inspiration expressed itself in Jason's later influence in promoting farm forestry as ACF National Landcare spokesperson mentioned in *Article Thirteen: Creating a History of the Australian Search for Sustainable Land Use* as well as the farm forestry design concepts published in *Trees On The Treeless Plains* (Ref 4) in 1994.



Photo Five: Haikai Tane, Waitaki Basin South Island N.Z. 1984.

I took this picture during my second visit to the N.Z. high country. This barren “naturally treeless” area has a semi arid climate with very cold winters, but the growth of suitable species of trees on the fresh glacial soils is nothing short of spectacular as illustrated by the 15 year old plantings in the valley. Haikai and his love of the NZ high country was very influential on the development of my ideas as reflected in *Articles Two & Three*. More information about Haikai Tané (Ref 2)



Photo Six: Terry White (hands on head) at the 1st International Permaculture Convergence at Pappinbarra, northern NSW 1984.

Terry played a pivotal role in the emergence of both the Permaculture and Landcare movements. Part of his role in the later is recorded in *Article Eighteen: The Landcare Movement: Community Based Design and Action on a Scale to Match the Continent*. This photo captured him explaining the workings of the *International Permaculture Journal* (Ref 17) to the conference. Also recognisable in the photo are three permaculture activists who have since then all been involved in varying ways in the Crystal Waters Eco-village. Hans Erkin (standing), Max Lindegger (glasses) and Dave Blewett (profile).



Photo Seven: Vern Howell clearing access for tree planting Spring Ck, Hepburn 1990.

A close working relationship with local bushman, chainsaw educator and social entrepreneur Vern Howell saw a considerable amount of my mental and physical energy focused on the ecological and social dynamics of weedscapes. *Article Twenty One - Permaculture And Revegetation: Conflict or Synthesis* deals with the wider issues but those ideas were strengthened and put into practise through working with Vern and others in a kind of ecological and social anarchy which played out in the Spring Creek "common" during the late 1980's & 90's.



Photo Eight: Hepburn Permaculture Gardens (Melliodora) in early spring 1991.

The intensive garden and orchard development phase of these years provided a context for an increase in my writing including *Article Eight - Gardening As Agriculture* as well as the work towards the book *Melliodora: Ten Years of Sustainable Living* (Ref 14).



Photo Nine: Su Dennett at home in Hepburn Springs 1991.

This was taken about the time of our active involvement in local planning issues covered in *Article Six - Submission in Response to a Review of Rural Land Use in Victoria*.



Photo Ten: Rod May measuring tree growth Kangaroo Hills central Victoria 1991.

In 1988 Rod May was project manager of a bicentennial Landcare project in the area north of his family organic farm at Blampied, central Victoria. As revegetation designer, I worked closely with him in implementing many of the revegetation design concepts I had researched over the preceding two years. These were later published in *Trees On The Treeless Plains* (Ref 4). *Article Eighteen: The Landcare Movement: Community Based Design And Action On A Scale To Match The Continent* mentions the part Rod played in the emergence of the Landcare movement.

Rod is also a leading player in the Australian organic agricultural movement, which has included a term as president of NASAA (Ref 16).



Photo Eleven: David Holmgren slashing spring pasture growth at Hepburn Permaculture Gardens in spring 1992.

Again the experience in designing, developing and managing our place informed writing at the time such as *Article Twelve - Lawns, Mowing and Mulch in Permaculture*.



Photo Twelve: David Holmgren at Avdat Research Farm, Negev desert Israel.

This photo by Michael Cowan shows part of the ancient Nabatean runoff irrigation systems, reconstructed and used by Michael Evenari and his team of researchers in the 1970's is shown in the photo. *Article Sixteen - Impressions of Israel: A Permaculture Perspective* includes reference to my "pilgrimage" to this site during my 6 month study and teaching tour of Israel and Europe in 1994.



Photo Thirteen: Prinzhöfte community North Germany 1994.

Lutz Wendeler [gesticulating centre] leading a tour of the permaculture teaching gardens at the Prinzhofte community, the venue for the 1994 European Permaculture Convergence, where I presented *Article Fifteen: Development Aid for the Industrialised North: Turning an Idea on its Head or "The Problem is the Solution"*. To the right of Lutz with hands on hips is Declan Kennedy, professor of architecture and facilitator of the spread of permaculture in Europe during the 1980's, as well as one of the leading lights of the Global Ecovillage Network [Ref 15]. At the far right, with hands in pockets, is Tony Anderson, architect and permaculture activist from Denmark, one of the organisers of the 4th International Permaculture Convergence in Copenhagen in 1993.



Photo Fourteen: Su Dennett, Haridas & Samantha Fairchild at Fryer's Forest Sept 1996.

As partners and co-directors of Fryer's Forest Research & Development, we were celebrating receiving the planning permit to proceed with the eco-village project [Ref 10] we had been working on since early '95.



Photo Fifteen: Fryer's Forest Open day October 1996.

Our first public gathering of interested people and prospective members at the community building site. *Article Twenty Four: Starting A Community: Some Early Lessons From Fryer's Forest* was written not long after.



Photo Sixteen: Stewart Hill and David Holmgren
Hepburn Permaculture Gardens autumn 1999.

Joy Finch, editor of *Green Connections* (Ref 11) took this photo at the time she introduced me to Stewart Hill (although I felt we had been colleagues for ages). As Chair of Social Ecology at University of Western Sydney, Stewart was able to combine his interests in personal health and social transformation with those in sustainable agriculture. About this time, he interviewed me as part of his research for *Ecological Pioneers: A Social History of Australian Ecological Thought & Action* (Ref 12) and gave me useful feedback on my articulation of permaculture principles in the manuscript of *Permaculture: Principles & Pathways Beyond Sustainability* (Ref 1) and wrote the forward for the book.



Photo Seventeen: David in recently thinned box forest regrowth,
Fryers Forest ecovillage central Victoria 2001.

I have long advocated the ecological and productive benefits of thinning regrowth native forest expressed in *Article Nineteen - Hemp as a Wood Paper Pulp Substitute? Environmental Solution or Diversion from Sustainable Forestry* but this article was written at the same time I was first able to put those ideas into action in the late 90's. Sustainable native forest management continues to be developed at Fryer's Forest (Ref 10) where the twin challenges of the forest ecology and the social ecology of an evolving eco-village come together.



Photo Eighteen: Oliver (16) Su and David at Melliodora November 2002.

On the eve of the publication of *Permaculture: Principles and Pathways Beyond Sustainability*. In the following years Oliver managed the property on several occasions while Su and I were away promoting the book and teaching.



Photo Nineteen: Melbourne comedian and social activist Rod Quantock launching *Permaculture: Principles and Pathways Beyond Sustainability* on the Yarra River (for the beginning of a journey around the world) during the Sustainable Living Festival Feb 2003.

The red haired woman in the foreground is Joy Finch editor of *Green Connections* magazine who published many of my articles in the 1990's. Seated on the wharf taking photos is Ian Lillington, permaculture co-teacher and editor of several of our publications including the first edition of *Collected Writings*. (see Book launch photo gallery on website.)



Photo Twenty: David getting the feel of weeding organic rice with traditional tools on organic farm in Kyushu Japan May 2004.

This month long study and teaching tour provided the material for *Article Thirty Seven - Permaculture In Japan: Foreign Idea or Indigenous Design*

(see Japan 04 Photo Gallery on website for more photographs)



Photo Twenty One: David and son Oliver (with chainsaw) thinning box eucalypt regrowth at Fryers Forest Jan 2005.

The experience at Fryers Forest further consolidated my ideas on sustainable forestry expressed in letters to the local papers *Articles Thirty Two* and *Forty Six* and my views about forests as more ecological and economic source of biofuels than agriculture in *Article Thirty Five - Biofuels from Sustainable Landuse: A permaculture perspective* and *Article Forty One - Firewood: Sustainable and Appropriate Energy Source*.



Photo Twenty Two: David, Cyrano Middleton and Tony Soccio raising the frame of a new building at Melliodora March 2005.

The timber was from Dwyers Sawmill, which was the subject of *Article Forty Six - Sawmills in the Energy Descent Future*. (see Melliodora photo gallery on website for more photos)



Photo Twenty Three: David and Richard Heinberg at Kinsale Ireland during the **Fueling the Future** conference (Ref. 25).

This meeting led to collaboration on a Australian speaking tour in Sept 2006 is most strongly reflected in *Permaculture as Relocalisation*, Article Forty Four.



Photo Twenty Four: David and Su (back left) and participants at Advanced Principles course held at Gudhorst Germany July 2005.

Declan Kennedy permaculture pioneer and leading teacher (now retired) front left. These courses allowed me to consolidate the focus on principles which I made in a keynote presentation (Article Forty Two) to the 7th International Permaculture Convergence in Croatia, shortly before in May 2005 (Ref 24). The permaculture principles card game was used as a final event on these two, three and four day courses (see Europe photo gallery on website).



Photo Nineteen: Su with Peter Bane and Keith Johnson at the office of the **Permaculture Activist**, Earthhaven eco-village North Carolina (Ref. 21).

Peter made one of the more in depth reviews of *Permaculture Principles and Pathways Beyond Sustainability* and the Activist published my review of *Invasion Biology* (Article Thirty Eight) (see North America photo gallery on website).



Photo Twenty Six: Graham Brookman of the Food Forest Gawler.

Permaculture co-teacher, organiser and facilitator of many of my South Australian public speaking events including the IFOAM address.



Photo Twenty Six: David presenting the keynote address (Article and presentation Forty Three) at the IFOAM conference in Adelaide SA in September 2005.



Photo Twenty Seven: David inspecting dying willow root mat in Jim Crow Creek after poisoning with herbicide by Catchment Management Authority.

This photo was part of the campaign we ran in late 2005 against so called Landcare activities in our area, See press release *Article Forty Five*. (see Spring Creek photo gallery on website.)



Photo Twenty Seven: Su posing over a banner extolling some of the community and ecological benefits of willows.

Part of a local street protest we organised. This focus on the positive aspects so called environmental weeds has stimulated some of the most extreme criticism of permaculture in general and especially my writings and action.



REFERENCES

The URL links on this page require a connection via the Internet to the World Wide Web

Reference 1

Holmgren, D. **Permaculture: Principles & Pathways Beyond Sustainability** Holmgren Design Services 2002

Essence of Permaculture [Article Thirty Six in this collection] provides an outline of the ideas in this book. See <http://www.holmgren.com.au/html/Writings/Writings.html>

Reference 2

Haikai Tané,

resource ecologist and planner with particular expertise in integrated catchment management, based in Twizel N.Z. For papers and projects by Haikai Tané. See <http://www.cyberport.net.nz/>

Reference 3

EmergySystems.Org

Central reference point for information about Emergy concepts and accounting methods including developed by pioneer systems ecologist H.T. Odum who is frequently referenced in writings by David Holmgren as a primary source informing the development of permaculture principles See <http://www.emergysystems.org/index.php>

Reference 4

Holmgren, D. **Trees On The Treeless Plains: Revegetation Manual For The Volcanic Landscapes of Central Victoria** Holmgren Design Services 1994.

Now available as an eBook. See <http://www.holmgren.com.au/html/Publications/TOTPhtml>

Reference 5

Sustainable Agriculture, Orange NSW campus of Charles Sturt University

This post graduate external studies course includes course material written by David Holmgren See http://www.csu.edu.au/courses/postgraduate/sustainable_agriculture/

Reference 6

Centre for Alternative Technology

in Wales is one of the largest and oldest ecological education organisations in Europe. See <http://www.cat.org.uk/>

Reference 7

Victorian Landcare Centre,

Creswick Victoria. Government funded courses and information [including Landcare For Educators course at which David Holmgren was a presenter]. See <http://www.alphaville.com.au/clc/>

Reference 8

Upper Spring Creek Management report to Daylesford Region Landcare Group

by David Holmgren.

Reflects permaculture design principles applied in a landcare context.

See <http://www.holmgren.com.au/html/Writings/Writings.html>

Reference 9

Michael Wilson **Post gold rush Stream regeneration: implications for managing exotic and native vegetation.** Centre for Environmental Management, University of Ballarat.

Presented at the Second Australian Stream Management Conference in February 1999.

Reference 10

Fryer's Forest

is a small eco-village of 11 residential lots and 100 hectares of managed common forest in Central Victoria designed and developed by David Holmgren and partners (photo 14).

See <http://www.holmgren.com.au/html/Fryers/fryers.html>

Reference 11

Green Connections

*The magazine began in 1995 as the newsletter of the Goldfields Permaculture and Landcarers. Through the magazine, editor and social entrepreneur Joy Finch, assisted by dedicated staff and volunteers, made central Victoria one of the dynamic centres of permaculture and sustainability networking and action. David had been a regular contributor to **Green Connections** and other events organised by Joy including the Edward De Bono presentation in Castlemaine in February 1998 [see Article Twenty Six]. When the **Permaculture International Journal** [Ref 17] folded in mid 2000, **Green Connections** took over the national subscribers and the role as voice of the permaculture movement. By issue 32 in December 2000, the same economic forces which brought down **PIJ** closed **Green Connections**.*

Reference 12

Mulligan, M. & Hill, S. **Ecological Pioneers: A Social History of Australian Ecological Thought & Action** Cambridge University Press 2001

Reference 13

Mollison, B. & Holmgren, D. **Permaculture One** Corgi 1978 [Out of Print].

See <http://www.holmgren.com.au/html/Publications/Publications.html>

Reference 14

Holmgren, D. **Melliodora: 10 Years of Sustainable Living** Holmgren Design Services 1996.

Also 2nd edition as eBook [2005].

See <http://www.holmgren.com.au/html/Publications/eBook.html>

Reference 15

Global Eco Village Network

An information network [with strong links to the permaculture movement] about intentional communities world wide. See <http://www.gaia.org/>

Reference 16**National Association for Sustainable Agriculture Australia**

The largest organic certification organisation in Australia. See <http://nasaa.com.au>

Reference 17**The Permaculture International Journal**

was the voice of the permaculture movement, nationally and internationally for 23 years from 1978 to 2000.

Terry White's inspired editing and almost single handed production of the first 25 issues of Journal did much to cement the interlocking of the permaculture concept with a wide array of sustainability activities and networks around his central Victorian region, Australia and the wider world. The refreshing combination of text, photos and drawings rolled off Terry's desktop and the local Maryborough printers and was nothing short of brilliant; all done in the days before the Mac computer became the essential desktop publishing tool (The Journal ceased publication in June 2000 with issue 75).

Reference 18**Students of Sustainability Conference**

held annually for the last 15 years at an Australian University.

See SOS 2006 website <http://www.studentsofsustainability.org/>

Reference 19**The Shell Economist Writing Prize**

is an international writing competiitiion held annually since 2000.

Reference 20**Solar Progress**

is the Journal of the Australian and New Zealand Solar Energy Society and covers renewable energy issues. See website <http://www.anzses.org/Journal/Journal.html>

Reference 21**The Permaculture Activist**

published by Peter Bane covers a broad spectrum of permaculture action and thinking, mostly but not exclusively North American. See website <http://www.permacultureactivist.net/>

Reference 22**The CSIRO Sustainability Network** facilitatored by Elizabeth Heij

See website <http://www.bml.csiro.au/sustnet.htm>

Reference 23**Renew magazine**

Published by the Alternative Technology Association.

See website http://www.ata.org.au/?page_id=15

Reference 24**IPC7** [The Seventh International Permaculture Convergence]

held in Croatia June 2005. See website <http://perma.superserver.dk/PermacultureConvergence>

Reference 25**Fuelling The Future** conference Kinsale Ireland.

See website <http://www.fuellingthefuture.org/>



CATALOGUE

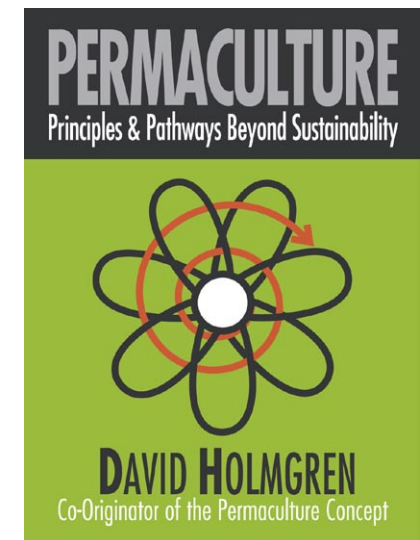
*We publish a limited number of permaculture books and teaching products authored by David Holmgren, the co-originator of the internationally acclaimed Permaculture concept of sustainability, first presented in **Permaculture One** [1978].*



HOLMGREN DESIGN SERVICES

The source of permaculture vision and innovation
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PERMACULTURE: PRINCIPLES & PATHWAYS BEYOND SUSTAINABILITY



This book uses permaculture principles as a framework for an empowering but challenging vision of creative adaptation to a world of energy descent. David Holmgren builds on the extraordinary success of the permaculture concept (which he co-originated with Bill Mollison 25 years ago) and the global permaculture movement, to provide a more cerebral and controversial contribution to the sustainability debate.

- 320 pages, graphics and design principle icons
- Available from the publisher and selected bookshops

"If the 'Permaculture Principles that David Holmgren discusses in this extremely important book were applied to all that we do, we would well be on the road to sustainability, and beyond.'" Professor Stuart B. Hill

Contents:

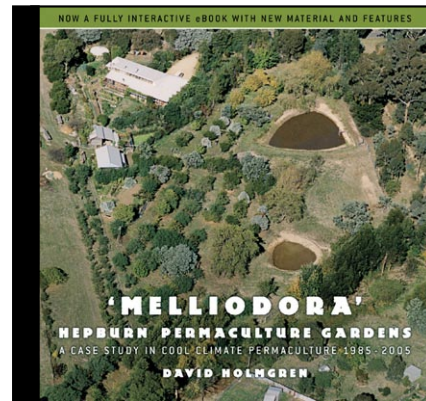
Introduction • What Is Permaculture? • Popular and academic reactions • Ethical and Design Principles

Ethical Principles • Care of the Earth • Care of People • Distribute Surplus and Set Limits to Consumption and Reproduction

Design Principles • Observe and Interact • Catch and Store Energy • Obtain a Yield • Apply Self Regulation and Accept Feedback • Use and Value Renewable Resources and Services • Produce No Waste • Design From Patterns To Details • Integrate Rather Than Segregate • Use Small and Slow Solutions • Use and Value Diversity • Use Edges and Value The Marginal • Creatively Use and Respond To Change

'MELLIODORA' HEPBURN PERMACULTURE GARDENS

A Case Study in Cool Climate Permaculture 1985 - 2005



This PC/ Mac compatible CD ROM format publication contains the original 1995 A3 format book *Melliodora: Ten Years of Sustainable Living* in digital form as well as new and updated material about this leading cool climate permaculture demonstration site.

The eBook is a pdf (viewable with Adobe Acrobat Reader) It includes all the book text, high resolution zoomable graphics and full colour high resolution versions of the photos as well as linkable new photos of key views showing the changes and growth over the last decade.

New sections include:

- House thermal performance upgrade and review
- Grid feedback photovoltaic installation and performance
- Cool cupboard review and design
- Animals update including goats and soil management
- Seasonal cycle photos

Built in navigation bar, jump buttons and text links allow you to cross reference, move around the eBook and get back to where you were.

Also on the CD: Virtual Tour

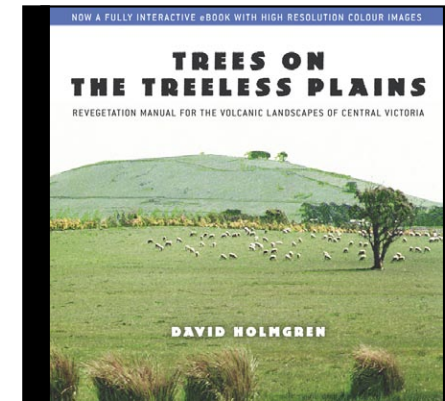
A virtual tour of the property (html file viewable with any web browser) starts from an interactive high resolution aerial view, zooming into each of the planting zones described in detail in the eBook. Selection of photo icons opens high quality photos and panoramas in separate windows. Clicking on the caption button gives you orientation and id info for each photo and panorama The virtual tour provides a snapshot of the property during a drought growing season (late 2003- early 2004).

Melliodora Promotional Download

A free low resolution downloadable copy of the introductory chapters plus some of the update photography gives you the feel of the eBook to view and share around.

TREES ON THE TREELESS PLAINS

Revegetation Manual for the Volcanic Landscapes of Central Victoria



This PC/ Mac compatible CD ROM format publication contains the original 1994 A4 format book *Trees On The Treeless Plains* that has been out of print for several years.

The eBook is a pdf (viewable with Adobe Acrobat Reader). It includes all the book text, high resolution zoomable graphics and full colour high resolution versions of the photos.

Includes:

- New foreword
- Excel spreadsheet of species index
- Complementary copy of the foldout printed map from the original book

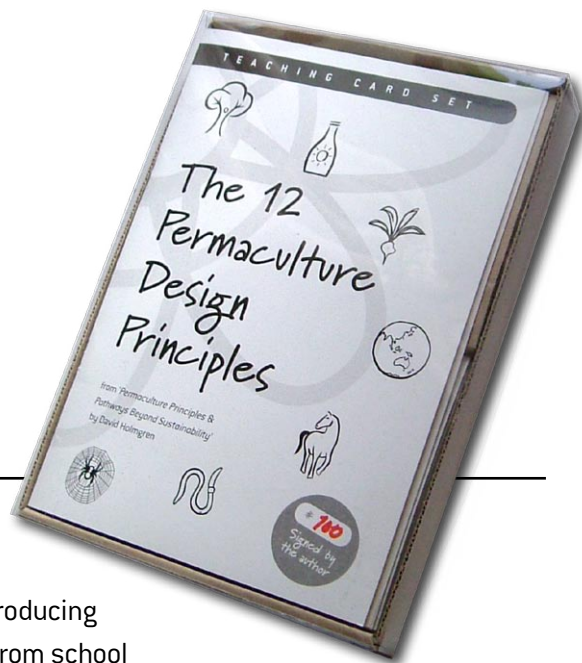
Built in navigation bar, jump buttons and text links allow you to cross reference, move around the eBook and get back to where you were.

This design manual is a result of years of research and observation into the role and potential of trees and shrubs on farms. It addresses the transformation of broader farm landscapes through the application of permaculture principles to revegetation. The manual includes revegetation strategies and design solutions relevant to increasing and diversifying farm productivity while stabilising the landscape. It also address the public land on roadsides, stream sides and reserves.

The case study approach of the manual uses the volcanic landscapes as a focus to describe land types, local native species and to provide strategies, design solutions and species lists. It is directly relevant to some of the most valuable agricultural land in Victoria including the extensive Western Districts. A comprehensive species index of native and introduced trees and shrubs with proven performance provides a ready guide to species selection for different situations and purposes. For private and public land managers of the volcanic landscapes this manual is an essential reference.

For a wider audience concerned with revegetation, this book provides a design system approach and principles applicable everywhere to assist in the development of local strategies and design solutions.

THE 12 PERMACULTURE DESIGN PRINCIPLES TEACHING KIT



This kit is designed as an aid to teaching ethics and principles on Permaculture Design Courses but will also be useful in introducing permaculture to a wide range of audiences from school children to design professionals. It can be used as a static display, a group revision game, or to present ethics and principles especially where audio visual equipment is not available.

The teaching kit consists of 52 cards and an explanatory booklet printed on recycled card stock and packed as a boxed set. Designed by graphic artist, Richard Telford, using striking icons, the principle card concept is based on a card set developed by Robin Clayfield and Skye, innovators in creative and participatory learning methods in permaculture.

These teaching cards do not explain the principles in any depth. For an introduction to the scope of permaculture, and each principle read the Essence of Permaculture. For a full understanding of this format and explanation of permaculture principles, read *Permaculture: Principles & Pathways Beyond Sustainability*.

For each of the twelve design principles there are four cards; principle, icon, proverb (black on white) and photo (full colour). For each of the ethics, there is a single card with the ethic, icon and action statement.

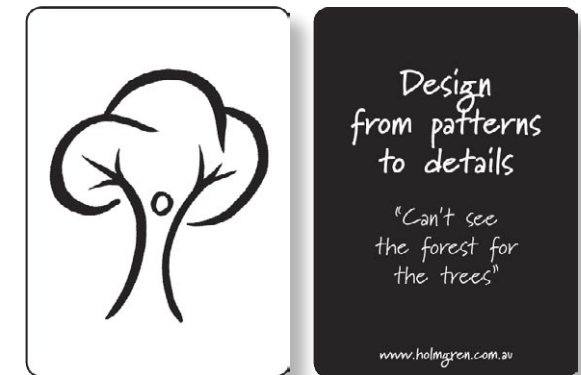
A set of fridge magnets of the ethics and principles is included in the kit.

This teaching kit will be useful for anyone involved in permaculture and environmental education wanting a condensed way to communicate and remember the essence of the powerful concepts explained in *Permaculture: Principles & Pathways Beyond Sustainability*

The Kit:

A5 box with 20 page A5 booklet, 52x66 sized cards, 40 b&w on 300gsm - booklet and b&w cards printed on 100% recycled stock, 12 colour cards - on 250gsm, 15 fridge magnets 5cm x 7cm. The first 200 copies have been numbered and signed by the author.

PERMACULTURE ETHICS & PRINCIPLES FRIDGE MAGNETS



Show how permaculture is more than gardening!

Bring permaculture ethics and principles into everyday life with this set of fifteen magnets each with a simple graphic representing a core permaculture concept. Turn the magnet over to read the principle and proverb. Great memory tool for permaculture teaching, daily living and spreading the permaculture message to friends and family including children.

15 double sided black and white fridge magnets 5cm x 7cm

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Check our website for pricing and payment options www.holmgren.com.au

Cheque or money orders can be made out to:

Holmgren Design Services
16 Fourteenth Street, Hepburn, Victoria 3461, Australia

Email us for inquiries about discounts on bulk orders: info@holmgren.com.au

N.Z. distribution

- Living Lightly: Principles & Pathways, Melliodora, Collected Writings CD

U.S.A. distribution

- Chelsea Green: Principles & Pathways, Melliodora
- Permaculture Activist: Collected Writings CD, Principles & Pathways

U.K. distribution

- Permanent Publications: Principles & Pathways, Melliodora, Collected Writings CD