

## 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.

### DEVELOPMENT OF THE PERMACULTURE CONCEPT

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*<sup>1</sup> 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 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 Odum<sup>2</sup> 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

<sup>1</sup> Reeve, I Sustainable Agriculture: Ecological Imperative or Economic Impossibility? Rural Development Centre UNE Armidale 1990

<sup>2</sup> 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.

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, 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 a 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 work<sup>3</sup> 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 concept remains 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 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.

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

### **Tree crops; economic botany**

The work of J Russell Smith<sup>4</sup> 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 century<sup>5</sup>. 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 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.

### **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 learn.<sup>6</sup> 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<sup>7</sup> in 1978, the same year as

<sup>4</sup> Russell Smith, J. Tree Crops: A Permanent Agriculture Devain Adair 1953.

<sup>5</sup> Maiden, J.H. Useful Native Plants of Australia. Compendium 1975

<sup>6</sup> See Aboriginal Land Use for my own explorations of these ideas

<sup>7</sup> Fukuoka, M. The One Straw Revolution Rodale Press 1978 and The Natural Way of Farming Japan Publications 1985.

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, and 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.<sup>8</sup> 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.

### **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

<sup>8</sup> Anon. Good crops, and an end to soil damage in ECOS no.69 Spring 1991

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 increasing 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 permaculturalists 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 permaculturalists. 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 permaculture<sup>9</sup> 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

<sup>9</sup> Mollison, B. & Slay, R. Introduction to Permaculture Tagari 1991

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.

### **Pattern understanding**

Mollison<sup>10</sup> 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 involved.<sup>11</sup>

It can be argued that permaculture has been a catalyst contributing to creative new directions

<sup>10</sup> Mollison, B. Permaculture: A Designers Manual Tagari 1988

<sup>11</sup> See story about Terry White and Project Branchout in The Landcare Movement: Community Based Design and Action On A Scale To Match The Continent

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by thinkers and practitioners who are at the forefront of sustainable land use. These people are generally identified with much more mainstream concepts and 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 history<sup>12</sup> 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.

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<sup>12</sup> Thompson, W.I. in Journal of the New Alchemy Institute Stephen Green Press