Keynote Speaker at the first annual Kachana Landscape Management Workshop, 4-6 Sept 2002: Kester A. Baines, B.H.Sc., N.D., Dip.Hom.

Kester is a Fellow of the Australian Natural Therapists Association. He is member of the Homoeopathic Education & Research Association, the Orthomolecular Medical Association of Australia and the Natural Health Society of Australia. He and his wife Suzanne manage the Raphael Centre of Natural Healing in Geelong, Victoria. Kester offers us the benefit of 22 years of experience in his field. He has particular interest in clinical nutrition, functional medicine, and herbal and homoeopathic therapies, and is currently working on a plan to make natural therapies more accessible in outback Australia. Other interests include agroforestry, organic farming and gardening, natural history, and restoring habitat to a small property in the Otway foothills.

Kester visited the Kimberley in October 1999 when he addressed the Rotary Club of Kununurra.

Talk 2 – "Healthy soils, healthy food, healthy environment"
- Kester A. Baines B.H.Sc., N.D., Dip.Hom.

Let me say at the outset that I am not an expert in soil science. But I understand that the vitality and diversity of life in the soil, and its bio-available mineral content, has a huge bearing on the quality and nutritional value of food produced on and in it.

At the risk of restating what is common knowledge amongst us all here, let's quickly review the physical aspects of soil formation. Living soils are not just a physical medium to hold plants upright. The parent rock provides the inorganic materials (sands, clays, etc.) through physical, chemical and biological weathering processes. They may be in situ or may have been transported short or vast distances by wind, water or ice (eolian, alluvial or glacial deposits). The mineral content varies tremendously depending on the content in the parent rock, how soluble the minerals are, how long they've been exposed to leaching, etc. Minerals may be present in large amounts, such as calcium in a limestone soil (let's be grateful for the "terra rossa" of the Coonawarra and elsewhere for the great reds they produce!). There may be trace minerals such as selenium, manganese, zinc, copper and molybdenum, which are extremely important for plant and animal health. Many plants in impoverished soils, such as in many parts of Australia, have adapted to the low nutrient levels. The organically derived fraction is also vitally important. It comes from decaying plant matter, decaying animal material and material processed through animals (faeces and urine). Bacteria, fungi, and many other organisms are feeding on and transforming this plant and animal material and each other. It's a bug eat bug world down there! There are myriad symbiotic relationships with each other and with plants. (Obvious ones in my part of the world include fly agarics with pines and birches, and death caps with oaks.) When foresters tried to grow pines from seed in Western Australia the project was a failure until they realized they had to inoculate the soil with the right kind of fungi.

Ultimately, the welfare of the soils and the welfare of civilization and the human race are inseparable. We in the West put so much attention and energy into things such as the economy, video games, cars, houses, clothes and consumer goods, but in the final analysis, they are meaningless if the soils are depleted and dying.

We take food and its production so much for granted, because it has been abundant and cheap for so long. I had a patient who had grown up in wartime Berlin. To catch a rat was cause for celebration. (Manuel would have called it a Siberian hamster!) It was meat. Also during WWII, my parents used to send food parcels to a family in England. With one parcel, the family was down to the last can. It had been left to last because the label had come off and been lost. They opened it. It was butter. They cried tears of joy. Baby boomers, Generation X and whatever today's kids are called would not understand that. As I said, we take food very much for granted.

Our increasing dependence on industry, technology and fossil fuels for the production, transport, storage and distribution of food has freed up a lot of time for the vast majority of us to get on and focus on other things. But, I believe, this has also not only compromised the nutritional and flavour quality of our food, but has created a situation of great vulnerability for us. In a sense, we are putting all our eggs in one basket, that of industrial agribusiness. We are now dependent on corporate-based commercial activity for our food supply and are rapidly losing the self-reliance and broad-based skills and knowledge of food production which characterized earlier times of family farms and home-based gardening and animal husbandry. Whereas 100 years ago about half the workforce was engaged in agriculture, now it is only a few percent. So there has been a huge increase in productivity when considered on an output per worker basis. But this has been at the cost of environmentally unsustainable practices, consumption of non-renewable inputs, and huge social disruption through drift to the cities and decay of rural communities.

Of course, modern agricultural practices have produced many benefits. Some people, either actively involved in food production or as owners and shareholders of agribusiness companies, have made a lot of money. (Some others would say that if they won Tattslotto, they'd just keep on farming until it was all gone!) Some of the farm workers made redundant, or their descendants, have provided labour for the expansion of other sectors of the economy in predominantly city-based industries. Modern transport and refrigeration have reduced our vulnerability to local or regional crop failures and drought. They have allowed efficient export of surplus production, earning foreign exchange which ultimately raises our material standard of living. You can rug up, run from your car through the freezing rain and icy south-westerly blast, into a suburban supermarket in Melbourne or Hobart in July, and buy North American cherries, Queensland green beans and Kununurra butternuts. And food is comparatively cheap relative to average incomes, especially if one buys fresh and unprocessed foods rather than pre-packaged, processed and take-away meals.

But, my question is, at what price have these benefits come? As we try to control our world and create security, have we replaced one set of vulnerabilities with another, potentially much more disastrous?

As we move on to look at the down-side of modern industrial agriculture, I hope you won't get the impression that I want to return to some romanticized notion of pre-industrial Arcadian bliss. No. Life was very hard in those times. But people had a deep connection with the soil (not only because they rarely washed!). They had a respect for the skills and knowledge of farming and herding which were handed down from generation to generation, and people had a sense of place and belonging. They were in tune with weather patterns, the cycle of the seasons and the interdependency of all the known elements in the natural environment. But even then, some of their practices were unsustainable, and civilizations waxed and waned as a result.

I mentioned in my first talk that a great weakness of our industrial economy is that the true cost of products is not factored into the price they are sold for. This is certainly true for the products of modern industrial agriculture.

Let's examine some of these costs, which are not only financial, but environmental and social as well. When you apply triple-bottom-line assessment criteria to agribusiness, it, quite simply, fails the test.

Erosion

- European farming methods transplanted to the driest continent
- wind erosion – Aussie topsoil colours the snow of the NZ southern Alps
  - precious topsoil layer declining each year
  - average depth of topsoil in USA has declined from 52cm to 15cm in past hundred years
- water erosion – deforestation (e.g. Asia) ? flooding, scouring
  - agricultural and rangeland practices – sheet, gully, tunnel erosion, streambank trampling and undercutting, etc.

Salinity

- 6M ha affected in Aust in 2000; est. 17M ha by 2050
- land clearing – we are worst in the developed world – rising water table brings salts to the surface
- irrigation – also causes rising water table
- dams for irrigation prevent flooding needed for regeneration of riparian environments; cold water release from dams affects fish spawning; dams prevent fish migration; 14 large dams and 4000 weirs on Murray-Darling system alone
- salinity has massive impact on agricultural productivity and biodiversity

Desertification

- can result from dry-land cropping and inappropriate grazing practices, especially in what Allan Savory calls "brittle" environments

Loss of biodiversity

- large monocultures cause drastic reduction in quantity and variety of wildlife habitat, and hence reduction in number of species and number of individuals
- consolidation of farms and removal of hedgerows (UK)
- decline of birds and predatory insects can cause population explosions in "pest" species

Decline or loss of soil structure, fertility and micro-organism populations

- synthetic fertilizer, herbicide and pesticide use decimates soil macrofauna such as earthworms, and micro-organisms such as bacteria and fungi, which are crucial to breakdown of organic detritus, recycling of nutrients, aeration of the soil, and water penetration
- after at least 13 years without superphosphate application on our pastures at Bambra, only in the last couple of years have mushrooms started to reappear
- compaction by heavy machinery alters soil structure and promotes development of hardpan
- plants take about 50 nutrients out of the soil as they grow; farmers commonly put back only three: nitrogen, phosphorus and potassium, although trace mineral formulas are available; superphosphate is acidic and contains trace levels of cadmium, a metal contaminant which is very toxic especially in the presence of zinc deficiency, which is the case with many Australian soils due to millions of years of leaching

Decline of nutritional value of food

- mass spectrometer analysis of fruit and vegetables shows much lower levels of beneficial minerals in conventionally grown as compared to organically grown produce
- nutrient density and flavour in conventional produce is often less due to "forcing" to create higher water content, hence higher weight, higher profit
- because markets may be far from farms, produce is picked green to prevent bruising and over-ripening in transit; result is poor flavour and texture and low levels of important phytonutrients which the plant manufactures in the last few days of natural bush-ripening

Contamination of food

- pesticides e.g. organophosphates, organochlorines – chemically related to the nerve gases developed by the Nazis in WWII; neurodegenerative diseases such as Parkinson's disease and motor neurone disease are more prevalent in farm workers and industrially exposed workers; how safe are the low levels in food? Known to cause long term endocrine and immune dysfunction and insidious neurological damage at low doses, and cancer and direct toxic effects at higher doses
- herbicides; may have trace levels of highly toxic contaminants such as dioxin? (one of the most toxic and carcinogenic substances known)
- hormones, and hormonal effects of industrial and agricultural chemicals (mainly oestrogenic) (Everglades alligators; decline in male fertility in humans)

- antibiotics; used as growth promoters; big problem with promoting growth of antibiotic-resistant bacteria
- label warning frequently ignored and mix strengths increased, withholding periods not observed; in many countries a high proportion of agricultural workers are illiterate
- toxins can have synergistic effect (explain LD1 plus LD1 can produce LD100, and bell curve effect of toxins on health of populations)
- trans-species genetic modification of food plants and animals; unforeseen consequences e.g. superweeds (Round-up resistant canola now ranked 14 on list of most important weed species in Canada after only five or six years); allergies e.g. brazil nut protein in soy beans; people's right to know what they are eating; contamination by cross-pollination with wild or domesticated naturally-bred related strains (refer Mexican study); loss of organic certification and markets; benefits grossly over-rated and decline with subsequent plantings; "terminator" genes; can never put the genie back in the bottle, but the headlong rush for genetic gold continues; not all experts agree that GM is the way to go (refer Eminent Scientists Comment summary -118 scientists, quote Dr Norman Ellstrand, Professor of Genetics at U. of California); the precautionary principle

Shrinking of the food plant and animal gene pool

- drastic reduction in number of varieties planted as agribusiness expands and multinational companies gain greater control over world agriculture; farmers seduced to buy seed of high yield varieties which need large inputs of chemical fertilizers and pesticides to perform, chemicals conveniently available to them from the same companies that supplied the seed; Asia used to grow thousands of varieties of rice, now down to about twelve; increased vulnerability to crop-loss from disease (quote Vandana Shiva re suicides in Indian farmers)

Loss of rural employment and decline in viability of family farms and rural towns

- "get big or get out" – farm consolidation, increased mechanization, increased ownership of farms by agribusiness companies; exodus of rural young people to cities; flow-on effect – decline of local businesses as population base shrinks; contrasting prosperity of regional centres and capital cities

Unethical practices of agribusiness companies

- cruelty (battery hens for egg production, factory "farming" of chickens, pigs and cattle in feedlots) – animals with feelings and instincts, creatures which need to roam free, scratch in the dirt and interact socially);
- waste of protein – feedlots are the greatest protein sink in the world;
- plant patents – piracy of indigenous peoples' knowledge in some cases; locking small farmers into high input varieties as mentioned
- "bully boy" tactics with regard to GMOs (refer Percy Schmeiser speech)

Pollution of the environment

- greenhouse gas emissions from burning of fossil fuels in production and transport
- pesticide/herbicide manufacture and use – effect on non-target species in situ, from spray drift and run-off, from incorporation into the food chain; direct toxic effects and hormone-mimicking effects
- effluent from factory fams; toxic algal blooms from phosphate and nitrate run-off; sediments and nutrients from sugar cane farms killing Great Barrier Reef, for sugar, a deleterious food!

So, to summarise those problems with modern agriculture, (read sub-headings)

HOW MUCH DOES CHEAP FOOD COST WHEN YOU TAKE ALL THESE FACTORS INTO ACCOUNT?

Leaving aside the question of nutritional quality for the moment, even if we just consider such factors as reliability of supply and the effect of food production on the wider environment I think there are serious negatives with current practices that must be resolved in the immediate future. Agriculture as we presently practise it is unsustainable. Manasobu Fukuoka, a Japanese microbiologist, farmer and author who has spent the last half century researching a gentler, more productive, sustainable, and people- and environment-friendly approach to agriculture, had this to say: "When the farmer forgets the land to which he owes his existence and becomes concerned only with his own self-interest, when the consumer is no longer able to distinguish between food as the staff of life and food as merely nutrition, when the administrator looks down his nose at farmers and the industrialist scoffs at nature, then the land will answer with its death. Nature is not so kind as to forewarn a humanity so foolish as this."

How can we improve the situation?

I believe most farmers, especially if they have generational links to the land, *do* want to care for it and use it in a sustainable way, maybe even pass it on in better condition. The problem is that so often short-term financial imperatives penalize the person who wants to do the right thing. This is the problem with our economic system, which we have spoken of earlier, and is compounded by the fact that the true costs are not being factored in to the prices being offered by the responsible farmer's competitors. That the system must change is not in doubt, but that will take decades. In the immediate sense, it may be that if the farmer can look laterally and see that he or she can serve a market which is prepared to pay a premium price for sustainably produced, nutritious, flavourful, uncontaminated food, then what was an economic liability becomes an opportunity to make a good living with a clear conscience.

The demand for so-called "clean, green" food, produced organically without chemical sprays and synthetic fertilizers, is exploding in the developed world. Demand outstrips supply in Europe, North America and Australia, which is part of the reason why organic food costs more. Another reason is that it *is* more labour-intensive to produce (although Fukuoka with his non-tillage approach may dispute that – he says he is the laziest farmer

in the world and his yields are amazing!). In terms of productivity, you sometimes hear the comment that we would all starve if we had to rely on organic farming. This is a fallacy. It is true that the productivity *per worker* is higher with mechanized industrial agriculture, but when you compare productivity *per hectare* or *per kilojoule of energy input* then mechanized industrial agriculture is laughably inefficient compared to natural farming.

So I ask, what would be so wrong with creating some jobs in the agricultural sector and teaching people to farm sustainably? Is farming such an ignoble profession that we wanted to get as many people out of it as quickly as possible? Or was it just that more money could be made more quickly by sacking the workers and bringing in the machines and the sprays?

There are many aspects to a more sustainable economy and sustainable means of industrial and agricultural production. Two approaches relevant to soil health and food production which I'd like to mention briefly are Biodynamics and Permaculture.

Biodynamic farming

When Rudolph Steiner died in 1925 he left behind an amazing legacy in the fields of literature, philosophy, education, medicine and agriculture. Though a highly educated scientist, he became known for his capacity to access knowledge on an intuitive level. His prescriptions for sustainable farming are just too way out for orthodox agronomists and scientists to get their heads around. But surely part of the scientific method is to dispassionately evaluate the evidence. Rather that saying "I don't understand how this could work, therefore I don't believe it does work" we should look at the results in terms of soil health, agricultural yields and quality of produce. Steiner's methods tap into the energetic realm rather than operating on a purely material level, using lunar and planetary positions to assist with planting times and using virtually homoeopathic preparations of fertilizer and other naturally prepared sprays.

Only recently did I realize that Alex Podolinsky who lives just outside Melbourne has had such a pivotal role in the establishment of biodynamic methods worldwide, and we are well placed to tap into the wealth of knowledge and experience that he and other local growers have accumulated.

Permaculture

In the early 1970s in Tasmania, Bill Mollison and David Holmgren developed a framework for a sustainable agricultural system, which they called permaculture. It evolved into a design system for creating sustainable human environments. "The word itself is a contraction not only of permanent agriculture but also of permanent culture, as cultures cannot survive for long without a sustainable agricultural base and landuse ethic. On one level, permaculture deals with plants, animals, buildings and infrastructures (such as water, energy, communications). However, permaculture is not about these elements

themselves, but rather about the relationships we can create between them by the way we place them in the landscape.

"The aim is to create systems that are ecologically sound and economically viable, which provide for their own needs, do not exploit or pollute, and are therefore sustainable in the long term. Permaculture uses the inherent qualities of plants and animals combined with the natural characteristics of landscapes and structures to produce a life-supporting system for city and country, using the smallest practical area.

"Permaculture is based on the observation of natural systems, the wisdom contained in traditional farming systems, and modern scientific and technological knowledge. Although based on ecological models, permaculture creates a *cultivated* ecology, which is designed to produce more human and animal food than is generally found in nature."

PRINCIPLES OF PERMACULTURE

1. **Work with nature rather than against it**
   Information from the observation of natural processes is applied to maximize yields, using biological resources to save energy and do work.
2. **Relative location and connections**
   Efficient function is achieved by careful placement of elements to enable them to form useful connections.
3. **Every element (plant, animal or structure) should be placed so that it serves at least two functions**
4. **Every major function is served in two or more ways**
5. **Make the least change for the greatest possible effect**
6. **Efficient energy planning is essential**
   Zone Sector Slope Cycling
   Good design makes maximum use of minimal land … small-scale intensive systems.
7. **All systems evolve … succession**
   e.g. coastal sand dunes, bush after fire, bare earth
   Old deserts of Central Australia have up to 3000 species of woody plants while the newer deserts of SW Asia can have as few as 150 species surviving the recent change from forest. The designed system itself evolves.
8. **Diversity**
   In mimicry of natural systems, increasing diversity leads to increasing stability provided there is an increase in the number of beneficial interactions between elements.
9. **Patterning – edge effects**
   By extending and exaggerating boundaries**,** yields of systems can be increased. All natural systems are more productive at the interface of zones.
10. **Everything gardens!**
    Everything affects its environment by its very existence. Our challenge is to make our effect minimal while seeing the effects of other species as potential solutions not problems.

11. The theoretical yield of a system is limited only by the imagination of the designer

12. **Think globally, act locally**
Needs are satisfied by local resources wherever possible.

THE ABOVE PRINCIPLES CAN BE APPLIED TO ANY SITE IN ANY CLIMATIC ZONE … IT IS THE STRATEGIES AND TECHNIQUES ADOPTED TO ENABLE THEIR APPLICATION WHICH WILL DIFFER.

Refer: *Introduction to Permaculture* **– Bill Mollison**
Earth User's Guide to Permaculture **– Rosemary Morrow**

To summarize the benefits of a natural organic approach to farming:

We need to change to:

ORGANIC FARMING, Biodynamics, agroforestry, Permaculture, Holistic Management of rangelands, urban forestry, urban community gardens, etc., to:

- Produce safe, nutritious food
- Enhance individual and family health - mental, emotional and physical
- Restore health to soils
- Reduce erosion, salinity and desertification
- Increase habitat and biodiversity
- Increase employment, especially in rural areas
- Promote decentralization and viability of rural communities
- Reduce pollution and greenhouse gas emissions
- Diversify knowledge of food production techniques
- Enhance awareness of and respect for nature, re-establish links between people and the land
- Reduce dependence on and support of morally bankrupt multinational agribusiness companies
- Maintain gene pool of plant and animal varieties
- Promote sustainable production

The change to organic farming will require a transition phase – it takes years to rebuild soil health and fertility. This will happen as more and more growers recognize the commercial potential, domestic and export, of "clean, green" food. We as consumers, and the government, must encourage and facilitate this.

So, what the world needs is a sense of humus! Compost, animal manures, green manure crops, organic material that bugs can thrive on to condition the soil and make it plant heaven. And maybe some rock dust to add minerals that can be turned into colloidal bio-

available forms for plant uptake and better health for the people and animals that eat those plants. Living soils, healthy plants, sustainable production, clean environment, healthy animals and healthy people.

I'd like to end this session with three brief quotes:

We, the undersigned, senior members of the world's scientific community, hereby warn all humanity of what lies ahead. A great change in our stewardship of the Earth and the life on it is required if vast human misery is to be avoided and our global home on this planet is not to be irretrievably mutilated.

- from "World Scientists' Warning to Humanity"
  November, 1992. Signed by over 1600 of the world's senior scientists, including more than half of all living Nobel laureates.

The "Washington Post" and the "New York Times" decided that this statement by world scientists was not sufficiently newsworthy to warrant reporting it.

Has much changed since then?

Another quote:

One of the penalties of an ecological education is that one lives alone in a world of words. Much of the damage inflicted on land is quite invisible to laymen. An ecologist must either harden his shell and make believe that the consequences of science are none of his business, or he must be a doctor who sees the marks of death in a community that believes itself well and does not want to be told otherwise.

- Aldo Leopold, pioneering ecologist

Finally:

It is the story of all life that is good to tell, and of us two-leggeds sharing in it with the four-leggeds and the wings of the air and all green things; for these are children of one mother and their father is one Spirit.

- Black Elk, Sioux elder

To me, it is an extraordinary arrogance (hubris, if you prefer) to think that science and technology have taken us beyond our deep and total dependence on the viability and balance of nature. We have barely begun to understand the intricacies and interconnectedness of the natural systems and processes on which we depend. When outcomes are in doubt, surely the "precautionary principle" must always apply. What will it take to make us realize that we cannot eat money?