



Bee keeping for the energy descent future

David Holmgren

January 2011

Summer solstice, the social high point of our year is past and I am in reflective mode over the Christmas period (traditionally a quiet one at [Melliodora](#).) Su has decided to open the largest of her 4 bee hives and finds it brim full. Definitely time to extract! She works the bees (by far the most numerous of her “girls” that include goats, chooks and geese). My job is uncapping the frames and spinning them in the extractor. Uncapping 16 frames full of tagasaste and yellow box honey today gave me time to reflect on the prospects for apiculture (bee keeping) as a sustainable and resilient livelihood in the future.



Su learning the art of reading a frame of comb and bees at Melliodora 2007 from urban bee keeper Andy Carter.

I have never been a bee keeper (due to adverse reactions to stings) but my enthusiasm for apiculture goes back a long way. Apiculture was one of the cornerstones (along with horticulture, silviculture and aquaculture) of my mid 70's research of sustainable and resilient land use that informed permaculture.

From a permaculture perspective, bees can be beneficially added to any system, improving pollination of crops while yielding concentrated storable sugar with additional nutritional values, not to mention pollen, bees wax, and other special minor



yields. All of this can be achieved without detracting from any other yield or use in the system.

In [Permaculture One](#) (published in 1978), [Bill Mollison](#) and I suggested extensive planting of bee forage species, not so much to attempt to provide major nectar and pollen sources but more to fill the seasonal gaps for sedentary (permanently located) hives. We recognised that the migratory nature of Australian commercial apiculture was dependent on cheap fossil fuel, while feeding to support sedentary hives through cold winters didn't inspire us as sustainable either.

In 1979, [Haikai Tane](#), a passionate apiarist (and my second mentor in permaculture) introduced me to his vision of rural resettlement of the New Zealand South Island high country based on bees and trees. The bees foraged the pastoral weeds hated by the graziers, while replanted and wilding trees of mixed food and timber forests would massively expand the resource base.

Honey production is one of the few yields that has not significantly increased as a result of the industrialisation of agriculture. The gains in honey yields from sugar feeding, chemical control of pests and diseases and migratory harvesting across whole continents have been neutralised by the loss of forage from forests, wild spaces and pastures combined with the increasing toxicity of agricultural landscapes. In the USA and Europe pollination services for massive monocultures, rather than honey, provide most apiarists with a living.

The exclusion, morbidity and mortality of bees due to the industrialisation of agriculture should be seen as "the real canary in the coalmine" warning us that we might be next. One of the most shocking facts revealed in the doco [Honeybee Blues](#), is that it takes more than half the bee hives in the USA to pollinate the Californian almond crop (50% of world production of almonds) and that it still requires an annual airlift of verroa mite free bees from Australia to complete the job. The arrival of verroa in Australia could see the collapse of almond yields in California (and a consequent spike in the world price of almonds).

In Australia the absence of agricultural subsidies has fortuitously resulted in less chemical drenched agricultural landscapes where most bee keepers still manage to earn a living from honey harvested from crops, pastures, weeds and of course our ubiquitous eucalypts. Our extensive rangelands and forests provide bee forage on a continental scale with minimal toxins to bother the bees. The downside is our notoriously erratic seasons and ecologies to match with nectar flows that vary massively from season to season and place to place. Migratory apiculture is a fact of life for Australian bee keepers and in some ways this mimics the migratory nature of the indigenous cultures, co-evolved with those ecologies over tens of thousands of years. Bee keepers as a group, are in my experience, excellent observers of nature, something that has been weeded out of almost every other livelihood and activity including farming.

So beyond the immediate threats from the likely arrival in Australia of verroa mite, what place will apiculture occupy in a post peak oil world with contracting economies and climate chaos? My future scenarios work has included discussion of how the energy descent future will drive more localised economies based on land use and livelihoods that make more use of self-renewing and salvaged resources. I have highlighted pastoral

farming, forestry, hunting and bee keeping as likely resilient land uses in more severe scenarios.

To understand the attractive prospects for apiculture I need to explain the rather sobering prospects for agriculture more generally.

The permaculture vision of urban and garden agriculture replacing globalised markets for horticultural products is one that has been given a huge boost by understanding the implications of peak oil. Sedentary bee keeping is an obvious element of that vision, but the combination of peak oil, climate change and economic contraction, if not collapse, will generate many challenges for that permaculture vision of an alternative food system. Those challenges could make bee keeping a more important, even central element of garden agriculture for the future.

Extreme weather events and chaotic seasons, without clear patterns, are a greater challenge, than simply a shift to a warmer or even drier climate. Australia's unreliable climatic patterns combined with chronically infertile soils made agriculture a marginal project, before the arrival of Europeans with several continents worth of cultivated plants and domesticated livestock. The sustainability of this on-going experiment in agriculture remains a moot point, even without climate change. The progressive (or rapid) breakdown of the globalised markets for agriculture and more chaotic seasons adds to the doubts. In general we should expect broadacre crop agriculture to become an increasingly marginal activity.

This thought might make some permie purists feel a little smug as they grind and leach acorns for their daily bread, but the resilience of many of our cherished tree crops to climate chaos is not much better than annual crops, a point made (through gritted teeth) by my good mate Graeme Brookman at the [Food Forest](#). (Lack of winter chill and extreme heat waves are having increasing impact on the yield from mainstay tree crops at the Food Forest.)

Compared with annual crops, one disadvantage of tree crops is vulnerability due to specific seasonal conditions for fruit set and ripening. Long lead times and resources involved in planting and establishment of tree crop species and varieties adapted to emerging climates are also problematic.

Diversity gives us a "hedge" against climate (and market) chaos, with some winners and some losers each season, but this value from diversity is most useful in small scale systems supplying a household rather than market systems where some degree of commitment to scale and specialisation is inevitable (even in a more localised world).

Microclimate buffering of extreme weather conditions is another advantage of food forests but much of that buffering of heat scorch, frost, wind damage etc is restricted to the understorey. It is the tree canopy, especially in temperate climate systems, exposed to full sun that provides the greatest yields.

Timber forests are more capable of dealing with the extreme weather and seasonal chaos than food forests. They grow fast when moisture and temperature allow but continue to slowly gain (dense) wood in all but the most extreme seasons. Ironically it is grasslands with grazing animals that might be one of the most resilient systems of land use in the face of climate chaos; these opportunistic systems mostly developed through

the pulsing of ice age and interglacial over the last few million years. Animals represent storages that dampen the pulse while predators act to further moderate and protect the whole system. Hunter/gatherer and nomadic pastoralist cultures (at their best) incorporated this wisdom of nature to survive and thrive harsh climatic transitions of the past. This interpretation might be a bitter pill to swallow for vegetarian and vegan idealists wedded to the idea that the keeping of livestock represents the most destructive and unethical of our land uses. (They will have to console themselves with the fact that the obscenity of factory farming of pigs, poultry and cattle will be consigned to the rubbish bin of history in a post peak oil world.)

Some of the historical advantages of pastoral farming and even nomadic pastoralism could also be important in the energy descent future. Animals (rather than machines and fossil fuel) do most of the work converting plant biomass into condensed and self-transporting storages of value to people. At the same time, they provide environmental services, such as vegetation management, fertility cycling, transport, companionship and even security.

Now the issue of security is a big one. Many years ago a friend travelling through the Sudan noticed that no one kept chooks and that those who could afford to, ate powdered eggs from the EU. When he asked why no one kept chooks, the answer was that someone with an M16 rifle would come along and claim the chook as theirs. In 1994 on the Amalfi coast, south of Naples I noticed cattle kept in stalls rather than grazing freely on the abundant mountain pastures. When I asked why, people said animals were valuable and someone might steal them. I was sceptical whether this was a real issue but when challenged on this point people referred to the "Saracens" stealing livestock (in the 15th century!).

The security issue was also a factor in rural settlement tending to be in compact and sometimes walled villages, rather than dispersed homesteads. In bad times, tending field crops could be dangerous while war generally led to forests being overcut to support sovereign demands. Compact villages with garden agriculture and livestock combined with opportunistic harvesting of the wild landscape by people and animals is an old pattern that could return in more severe energy descent scenarios.

My [future scenarios](#) thinking is not intended to scare people witless. The aim is to encourage strategic and flexible thinking that leads to the development of skills, livelihood and lifestyles that will be most resilient in the diversity of realities that will emerge from energy descent over the next few decades.

So why am I so upbeat about bees and beekeeping in the energy descent future? Firstly, bees are livestock that free range up to 2km from home across all boundaries and barriers, harvesting nectar and pollen sources using their own amazing intelligence and communication. Although we think of insects as being living machines controlled by hard-wired instincts, bees (and other social insects) show a higher form of collective intelligence that far exceeds the modest intelligence of individual bees. This "hive mind" has even been used as a model in understanding the emergence of higher human intelligence (via collective global consciousness) that might yet help save humanity from extinction.

They work when the weather suits and hold large stores to tide them over shortages. It is the very unreliability of nectar flows on top of the unreliability of flowering that has

driven the evolution of social bees to “[catch and store](#)” large flows of nectar in condensed self preserving honey.

They thrive with a diversity of floral sources typical of wild and minimally managed landscapes that will quickly develop in rural areas as soon as fuel and herbicide become expensive and/or climate chaos accelerates and/or lack of security and markets make farming activities difficult.

Many of the pioneer plants (so called weeds) that take over when human control declines are excellent sources of bee forage. By aiding in pollination bees increase seed set ensuring a resurgence of pioneers if the healing process fails. If succession from pioneers to perennials and trees is successful the bees simply shift to harvesting the tree flowers increasing their flower set and so supporting more life and more abundance for people. This mutualistic relationship between pioneer plants that heal the land and bees that make their living harvesting the floral abundance of pioneers is a model for how we should behave.

Many Australian native species, most noticeably eucalypts, have these same characteristics (weediness and bee forage) as pioneers. In a changing climate, there's a fair chance that bees will find nectar and pollen.

Sited at homesteads, villages and towns, bees can have access to a wider range of floral forages from gardens to fill in gaps between the main flows from forests, pastures, weeds and field crops. This diversity of nectar and pollen types is believed to be a factor in maintaining healthy hives while it provides variety and spice to our own seasonal harvest.

Honey is a compact, self preserving store of wealth that makes an excellent tradeable surplus in any economy that might survive or emerge in an energy descent future. The fact that bacteria cannot survive in honey make it almost unique amongst natural unprocessed foods. Its density (1.4 kg/litre) is an advantage for storage and transport.

Honey can be used to preserve fruit and other foods from decay and can be fermented to make mead, a common drink in medieval Britain. Haikai Tane claimed Britain was known to the Vikings as the “honey isles”, while my introduction in 1994 to “Ång”, a traditional Scandanavian wood pasture that supported browsing and grazing animals as well as bees had me speculating whether this is why the south of Britain was called “Angland”.

It is likely that the relative cost of industrially produced sugar (whether from cane, corn or beets) will rise along with energy. This could make concentrated sugar a luxury after hundreds of years of cheap industrial sugar. In the energy descent future, satisfying the almost universal sugar addiction could be as difficult as satisfying caffeine addiction. In this situation, locally produced honey will be in high demand so the bee keeper might be everyone's friend.

As well being sweet enough to satisfy the craving for sweet food, honey has an amazing range of health benefits that make it a super food, especially when cold extracted ([slow rather than fast solutions](#)). Pollen and other yields from bees have further nutritional benefits. The shift from sugar to honey will be one from quantity to quality.

In a less secure future, the apiarist might be a target for thieves but at least his livestock, and their housing, complete with some stores of honey will be relatively safe, for fairly obvious reasons. Bees have been bred to be fairly docile to assist in their easy management but it is relatively simple to reverse that selection to breed more aggressive bees to allow the apiarist to keep ahead of opportunistic thieves. Bee keepers develop a calm and deliberate demeanour because they know bees hone in on fear and fussing behaviour. Thus bee keeping selects for calm and careful behaviour in humans, the very opposite of the bluster and fear that we tend to think of when contemplating a less secure world. While there are no guarantees in an insecure world, bees certainly help.

The only downside I can think of are that the skills and temperament required to be a successful apiarist are more particular than that involved in food gardening, mechanics and many other basic trades that will flourish in the energy descent future. The patience, persistence and capital it takes to build up hives and gather the needed gear, may be hard once economic and social conditions get tough. Getting into that gentle observation of nature and flexible response to constant change that's needed to be a successful bee keeper could be harder as the energy descent crisis really begins to bite.

So kick the industrial sugar habit by supporting local bee keepers or better still become an amateur apiarist yourself and build reciprocity in your local community with the gift of the gods. Maybe our anglo-celtic culture will have finally found a place in this ancient land when we see it as the honey island continent.