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Members
CSIRO Sustainability Network

Feature thought:

“Not everything that counts can be counted. Not everything that can be counted counts.”

Albert Einstein

Dear Networkers:

SUSTAINABILITY NETWORK UPDATE – No. 56E

Happy new year to everyone! Let's imagine it as a parade of new opportunities to help build more sustainable lifestyles and communities.

In this first newsletter for 2006, Andy West, a senior agricultural scientist from New Zealand, “rattles the cage” of our own agricultural scientists, particularly those involved with animal agriculture, challenging them to become involved in helping society face up to some home truths about assumptions of food security. We then look at the leadership being shown by Charles Sturt University on its Thurgoona (Albury) Campus in bringing into practice the principles of a more sustainable built environment, so that students can learn by experience as well as from books and classes. Finally, in another instalment of my own adventure in trying to live more sustainably, I describe some lessons learned in seeking to generate greater personal food security in my own backyard.

Of Martians, men & agriculture – challenges for agriculture & society



Dr Andrew West – andy.west@agresearch.co.nz – is the Chief Executive of AgResearch, the New Zealand Crown Research Institute for agricultural research. On a recent visit to Australia, he provided the following personal perspective on the future of agriculture as part of his closing address to CSIRO's 2005 conference on “Horizons in Livestock Sciences”.

In a nutshell: The consumers of developed nations have come to consider future food security as a given. This is not a safe assumption, however, bearing in mind forces such as global warming and human population growth. Agriculture, particularly animal agriculture, will come under increasing pressure. Scientists concerned with food production have a responsibility to begin debating the implications and asking the difficult questions – like, how much of the world's resources do humans want to consume? And how fast do we wish to continue to exterminate other species? Informed debate is needed to help society acknowledge some important global truths and their implications for future food supply.

The concept of absolute food security has been assumed by many developed nations or societies as a complete given into the future.

I personally believe that this high degree of comfort has eventuated since the development of nuclear weapons and, in conjunction with these weapons, substantial and enduring political alliances.

Belief in total food security has largely come about as a major ramification from these weapons, removing the ability of one developed nation to blockade another.

In the United Kingdom where, it would appear, the presumption that absolute food security is so great that farming the landscape for the principal utility of urban recreation rather than food production, is steadily gaining momentum.

When people believe that food will always be available, and cheaply available, their views on agriculture and what is right and wrong with agriculture, radically change, with this expectation of change, it would seem, being at its greatest in their own back yards.

Practices and standards for production, environmental management and animal welfare dramatically rise in a fashion that would probably collapse if food security was genuinely threatened, or if prices of food rose steeply and sharply.

In thinking about the farm of the future,¹ should we be at all concerned about food security? It certainly is an issue in the developing world.

Another issue I see in discussion about agriculture is the pervading and pervasive anthropogenic analysis of agriculture.

I suppose that is inevitable speaking as one naked ape to another, but reflect on this. HG Wells, in his novel *The War of the Worlds*, was one of the few science fiction authors ever to paint the behaviour of aliens – Martians actually - in the exact fashion of humans. Humans came under a relentless, technologically-sophisticated reign of extermination and exploitation by Martian-controlled tripods.

As a lapsed ecologist I would argue that there is little difference between a Martian tripod and a human D9 bulldozer. Both exterminate or create the means to exploit most other terrestrial species in a ruthless and relentless manner.

So, I feel compelled to ask just how much of the world's resources do humans want to consume? How much of the solar energy? How much of the nutrients? How much of that most valuable of all minerals to us landlubbers, freshwater? How much of the land and how much of the coastline? And how fast do we wish to continue to exterminate fellow pilgrims – all the other species - on planet earth?

How do we reconcile nine billion humans within 50 years (that's 50 per cent more than now) with biodiversity, that is, with the so-called rights of other species to exist and consume – not that they actually have any absolute rights.

In that regard, will humans want to continue to farm livestock? Can and will biotechnology provide us the opportunity to live by plants alone? Or, if we want the real thing – animal protein – will it be produced synthetically in robotic factories?

Is this the animal protein farm of the future? And in so being, possibly sparing more of the planet for the existence of other species.

The curse on science (on science, not of science) is the absolute faith humans have that science and technology will always get our species out of the complete mess it regularly gets itself into.

¹ The theme of CSIRO's 2006 *Horizons on Livestock Sciences* conference

Well, in my view, that is blind faith. Whilst the well-fed, wealthy and healthy fret over some aspects of the environmental impacts of farming (principally those aspects that impact on human health or human recreation) are we not fiddling whilst Rome burns?

The big picture in the paleontological record is that of the five, climate-change induced mass extinctions of the Ordovician, Devonian, Permian, Triassic and Cretaceous.

We've now begun a major extinction event primarily caused by intelligence commanding the use of vast acreages of land (amongst a raft of other causes), yet perhaps we risk triggering a sixth mass extinction event caused by climate change, aided and abetted by continued deforestation for agriculture.

Once started, this change maybe impossible to reverse. For example, it now seems highly likely that within 50 years the ice cap on the North Pole will have entirely disappeared. It is also likely that actions taken (few though they are) are unlikely to stop this signal event, with its incipient feedback loops forcing further climate change.

As scientists associated with the feeding of humans, and in that process consuming far, far more of the landscape than any other human activity, I believe we have a growing obligation to paint the absolute and relative limits of science to resolve all human desires.

I also believe we have a growing responsibility to articulate the particular realities of food production about which some middle-class demands may not be possible to achieve or reconcile.

To conclude, the consumer is not always right. Whilst we can and should within livestock farming raise the standards of animal welfare and reduce environmental impacts (including non-anthropogenic impacts) I think it is essential that we create a debate in the context of:

- The global impact of livestock farming relative to other human activities, such as consuming high density energy – it is surely not “reasonable” to demand massive reductions in climate change gases from agriculture whilst so many of us refuse to use public transport
- That we can't just export the problems of food production out of sight and out of mind by importing large amounts of food if we wish to assume true responsibility for the planet and its biodiversity
- That humans are, in fact, biological entities and thus need to eat, and that livestock farming is in fact the exploitation of other mammals that helps us to do so in a fashion that we enjoy
- That, to meet the material aspirations of nine billion humans whilst maintaining a moderate element of biodiversity, we may well have to rely on extensive use of biotechnologies because these technologies will allow us to produce more from a given area of land and thus have the propensity to contain the demand for yet further deforestation with its incipient reduction in biodiversity

The list could go on, but there are some truths or at least implications that our societies need to acknowledge, and I think we have a role as scientists and scientific organisations (notwithstanding the possible jeopardisation of contract research funding by so doing) to point this out.

Lessons in sustainable design from Charles Sturt Uni

In a nutshell: All too often the emerging principles of more sustainable living are taught to students in old-fashioned or expediently low-cost, eco-inefficient surroundings. While we recognise the reasons for this, the lessons taught in such surroundings are inevitably tinged with

overtones of “Do as I say, not as I do”. Now, however, Charles Sturt University is leading the way in matching attractive, efficient, and eco-friendly campus design to the principles of sustainable design and living being taught in classes. Moving from “tell” to “show-and-tell” is a huge step forward. We hope the lead will be followed by other organisations.



A frequent incongruity in environmental and sustainability education is that it is all too often taught in surroundings that are not in the least sustainable or environmentally friendly – buildings that illustrate the past rather than the future. In contrast, Charles Sturt University’s Thurgoona Campus near Albury-Wodonga on the NSW-Victoria border, showcases buildings and surroundings to complement the rhetoric of evolving concepts in sustainable design for the Australian environment. In fact, the campus and its buildings represent a developing, dynamic model of how communities can plan to address environmental concerns and sustainable living for decades to come. It demonstrates how architecture can relate to lifestyles and the land, based on responsible use of resources and intelligent responses to local climate.



Environmental sensitivity is the basis of a new approach to site planning and building design on the Thurgoona Campus, through a comprehensive process that spans all phases from site planning to selection of materials and the accommodation of architecture to both climate and landscape.

Special features of the site, many visible in the accompanying pictures, include:

- Siting of Buildings either side of a pedestrian walk, which, together with a road and services follows the contours of a hill according to soil conservation principles
- Buildings constructed with rammed earth walls and concrete floors, which provide thermal mass to store the sun's heat in winter and keep buildings cool in summer; their passive solar design minimises energy use and eliminates the need for air conditioning
- Earth berm construction of some building areas, effectively placing them below ground to stabilise temperature
- Convection towers to vent heat from the tops of buildings
- Large, shaded windows for ample ventilation, natural lighting and views.
- Recycled materials, e.g., timber in window frames
- Solar photovoltaic power generation and solar hot water systems
- Water collection from buildings in tanks that are integral to the building structure and also help to stabilise temperature.
- Management of stormwater and wastewater in constructed wetland ecosystems within the 87-hectare site
- Waste management on site
- Landscaping with low-input native plantings



Environmental benefits of the project address local, regional and national concerns for global warming, ozone depletion, genetic diversity and air and water pollution. They go further, however, by illustrating for “tomorrow’s decision makers” (the students of today) how comfortable and attractive low-impact living can be while still remaining technologically advanced. Financial savings in terms of electricity and water management will also be a

valuable lesson. Living and studying in this beautiful, efficient, eco-friendly environment will have a big effect on what these young citizens demand in their homes and workplaces into the future. Well done, CSU. Going for principles rather than least-cost options will pay major dividends into the future!

You can find additional information and illustrations via the Charles Sturt Uni Thurgoona Website at www.csu.edu.au/division/marketing/thur/index.htm.

A novice gardener learns the hard-yakka way

As many of you know, your Network facilitator is a “down-shifter”. I have chosen to reduce my participation and earnings in the cash economy in favour of a lifestyle that spends less cash and reduces my environmental footprint. Here’s the latest report on this move. If you have comments, questions or suggestions, you can contact me at Elizabeth.Heij@csiro.au.

While I have personally pledged to try to practice what I preach about sustainable lifestyles, I have to say, it can be very time consuming and not always easy. The “capital investment” of a passive-solar home with energy- and water-saving features is a big first step, but aspiring to live subsequently within our “income” of solar energy and rainwater is certainly a challenge – especially when it involves adding a productive but thirsty fruit and vegetable garden and the cooking required to process at least a proportion of the resulting produce.²

Since last winter, the quest for greater local self-sufficiency through chemical-free home gardening has been mostly about the hard physical slog and dirty hands needed to go



from this

to this



and this

to this.³



² The total cost of all our household energy use over 12 months from November 2004 to November 2005 was \$10 – i.e., only one third of the winter quarter’s grid connection charge for the solar PV system that powers our all-electric house. So we were better than self-sufficient in the actual energy we produced. This year, however, with the additional processing of garden products, usage will be a bit higher.

³ Yes, that’s some of our bumper crop of tomatoes sun-drying in the foreground of the last picture.

We are now buying far less in the produce section of the supermarket – and the veggies we eat are fresher and tastier. Shopping costs will drop further still when our young fruit trees start to bear fruit.

It has, however, been a steep learning curve (and will be for some time to come). A background in experimental botany has helped me understand something of “what the plants are trying to do”, but this has been only a start. Getting practical, local know-how in what would not-so-long-ago have been a common back-yard art has meant jumping in, giving it a go and trying to learn something from mistakes.

So, in case anyone else out there is “having a go”, here are my **practical learnings** from the garden initiation process – some gleaned from the few experienced permaculture and organic gardeners already operating in our forming eco-village, and some from my own observation and trial-and-error experimentation. Bear in mind they apply specifically to Aldinga, a particularly windswept coastal region to the south of Adelaide in South Australia, with reactive alkaline clay soil and an average of about 500 mm of (mostly winter) rain per year. While many of the principles may be general, details of practice will obviously differ with latitude climate soil, etc.

- If you are building a new home on a “greenfields” site, make sure, when the ground is being prepared, that the builder separates the topsoil and leaves it on site. Replacing it is expensive! (An unscrupulous builder may see your topsoil as something that can be sold for profit!)
- Soils that have been cropped and grazed in European-style agricultural systems are likely to be very deficient in organic matter (carbon) and minerals. Green manure crops and compost help reverse this decline.
- Sticky, alkaline clay subsoil is not the disaster it might seem. It holds water on site, and a layer of gypsum at the interface with the topsoil helps roots and water to cross the interface. (You can even load it with extra stormwater in early spring if you have access, as we do, to a neighbourhood stormwater retention basin.) And if you want carrots or other vegetables that need deep sandy soil, find an old “lion-foot” bathtub, fill it with sandy soil and make it part of the garden-scape!
- Weeds are better than bare ground until something better is in place. At least they are harvesting the sun and drilling holes down into the soil for water and other roots to follow. Cut them off before they seed (leaving the roots in the ground), and let them rot down where they lie.
- Growing a start-up winter green-manure crop (e.g., barley and vetch) and digging it in before the first spring plantings, gives better growth of following vegetables.
- Well rotted compost (from kitchen and garden waste) is garden “gold” – make and use as much as possible.
- Animal manure is also garden “gold” – when planting, dig a slurry of it into the soil under each transplant. (We are lucky enough to have a horse agistment paddock close by and wheelbarrow access to old manure heaps.)
- When mulching a vegetable garden to slow water loss, use a final layer of composted mulch (coarse compost) as it will break down faster to add more organic matter to the soil for the following season. Lucerne hay or pea straw can make a good first mulch layer but both seem to attract slugs and snails, and they also blow away in strong winds. Covering with a second thick layer of coarse compost helps with both problems.
- Minimise water loss (by evaporation) by watering directly to the roots of plants, not over the leaves. Planting into a bowl-shaped depression helps funnel water to the root zone if

watering by hand. Dripper or soaker lines under the mulch can save time but allow less control over watering of different plants according to need.

- Mixing different crops throughout the garden, and inter-planting with fragrant companion plants (e.g., scented geraniums, yarrow, tansy, apple mint, garlic chives, etc) helps to “hide” vegetables and young fruit trees from insect pests and cut down the potential for below-ground cross-infections by fungi, nematodes, etc.
- Interplant crop plants with pollinator attractants (such as lavender, borage, calendulas, etc), and also herbs with massed small flowers (e.g., yarrow, fever-few, etc) to feed small predatory insects such as parasitic wasps.
- Build multi-layers of leafy canopy into the garden as soon as possible – shading layers help to conserve water, provide shelter from wind, and prevent sunburn of plants and fruits. (Gardens exposed to howling gales at around 40°C, as we have experienced this summer, need all the help they can get!)
- It is not possible to have too many tomatoes – they sun-dry well in our South Australian summer climate.
- It is, however, quite possible to have too many cucumbers and zucchinis! ☺

And here are a few more philosophical observations and learnings:

Greater self-sufficiency through gardening seems to work best at the Village or neighbourhood level, so that excess produce can be swapped with neighbours. However, you don't have to be in an “eco-village” for this type of local self-help to work – there might well be potential to do it where you live now if several neighbours are interested and have a bit of garden space that can be taken back from unproductive water-hogging lawns and ornamentals! As a bonus, the sort of garden I have been talking about – containing fruit trees and vegetables mixed in with pollinator attractant and pest repellent plants – looks very ornamental anyway. Some vegetables, like red lettuce or ruby and golden chard for example, are ornamental in their own right, and the lavender, geraniums and marigolds, etc, are all working for their living.

A productive garden is a lot of work – I have had to put time into it more-or-less daily, especially when starting up on a bare site and in the “learning-how-to” phase. (I now have a much deeper understanding of why agricultural systems had to become capable of delivering large surpluses before civilisations could allocate the time of a proportion of citizens to politics, art and culture!)

Home gardening is not economically efficient while food is still so cheap to buy. At present conventional jobs pay much more in one hour than can be saved by one hour of home gardening. The equation changes, however, if you are “down-shifting” out of full-time employment and away from consumerism. And remember, you get to keep all of every dollar you save, while part of every dollar you earn disappears in taxes – so, in a modern adaptation of that old piece of folk wisdom “A dollar saved is MORE THAN a dollar earned”. While the economic environment does not yet demand it, I believe it is important for the “future-proofing of our community that at least a scatter of individuals are learning, preserving and promoting the skills of home food production in suburban gardens.

Managing water involves some interesting issues and trade-offs. For instance, there has been a lot of talk about the re-use on gardens of raw or treated greywater (from laundry and shower, etc). Some folks in our region are actually plumbing their washing machines and/or shower outlets into the garden! To me, in the conventional domestic scenario involving flush toilets⁴, this makes no sense at all. My question has always been “Why flush the toilet with drinking-quality

⁴ Flush toilets are standard in our ecovillage, which has its own small-scale sewage treatment plant pumping treated effluent to a farm woodlot.

water and put salty, dirty greywater from the laundry onto the garden? Shouldn't we be flushing the toilet with greywater and putting clean, pure rainwater onto the veggies we are going to eat? If you check the salt content of laundry detergents, even the "greenest" still contain significant quantities of salts that, in a dry environment might well build up over time – that's quite apart from the bacteria present in raw greywater. Thus, part of our water management plan has come to include flushing the toilet with greywater from the laundry and shower while watering the garden with clean pure rainwater from our underground tanks. Our veggies are very impressed by our consideration and have rewarded us accordingly.

Another interesting issue has turned out to be managing garden watering in relation to storage capacity in the rainwater tanks. I feel quite eccentric sometimes watering the garden just before an expected period of rain. But, if the tanks are relatively full and likely to overflow to waste, it makes more sense to have the water under the veggies and the rain re-filling the space in the tanks!

So what's next in the garden? – learning to grow both autumn vegetables and the native plants indigenous to our region (for areas of the garden not needed for food). But, as the wise words say, "to everything there is a season" – so these new projects will need to wait for the autumn rains.

And that brings up another bonus beyond the fresher food we now eat – it is somehow very satisfying to now be living more in tune with the cycles of weather, growth and natural systems around me. I am increasingly confident with 'downshifting' and very serene in this great new lifestyle!



One morning's harvest from one back yard!

"Little Morsels" – Food for Thought

The high cost of corporate mobility

A recent short article by Rex Runzheimer in the Harvard Business Review⁵ provides some interesting information to ponder regarding the high costs (and other associated resource impacts) of ever-increasing business travel and mobility. [The research and costings refer to US businesses, but similar research in Australia would no doubt produce similar data.]:

"Employees are constantly in motion – making sales visits or taking service trips; visiting an international office for a few days or relocating there for a few years; soaring across oceans in the corporate jet or heading across town in the company car." "Several client surveys – each of which tracks a discrete aspect of corporate mobility and includes a sample of between 70 and 120 corporations, and proprietary research, show that the typical company spends \$25,000 annually on vehicles, travel, and technology per mobile employee. Business travel represents the largest component, with companies spending, on average, \$12,500 per traveler per year for airfare, meals, lodging, and other miscellaneous expenditures. The cost of providing a company vehicle or reimbursing an employee for driving his own vehicle for business is approximately \$7,100. Meanwhile, communication tools and other technology for mobile workers, such as PDAs, laptops, cell phones, and Internet access, raise the bill another \$5,900. Additionally, the employee who relocates costs companies an average of \$51,700 for a domestic move and \$500,000 or more for an international assignment."

⁵ Rex Runzheimer, "The Department of Mobility", Harvard Business Review 2005 (Reprint F0511H)

If ever I came across data that supported the concept of 'glocalisation',⁶ then this has to be it. Somehow we have to get much cleverer about transporting and applying the knowledge in employees' heads – finding more and better ways to transport and apply the knowledge itself without the huge cost and impact of transporting the heads as well!

The rise and rise of renewable energy

While it can be depressing to see how little renewable energy generation is installed in Australia, and to experience the low levels of interest shown by many of our political and corporate leaders, occasionally we get a welcome positive reminder that, on a broader scale, it is all actually happening. The WA Sustainable Energy Development Office (SEDO) recently provided such a reminder via their email news service⁷:

Recent research by the Worldwatch Institute reveals that [global] production of renewable energy is growing at an astounding 20-30% per year. This increase is even more impressive (and encouraging for renewable energy supporters) when you compare the increase with the 2% growth rate of oil and gas.

The report from the global sustainability researchers at the Worldwatch institute also reveals that investment in renewable energy hit a record high of \$US30 billion in 2004. It shows that at least 48 countries have taken the initiative to develop renewable energy promotion policies. And 14 of those 48 countries are developing nations that are exempt from emissions caps under the Kyoto Protocol.

When Worldwatch Institute president Christopher Flavin addressed more than 5,000 delegates at the 18th World Petroleum Congress, he said that traditional energy markets had reached a "tipping point" and, since new energy sources are attracting roughly \$30 billion in investment annually, the question for oil executives is whether they see themselves as being in the oil business or the energy business. He also added that global energy markets are already beginning to feel the shift, and cited China's encouraging commitment to generate 10% of its total energy needs from renewable sources. China is now one of the global leaders in renewable energy capacity with a currently installed capacity of 37 GW.

And which renewable energy source is proving the most popular? The report shows photovoltaic-based solar energy as the fastest-growing source, with global capacity increasing by 60% per year between 2000 and 2004. This increase is projected to continue as both improved technologies and economies of scale help to reduce the initial costs of photovoltaic systems. This outlook is supported by the fact that solar and wind power costs are already around half of what they were 15 years ago, and that many renewable technologies can now, under good conditions, compete with prices of conventional technology.

Results and forecasts such as these provide further encouragement for Governments, organizations and individuals to pursue and invest in renewable energy development and production.

Perhaps this is just the good-news stimulus the Heijis need to upgrade our own domestic solar PV system with a few more panels to take care of the increased work that a productive fruit and vegetable garden transfers to the kitchen. It would be good remain fully self sufficient for domestic power or even a net 'green-power' exporter! E.G.H.

Feedback

"A Clean Energy Future for Australia" – Response to Trainer critique

In seeking a collaborative pathway to a more sustainable future, a major obstacle is our collective understanding and ability to integrate the broad diversity of approaches, viewpoints and interpretations being expressed across the community. Future energy options are a case in point. Not only are we trying to assess the relative merits of fossil fuels, renewables, and

⁶ You can find more information on 'glocalisation' on pp 13-14 in Update 18 at www.bml.csiro.au/SNnewsletters.htm

⁷ See www.sedo.energy.wa.gov.au

nuclear power, but we are also faced with a wide range of underlying attitudes to energy consumption itself – from “business-as-usual-at-any-risk” through various progressive reduction scenarios to “immediate voluntary frugality”. No wonder discussions can become tense and polarised!

In Update 54, (pages 1-7)⁸ we featured an article by Mark Diesendorf of the Clean Energy Future Group summarising the results of a study showing, in effect, that renewable energy resources are capable of cost-effectively substituting for coal-fired plants. In the following Update (55, pages 19-20)⁹, we ran a critique by Ted Trainer of the work of the Clean Energy Future Group. Here, Mark Diesendorf – m.diesendorf@unsw.edu.au – takes issue with the way in which Ted Trainer has dealt with the study.

Ted Trainer's critique is based on objections that are factually incorrect and on misunderstandings of our study. He attempts to make technical objections, but confuses energy demand with energy supply, energy targets with energy scenarios, business-as-usual scenarios with our 'weak efficiency' baseline scenario, and capacities of wind turbines with capacity factors. More specifically:

In his second paragraph Trainer claims incorrectly that “the 2040 stationary energy target (I think he means the baseline or ‘weak efficiency’ energy scenario, which is not a target) is derived mainly by analysing trends in energy intensity and that in so doing our analysis ‘confounds’ the effects of technical efficiency improvements with the effect of other factors. We take issue with the use of the verb ‘confound’. What we have done, as we clearly state, is to include (or, if you like, conflate) the effects of three main factors: technical efficiency improvement, structural change within economic sectors or sub-sectors, and price. With respect to the first two factors, our analysis is in effect just an extrapolation of past trends, and the point of our analysis of past energy intensity was to identify what these trends have been. They include quite modest increases in energy efficiency in all sectors of the economy, and we consider it quite reasonable to assume that these will continue. With respect to the third factor, price, we have, as is clearly explained, assumed steady increases in fossil fuel prices (which, incidentally, are quite modest relative to the global price increases for coal, crude oil and natural gas in the period since our report was completed). Price increases will of course tend to suppress demand, which is likely to be realised through a combination of greater energy use efficiency and a shift in consumer preferences towards less energy intensive goods and services, thereby inducing some structural change in the economy towards less energy intensive activities. Our baseline includes these effects.

However, notwithstanding the above assumptions, there will remain, in the absence of more vigorous policies to support greater energy efficiency, many sectors of the economy where the improvement in the efficiency of energy use lags some way behind the technical and economic potential at the prevailing energy prices. Since our report was published, this fact has been explicitly recognised by all Australian governments in their joint adoption and implementation of the National Framework on Energy Efficiency (NFEE) program. This recognition is the basis for our ‘medium’ energy efficiency scenario. It should be obvious that there is no double counting between this and the assumptions that underpin the ‘weak’ efficiency or baseline scenario.

If more demonstration of this truth is needed, it is the fact that in some energy intensive materials processing sectors we have assumed, for the ‘medium’ scenario, no decrease in energy intensity additional to that already included in the ‘weak’ scenario, because we have assumed that the economic drivers and management focus in these sectors are sufficient to keep them at the front margin of technical and economic (at prevailing energy prices) efficiency. This also is clearly stated in our report.

Regarding the projections of energy demand in 2040 by ABARE, these were not published at the time our report was completed. ABARE had at that time published projections out to 2020 and our report includes (Table 5.5 and surrounding text) a detailed comparison between the interpolation of our baseline results and ABARE, in which we demonstrate that the two are almost identical when appropriate allowance is made for differences in assumptions about the size of some large energy intensive sectors of the economy, i.e. assumptions that are explicit in both studies about the structure of the overall economy, plus

⁸ See Update 54 at www.bml.csiro.au/SNnewsletters.htm

⁹ See Update 55 at www.bml.csiro.au/SNnewsletters.htm

a difference of opinion about the effect in the residential sector of drivers (policies) already in place. We did not review the Foran and Mardon projection.

In his Paragraphs 6-8, Trainer echoes some of the anti-wind power myths that have been disseminated by nuclear power, coal, NIMBY and other groups with vested interests. The myth about intermittency was addressed our original report and in the box in my article in Update 54, where some refereed publications were cited. But Trainer steadfastly ignores this work and instead tries to support his anti-wind position by citing an unrefereed, superseded, 2003 report by the German utility E,On Netz. The claim that, for a wind energy generation of about 15% of total generation, “we must also build maybe 80% as much coal or nuclear capacity to turn to when the winds are down”, is plain wrong. Incidentally, in its English summary E,On Netz does not specify the type of alleged back-up.

Some German utilities are hostile to wind power, because the feed-in laws require them to pay a high tariff for wind energy. It is interesting that Trainer does not quote the more substantial 2005 report from the German Energy Agency, DENA¹⁰, which finds that:

- electricity from wind power can be integrated economically into the German electricity grid by 2015, even if there is a very fast expansion in wind energy, provided there is a moderate expansion of the grid;
- until the necessary grid expansion happens, there are transitional technical solutions available;
- no additional conventional power stations need to be built to provide balancing and reserve power.

Denmark generates on average 20% of its electricity from wind power. When there is excess wind power, it sells beyond its borders and when there is a deficiency of wind, it buys electricity from overseas. But Trainer's claim that Denmark exports *most* of its wind energy generation is incorrect. Anyway, would it matter if it did?

Unlike the situation in Denmark, the eastern Australian transmission grid is not part of a larger network. So a wind energy penetration of 20% here would require a small amount of additional back-up capacity, which I calculate to be one-quarter to one-third of the wind capacity. But this would not come from expensive base-load plant, but from inexpensive-to-build peak-load plant (e.g. gas turbines) which are operated infrequently.

In Australia in the 1950s and 60s, the huge expansion of the transmission system, to cope with large centralised coal-fired power stations and to supply geographical diverse electricity consumers, was funded through a system of massive subsidies and cross subsidies. So it would be fair to also subsidise a moderate upgrading of the grid to make it more compatible with distributed energy sources such as wind and bioenergy.

Capacity factors are defined to be annual electricity generation divided by generation that would be obtained if the power plant operated continuously at its rated power capacity. Capacity factors alone are not a good measure of performance, since they reflect both the power station's availability (ability to operate) and its role in the grid. Capacity factors are typically 60-85% for conventional base-load power stations (coal, nuclear and sometimes gas); 30-50% for intermediate load (gas, old coal); and 5-10% for peak-load (gas turbines or hydro). We don't disparage gas turbines because they have very low capacity factors.

Modern wind turbines at excellent sites have capacity factors of 30-45%. These are taken into account in the calculation of economic performance, just as they are with gas turbines. The low Danish figures are averages over all wind turbines, reflecting the situation that there are many less efficient wind turbines from the 1980s still operating in Denmark. The low German figures reflect the fact that the feed-in tariffs are independent of geographic location, and so a significant fraction of wind turbines has been installed at inland sites where wind speeds are relatively low.

Concerning bioenergy, our report finds that there are enough residues from existing crops in Australia to supply 28% of electricity in 2040, but not enough to provide for transport as well. But there is also a huge potential to produce liquid fuels from dedicated crops in Australia, although these will be more expensive

¹⁰ www.dena.de/ Unlike the E,On Netz report, the DENA report received input from a wide range of stakeholders, including E,On Netz.

than from residues. The Torrie report to the David Suzuki Foundation, cited in our report, shows that CO₂ emissions from transport in Canada could be reduced by 50% within a few decades, based on small improvements to existing technologies: e.g. improved public transport in cities and greater use of hybrid and clean diesel motor vehicles. Petrol and diesel prices will continue to rise as demand from China and India increases and cheap supplies decrease. So, provided governments do not subsidise greenhouse-intensive shale oil and oil from coal or natural gas, motor vehicles will become much more fuel-efficient and liquid fuels from dedicated crops will become cost-effective within the next decade or two.

Trainer's ideological framework is revealed by his objection to having a fossil fuel, natural gas, as part of our clean energy mixes. But, a combined cycle gas fired power station has half the greenhouse intensity of the best new coal-fired power station, and a gas-fired cogeneration plant is even more efficient. Australia has enough natural gas to last for most of 21st century, even taking account of substantial sales of LNG to overseas countries. It would be silly to ignore natural gas as a transitional fuel to a renewable energy future.

It is the forecast outcomes by which our studies should be judged – namely large reductions in CO₂ emissions, air and water pollution, water use and land degradation – not whether a (relatively clean) fossil fuel is included in the mix.

The issue of what happens towards the end of the 21st century, as natural gas begins to become scarce in Australia, receives a preliminary discussion in Chapter 11 of our report. There we point out that “Australia must move to an economy where there is no longer any increase in the consumption of materials and energy”. We also assume that by 2040 “population growth has ceased”. These are radical changes in socio-economic policy, ignored in Trainer's critique.

Unfortunately, as Trainer seems to perceive our work as a threat to his approach of “abandon affluence” and accept “frugality” now, he is attacking renewable energy on technical and economic grounds, instead of developing credible scenarios, policies and strategies that could implement his vision of a simpler society that uses less energy and materials.

Maybe Network Facilitators are in a privileged position – but from where I sit, both sides in this debate have positive concepts to offer. As we transition to a lower-energy future, we will need a progressive sequence of energy mixes incorporating an evolving maximum possible contribution from renewables, and we will also need the voluntary acceptance of increasingly frugal consumption. So, in the end, we will need all the creativity and input we can muster from both sides. E.G.H.

Who are we kidding about sustainable or organic food production and certification?

Network member, Soo Man Heng – ecoorg@tm.net.my – is conscious of issues across both food production and waste management and, with an international perspective (Malaysia), has been stimulated to write by two items in Update 54: the feature on “Organic recycling and sustainable food production” by Helen Scott-Orr (pages 7-10) and the feedback from Andrew Jeeves entitled “Let's not kid ourselves about sustainability challenge ahead” (pages 15-18).

The fact remains that as long as the price of ‘certified’ food from sustainable or organic food production is higher than existing market prices there will be customer rejection. The certifiers want a piece of the pie – and so do all those involved in the certified production chain. Imposing such notions of ‘added value’ has caused the price of certified food to dramatically increase. How can a product be deemed ‘sustainable’ if it's higher-than-usual price means it sells only into a limited market?

We live in a modern society governed by ‘wants’ and ‘needs’. Wealthier, so-called sophisticated people like to be special – to satisfy their ‘wants’ irrespective of costs and price, with individual decisions also based on factors such as advertising, education, awareness, credibility and cynicism. In contrast, the mass of poorer ‘common people’ buy what is affordable to satisfy their ‘needs’.

About 50 years ago, with the introduction of the ‘green revolution’, prices of food dropped so drastically that now much food production has to be propped up with various types of subsidies. At that time, global

food production increased dramatically with the spread of new crops and bred varieties. In addition, all sorts of pesticides, chemicals, synthetic fertilizers, prophylactics and antibiotics were introduced into the food production chain to facilitate production. Now, with hindsight, we recognise these developments as one of those major human follies that are very difficult to undo or change for the better. We have degenerated from biodiversity to monoculture.

Our little friends living in the soil, air and water are inadvertently killed with pesticides as part of the 'collateral damage'. In the wake of the changes, new biological terrorists like SARS, bird-flu, mad-cow diseases, Nipah virus, etc. etc are emerging to attack us. Many 'mono-cultured' *Homo sapiens*, lacking immunity, now succumb to these epidemics, and also to influences from endocrine disrupting chemicals and other factors. We are what we eat!

Permaculture (a revival of traditional agricultural practices), 'organic', and 'sustainable' farming are seeking to supersede the Green Revolution, but, with the current push for various types of certification, they risk becoming simply a new way of getting money from farmers by doing very little work – using a pen instead of a spade. However, unless the cost of sustainable food production can be reduced to *lower* than that of conventional agriculture, there is no hope of winning this ecological battle.

The 'battle line' actually begins in the academic world, where new economic concepts must be developed for food production, such as 'how to grow more by using less' – not only less labour, but also less land, water, energy, pesticides, synthetic fertilisers, mechanisation and packaging – to produce more and better food – and not from Genetically Modified Organisms (GMOs).

The challenge for academics, farmers, disciples of sustainable development, and proponents of GMOs, is to change to a new mind-set – to produce ECOs (Ecologically Cultured Organisms) at substantially lower cost than that of conventional agriculture. We need ecologically sensitive production of more and better food at *lower* than conventional costs, so that farmers and consumers can mutually benefit without invoking subsidies.

Can we do it?

Other Information Resources and Links of Interest

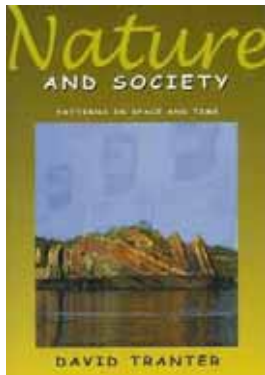
ECOS, Australia's most authoritative magazine on sustainability in the environment, industry and community is published bi-monthly by CSIRO – in print and online. See: www.publish.csiro.au/ecos.

FEATURE RESOURCE

Nature and Society: Patterns in Space and Time – New Book

Available from author David Tranter at: david.j.tranter@acenet.com.au

With this new book, **David Tranter**, has given us an unusual gift – a fascinating journey into the working principles of the Earth and its living inhabitants. But while



David has a scientific training, this is not just another scientific treatise. Instead it is a unique, often

metaphorical, word painting of the recurrent patterns in

time and space seen in the living and non-living world around us at the full range

of scales from subatomic to cosmic. It is a book of profound humility, placing

human society, like one piece in a giant jigsaw puzzle, into its natural context – so

that we see the greater design of which we are a part. And we see also the

nature and urgency of the task ahead if we are to achieve balance with Nature

rather than extinction through massive planetary changes of our own making.

David paints the designs for us, but also challenges us to act rather than just

observe – after all, we are a sentient species and have the power to do so. On

the book's cover we are told that David has "cultured pearls and venomous



octopus, explored ocean byways in canoes, sailing ships and frigates, exported wildflowers and befriended Aborigines". It seems no accident therefore to find a book of unusually broad observational knowledge presented in a way that reminds me of a series of talks to a wise and gentle community elder. [Published 2006 by Seaview Press, Adelaide; ISBN 1 74008 375 X; and available from the author (see above contact), publisher – www.seaviewpress.com.au, or the Robertson Community Technology Centre – Robertson@ctcnsw.net.au.]

AGRICULTURE

Religion and Agriculture: Sustainability in Christianity and Buddhism

www.iid.org (Click on "Books and Publications" then scroll down.)

Religion is a powerful expression of culture that is most obvious in our relationships with nature. As our major meeting point with nature is food, this provides a fertile field for the wisdom that Network member and author **Professor Lindsay Falvey** concludes is the essence of all sustainability. By bringing sustainability, agriculture, global issues, Buddhism, Christianity and a host of other factors into play, we see that our motivations belie our rhetoric – in environmental actions through to trade and aid. This open-spirited book contains a wealth of analysis and alternative logics for serious readers about nature, the environment, spirituality and religion, Asia and ourselves. An engrossing hybrid Oriental-Western dialectic allows chapters to be read alone or as part of an accumulating thesis. Thus Buddhist and Christian teachings are applied to agriculture and sustainability – and found to be at one with each other. Whether it is biblical metaphor, karmic logic or enlightened self-interest, a continuous strong thread stitches a complex set of subjects into a coherent sutra that will enliven the current moribund dialogue between agriculture, science and religion. As reviewers have said, "This work is unique and fills the gap that neither theologians nor scientists will readily attempt to fill; it has not been done before and is critically important"; and "the sutra of sustainability in the final chapter will certainly become a classic". [Published 2005 by the Institute of International Development (IID), Adelaide, and available via the above website – or FREE for those eligible at SpiritOfAgriculture@iid.org; You can also download a PDF version (1MB; 301 pp) from the IID website. ISBN: 0 9751000 2 5]

ENVIRONMENTAL EDUCATION and SUSTAINABILITY PRACTICES

A National Review of Environmental Education & its Contribution to Sustainability – Review Report



www.aries.mq.edu.au/project.htm

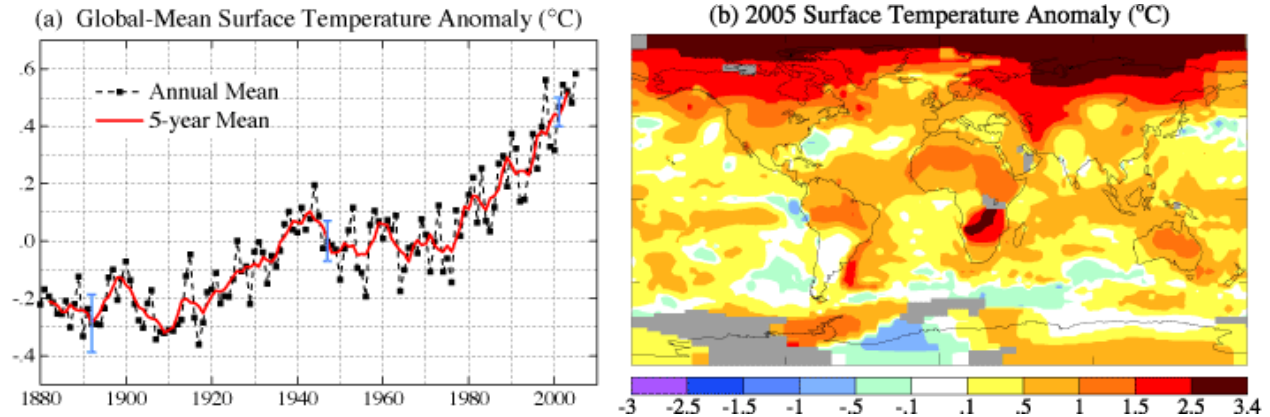
Is Australia on the right path towards Sustainability? Not yet, it seems! This comprehensive study by the Australian Research Institute in Education for Sustainability (ARIES) at Macquarie University was undertaken on behalf of the Australian Government Department of the Environment and Heritage and funded by the Natural Heritage Trust. It has attempted to answer the question by looking at the opportunities provided by Education for Sustainability – a key process for achieving sustainability. The research indicates that a major shift from 'environmentalism' to 'sustainability' is needed, implying a radical reorientation of the way educators, businesses, governments and communities think about, and teach, environmental issues. **The review report is a five-volume series incorporating: Volume 1: Frameworks for Sustainability; Volume 2: School Education; Volume 3: Community Education; Volume 4: Business and Industry Education; and Volume 5: Further and Higher Education.** The study provides a snapshot of environmental education and its contribution to a number of sectors within Australia. It looks at current sustainability practices and identifies educational needs across sectors such as business and industry, schools, the community and higher education. It also examines national strategies for sustainability from around the world and the frameworks they offer and looks at emerging trends. Each volume provides sector specific recommendations and highlights the opportunities for future work. One of the reports co-authors, **Associate Professor Daniella Tilbury**, Director of ARIES, says that a major shift in perception is required for countries to become sustainable. Major environmental problems cannot be solved with our current ways of living but instead will require a shift away from traditional ways of thinking and acting. Part of that change will be to move away from the traditional doom and gloom approach when dealing with environmental problems by cleaning up the symptoms of underlying problems. The key to change should be the development of specific education and learning strategies in sustainability. New learning approaches will not only help explore sustainability but also build skills that enable change. To this end, ARIES is in process of developing an Education for Sustainability (EfS) portal at www.aries.mq.edu.au/efportal.htm to provide an introduction to this area of learning and a site where supporting documents can be accessed. [Electronic copies of all five volumes of the review, and the

summaries of key findings, can be downloaded from the above ARIES website or from Australian Government Department of the Environment and Heritage website at www.deh.gov.au/education/. For a hardcopy or a CD-Rom containing all volumes, please contact the ARIES Coordinator at: ariescoordinator@gse.mq.edu.au.]

GLOBAL WARMING

Global Temperature Trends: 2005 Summation

<http://data.giss.nasa.gov/gistemp/2005/>



This summary of GISS global surface temperature data from the NASA Goddard Institute for Space Studies shows that the highest global surface temperature in more than a century of instrumental data was recorded in the 2005 calendar year (see figure). Record warmth in 2005 is notable, because global temperature did not receive any boost from a tropical El Niño. The prior record year of 1998, on the contrary, was lifted 0.2°C above the trend line by the strongest El Niño of the past century. Global warming is now 0.6°C in the past three decades and 0.8°C in the past century. It is no longer correct to say that "most global warming occurred before 1940". More specifically, there was slow global warming, with large fluctuations, over the century up to 1975 and subsequent rapid warming of almost 0.2°C per decade. Recent warming coincides with rapid growth of human-made greenhouse gases. The observed rapid warming thus gives urgency to discussions about how to slow greenhouse gas emissions. The map shows that current warmth is nearly ubiquitous and greatest at high latitudes in the Northern Hemisphere.

PERMACULTURE

The Permaculture Research Institute of Australia

www.permaculture.org.au

The site provides a range of information articles on permaculture, a discussion forum, notices about events and significant speakers/visitors, and blog posts from individuals talking about and practicing permaculture on a daily basis.

SOLAR ELECTRICITY – NEW TECHNOLOGY

The Liquid Solar Array (LSA) by Sunengy Pty Ltd

www.sunengy.com

The LSA is a simple innovative solar technology that has the potential to produce electricity at costs comparable to fossil fuel generators. The LSA system is based on floating solar collectors made mostly of plastic. Each has a very small area of highly efficient silicon photovoltaic cells at the water surface with a large, thin plastic focussing lens rotating slowly above to track the sun. The water cools the silicon cells, and in bad weather the lens is protected by rotating it fully under the water to avoid damage by high winds. The website gives further technical information brochures and a contact form to register interest.



SUSTAINABLE LIVING

Sustainable Homes Program (Queensland)

www.sustainable-homes.org.au

The Sustainable Homes Program aims to provide communities with display homes that incorporate principles of sustainable design and performance. The objective is to demonstrate and promote the importance of investment in sustainable design at the household and community level, and to increase the demand from home owners, builders and developers for sustainability practices. The website supports the initiative with information on design, materials and news of project progress.

Calls for input and collaboration

International Cooperative Survey of Global Health and Food Risks

Are you working in, or specialised in, **risk studies of global health, food safety, GMOs, or Biobanks?** If so, the following may be of interest: Network member **Chou, Kuei-Tien** – ktchou@ntu.edu.tw; <http://ccms.ntu.edu.tw/~ktchou/english.HTM>, Associate Professor at the Graduate Institute of National Development at the National Taiwan University - www.ntu.edu.tw/english/main.html - is constructing an international research network addressing issues on global health and food risks, and is looking to recruit scholars from various countries to allow more possibilities for cross-national comparisons. The team is still in need of researchers, particularly from Australia. The following is an introduction to the project:

We are planning to conduct the project – **International Cooperative Survey of Global Health and Food Risks** as a 3- to 5-year program scheduled for launch in 2006. We intend to explore the theoretical principles of risk perception, risk assessment, risk communication, and risk governance in different countries, while addressing the risk issues of electro-magnetic radiation of mobile phones and base stations, avian flu, GMOs, antibiotic overuse in food or animal feeds, hormones added to food, and dioxin pollution in food. We hope to initiate **international research networks** across at least 12 countries to share experiences of the development of global health and food safety issues under various national conditions. Each researcher will be free to choose their interest topics among those suggested above, but our hope is that focus can be on a small number of common issues to facilitate cross-national comparisons and analyses. The network will facilitate discussions of topics, research directions, methodology, and analyses. Currently the intended methodologies are based on national telephone surveys and interviews of stakeholders on risk issues. With respect to budgets, it is suggested that applications be made nationally to affiliated academic or governmental organizations. For example, instance, Prof. Chou is applying funds from NTU and the National Science Council of Taiwan. **For more information or to express interest, please contact Prof Chou at the above email address or his personal assistant Monica Fang-yu Hu – fangyu@ntu.edu.tw.**

Inquiry into Australia's future oil supply and alternative transport fuels

www.aph.gov.au/senate/committee/rrat_ctte/oil_supply/index.htm

The Senate has established an inquiry into Australia's future oil supply and how to reduce our reliance on oil. The inquiry, initiated by Greens Senator Christine Milne, will help raise awareness about the issue and allow the community to have a say in planning to reduce our reliance on oil and ensure a smooth transition to a future based on renewable fuels. Find out more about the inquiry from the Senate Rural and Regional Affairs and Transport References Committee at the above URL or telephone 02 6277 3511. **Submissions close on 24 February 2006.**

Reminder

Sustainable Development Update (SDU) – Issue 6, 2005, now online

www.albaeco.com/sdu/

Features information on: Poor women key to sustainable development; The Clean Development Mechanism; The enviro-myth that commonly owned natural resources are doomed; Human health threatened by ecosystem degradation; New possibility to overcome malnutrition; Khao Lak after the tsunami – as vulnerable as before; Many poor countries on an unsustainable path; Climate change might interrupt natural pest control; and an interview with Arjan Rajasuriya.

Courses in Sustainable Development

Marking the UN Decade of Education for Sustainable Development 2005-2014

ANU: SRES Intensive short courses in Eco-Innovation and Sustainable Development

Contact Janis.Birkeland@anu.edu.au or <http://sres.anu.edu.au/programs/postgrad.html>.

ANU: ACEL Courses in Environmental Law

A selection of courses can be taken as PD short courses or as part of a graduate degree in the Law Faculty at the Australian Centre for Environmental Law (ACEL), ANU. See: <http://law.anu.edu.au/accel>. Courses in Environmental Law are also taught in Melbourne. See <http://law.anu.edu.au/postgraduate>

Central Queensland University – Graduate courses in sustainable environmental management

Postgraduate programs in the Institute for Sustainable Regional Development and the Centre for Environmental Management: www.isrd.cqu.edu.au

Charles Sturt University

Distance Education postgraduate courses are available in: Ecotourism; Environmental Conservation; Environmental Management; Parks, Recreation & Heritage; Restoration Ecology; River Restoration & Management; Sustainable Agriculture; and Sustainable Management. See www.csu.edu.au/courses/ and follows the links for postgraduate courses in the Faculty of Science and Agriculture; or email enquiry@csu.edu.au.

Curtin University of Technology – Courses in Sustainability Management & Cleaner Production

The Centre of Excellence in Cleaner Production offers two world-class, multidisciplinary professional Masters programs – Sustainability Management and Cleaner Production – in addition to specialized undergraduate units in sustainable production & consumption and engineering sustainable development: See <http://cleanerproduction.curtin.edu.au>

Flinders University of SA – Postgraduate Environmental Qualifications

A range of courses are offered towards Bachelors and Masters Degrees and Graduate Diploma and Certificate in the School of Geography, Population & Environmental Management. See: www.flinders.edu.au/courses/areas/environment.html and www.ssn.flinders.edu.au/geog/

International – Blekinge Institute of Technology, Sweden

Applications are open for the 2006/07 Masters of Strategic Leadership Towards Sustainability program. This is a trans-disciplinary program taught in English based on an intellectually rigorous and scientifically relevant model for systematic progress towards an attractive sustainable society. See: www.bth.se/tmslm or email sustainabilitymasters@bth.se

IWES – Short courses in water management, wastewater treatment & environmental management

www.iwes.com.au

Macquarie University, Sydney Graduate School of the Environment

(1) Master of Sustainable Development – Contact Wendy Goldstein wgoldstein@gse.mq.edu.au. (2) Master of Environmental Education – See www.gse.mq.edu.au or contact Joy Monckton jmonckto@gse.mq.edu.au. The University also hosts ARIES, the Australian Research Institute in Education for Sustainability – See www.aries.mq.edu.au/index.htm for publications reviewing policy and practice of environmental education for sustainability. ARIES is also in process of developing an Education for Sustainability (EfS) portal at: www.aries.mq.edu.au/efportal.htm to provide an introduction to this vital area of learning and a site where key EfS documents, programs and case studies can be posted.

Monash University: Linked Postgraduate Coursework Programs in Environment and Sustainability

Each offers opportunities for students to study electives and undertake projects in topics of special interest. [For more information contact Sharron.Pfueller@arts.monash.edu.au] (a) Master of Environment & Sustainability – www.arts.monash.edu.au/ges/postgrad/mes.html; (b) Master of International Development & Environmental Analysis – www.arts.monash.edu.au/ges/postgrad/midea.html; (c) Master of Corporate & Environmental Sustainability Management – www.arts.monash.edu.au/ges/postgrad/mcesm.html

Murdoch University – The Institute for Sustainability Technology & Policy (ISTP)

Undergraduate Degrees in Sustainable Development, Masters by Coursework Degree in Ecologically Sustainable Development, an associated Masters in City Policy, and PhD programs covering a wide variety of sustainability issues from a policy perspective. A feature of the ISTP approach is the involvement of students in practical applications of sustainability (e.g., the recently developed WA State Sustainability Strategy). See: <http://www.wistp.murdoch.edu.au/> or contact ISTP Head, Professor Peter Newman – P.Newman@murdoch.edu.au or email www.wistp@murdoch.edu.au

Rangelands Australia – at the University of Queensland, Gatton Campus

Australia's only postgraduate coursework programs in Rangelands Management for land managers, government advisors and facilitators. Qualifications include a Graduate Certificate, Graduate Diploma, and Masters of Rangelands Management. For information visit www.rangelands-australia.com.au or contact rangelands@uqg.uq.edu.au or Janet Kieseker – j.kieseker@uq.edu.au

RMIT: Graduate programs in Rural & Regional Sustainability

www.rmit.edu.au (Use "Rural & regional sustainability" in the search facility.)

Swinburne University of Technology: Graduate Certificate in Sustainability

Courses developed at the National Centre for Sustainability Technology in response to industry demand for staff able to address the key sustainability challenges - www.ncsustainability.com.au/?id=courses

University of Melbourne

Graduate Environmental Program 2006 – a multi-disciplinary, cross-faculty program that helps students turn their interests and concerns into practical actions for environmental sustainability, social equity and profitability. See www.environment.unimelb.edu.au or contact: query-environment@unimelb.edu.au.

University of New South Wales - Institute of Environmental Studies: Masters, Graduate Diploma & Graduate Certificate in Environmental Management, based on a sustainable development framework. Visit <http://www.ies.unsw.edu.au> or contact Mark Diesendorf – m.diesendorf@unsw.edu.au.

University of New South Wales - Mining Research Institute: A range of graduate diploma and certificate courses with relevant sustainability content. Contact Kim Russel – K.Russell@unsw.edu.au or visit www.mining.unsw.edu.au

University of Sydney – Orange Campus – Postgraduate courses in Sustainable Management
Degrees, diplomas and certificates in Sustainable Management & Sustainable Agriculture;; and www.orange.usyd.edu.au

University of Western Australia: New for 2006 – Fully online Graduate Certificate in NRM Policy & Planning –. Especially suited to people in rural and regional areas. Examines key issues, institutions and policies for NRM in Australia as well as local and regional NRM planning. Contact ird@fnas.uwa.edu.au or Ph: (08) 9842 0808.

Conferences, Workshops & Events

Water Conferences listed by the International Water Association (IWA):

See: www.iwahq.org.uk/template.cfm?name=events

Conferences and courses listed by the Australian Centre for Groundwater Studies

See: www.groundwater.com.au/ or <http://groundwater.com.au/conferences.html>

International Events listed by the Harvard University Forum on Science & Technology for Sustainability

See: <http://sustainabilityscience.org/events.htm> or <http://sustsci.harvard.edu/events.htm>

Corporate Social Responsibility – Workshops and Conferences listed by ACCSR

See: www.accsr.com.au

Australia-New Zealand Climate Change and Business 2006

Adelaide, **20-21 February**. www.climateandbusiness.com

Collaborating on our water future – 4th Annual Australian Water Summit

Melbourne, **21-24 February**. www.australianwatersummit.com.au

Catchment & Natural Resource Management Conference

Albury, **23-24 February**. www.halledit.com.au or denise@halledit.com.au

Mine Tailings 2006

Brisbane, **27 February – 1 March**. www.iir.com.au/resources

Water '06 – The Industry Leaders' Forum

Brisbane, **1-3 March**. www.pipecommunications.com.au/water06/

Corporate Social Responsibility – Forum 2006

Sydney, **2-3 March**. www.liquidlearning.com.au/events.html

Sustainability & Environmental Reporting

Melbourne, **9-10 March**. www.marcusevans.com/events/CFEventinfo.asp?EventID=10420

4th World Water Forum – Local Actions for a Global Challenge

Mexico, **16-22 March**. www.worldwaterforum4.org.mx

Globe 2006 – 9th International Conference & Trade Fair on Business & the Environment

Vancouver, Canada, **29-31 March**. www.globe2006.com

4th Intl. Conf. on Water Sensitive Urban Design & 7th Intl. Conf. on Urban Drainage Modelling

Melbourne, **2-7 April**. www.icms.com.au/UDMandWSUD/

Water Reuse & Recycling 2006

Sydney, **26-28 April**. www.iir.com.au/infrastructure

Sustainable Energy 2006 – Conference of the Australian Business Council for Sustainable Energy

Brisbane, **3 May**. www.bcse.org.au

Environmental Health: Exposed – AIEH (WA/NT Branch) State Conference

Fremantle, **3-5 May**. www.aieh.org.au or wa@aiih.org.au

Enviro 06 – Building Sustainable Cities

Melbourne, **9-11 May**. www.enviroaust.net

7th ICTC Conference – Society for International Cities, Town Centres & Communities

Newcastle, NSW, **6-9 June**. www.ictcsociety.org/conf2006/index.htm

Hydrological Sciences for Managing Water Resources in the Asian Developing World

Guangzhou, China, **8-10 June**. <http://cwre.zsu.edu.cn/mwra>

National Greenbuild & Eco Show 2006

Sydney, **9-11 June**. www.ecoshow.com.au

2nd International Conference on Quantified Eco-Efficiency Analysis for Sustainability

The Netherlands, **28-30 June**. www.eco-efficiency-conf.org
 Cities of the Future: Blue Water in Green Cities Wingspread Workshop (IWA)
 Wisconsin, USA, **12-14 July**. www.iwahq.org.uk/template.cfm?name=cities_06
 7th International Conference on Hydroinformatics – HIC 2006
 France, **4-8 September**. www.hic2006.org
 Managing Environmental Knowledge – 20th Intl. Conf. on Informatics for Environmental Protection
 Graz, Austria, **6-8 September**. www.enviroinfo.net
 Sustainable Water Management Practices – IWA World Water Congress & Exhibition
 Beijing, China, **10-14 September**. www.iwa2006beijing.com
 2nd IWA-ASPIRE (Asia Pacific Regional Group Conference & Exhibition)
 Perth, **28 October – 1 November 2007**. www.awa.asn.au/events/aspire

And Finally – Notes and Reminders

Our web site at www.bml.csiro.au/sustnet.htm has CSIRO's "P@NOPTIC" search facility installed – and also features short content summaries for archived newsletters.

The *SustNet* website is maintained by Lyndon Hirst at CSIRO's Black Mountain Library – Comments and suggestions welcome. Contact Lyndon at Lyndon.Hirst@csiro.au

- To **SUBSCRIBE** to the Sustainability Network, visit www.bml.csiro.au/SNabout.htm or send me an email request: Elizabeth.Heij@csiro.au
- To find back issues of Sustainability Network newsletters directly, go to our web archive at: www.bml.csiro.au/SNnewsletters.htm
- **Pass it on!** The Sustainability Network is intended to be inclusive rather than exclusive. If you know someone who might be interested in this newsletter, by all means forward it to them or give them our web address.
- **Want to make contact with scientists?** If you can see an application for the science featured in these newsletters and need to contact the scientists involved, let me know by email.
- **Want to see a particular area of sustainability science featured?** If there is a particular area of sustainability-related science that you would like to see featured as a "spot" in a future newsletter, send me an email or call me by phone to discuss it.
- **Give me your feedback.** I am interested in your comments as to whether these newsletters are interesting, useful, and pitched at the right level for your particular purposes. Do you have suggestions? Thanks to all those who have already sent in comments and alerts.



Sincerely,

Elizabeth Heij

Network Facilitator

Network Milestone:
 Our Sustainability Network
 has over a thousand members.

Bicycle taxis go up-market!

Here's a new take on an old idea that can cut pollution and congestion in the inner city – an innovative bicycle taxi ("fietstaxi") as seen on the streets of Amsterdam in the Netherlands.

