

CSIRO

SUSTAINABILITY NETWORK

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11 December 2002

Members
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Feature “thought” :

When the winds of change blow, build windmills, not shelters!

*Unattributed quote overheard at
a recent industry workshop.*

Dear Colleagues:

SUSTAINABILITY NETWORK UPDATE – No 21

This Update takes a further look at risk, uncertainty, and the interface of science with human perceptions and fears. It also brings together several converging themes at the interface of globalisation versus “glocalisation”, and sectoral clustering versus eco-clustering.

Sustainability and our evolving perceptions of risk

Following up on the “Budapest Manifesto” featured in the last newsletter, this feature covers a subset of the material presented by participants at a multidisciplinary CSIRO project-development workshop, “Risk and Uncertainty in Decision-Making for a Sustainable Australia”, convened by Dr Tom Beer¹ for the Risk and Sustainability Networks, and held in Melbourne on 21 November. The workshop comprised the first comprehensive discussion of risk as a potential area for bridging two of the emerging science themes being promoted by the CSIRO Science Forum – Complex Systems Science (CSS) and Socio-Economic Integration (SEI). The workshop was based around five strands: Biosecurity, Global Change & Sustainability, Risk-based Urban & Rural Management, Perceptions of Environmental Risk, and Modeling & Integration. It is planned to make the presentations and other summary documentation available on the web. In the meantime, refer enquiries to Tom.Beer@csiro.au

The following short feature is drawn mainly from the presentations of Dr Rob Floyd – Rob.Floyd@csiro.au - (introducing the Biosecurity strand) and Prof. David Fox - david.fox@unimelb.edu.au - (introducing the Global Change & Sustainability strand).

In many ways, *risk* – the probability of an adverse outcome – is the flip-side of *sustainability*, particularly when it comes to the environment. Human activities impact on ecosystems in ways

¹Tom Beer, CSIRO Atmospheric Research, is also Chair of the Commission on Geophysical Risk and Sustainability for the International Union of Geodesy & Geophysics (IUGG).

that can be detrimental to long-term sustainability but are not necessarily immediately perceivable. Although we know many of our actions carry risks, it is often difficult to define those risks, or to determine their probability, magnitude, time-scale and associated knock-on effects.

A fundamental problem with assessing risk in this context is knowing just what it is we are aiming to sustain. It may be quite impractical to sustain a particular ecosystem state, and difficult or controversial to assess the risks and trade-offs associated with some different state.

We struggle with the range of definitions of “sustainability” – from dictionary definitions centred around “capability of endurance” to the Brundtland definition, which introduces the concept of intergenerational equity. The problem is that the word “sustainability” has become too big a concept – essentially being asked to carry all of society’s aspirations for the future – a sort of repository for “forward nostalgia.” Just imagine the different sustainability yearnings of a corporate business magnate and a deep ecology proponent!

So, there is always a question about what it is we are seeking to sustain and for whom we want to sustain it. These questions are not trivial. In essence they define the base conditions against which risk is perceived and needs to be assessed. Do we want to sustain a system as it is, or are we willing to sustain some boundary conditions over others? The answer will determine what we interpret as “risks” and the sort of framework we set up to assess them.

Risk assessment is not an absolute. It is a human construct combining analytical techniques with social knowledge to predict both the likelihood and consequences associated with some pre-defined event. It involves technical, scientific and mathematical translation of human perceptions of fear. In working with this translation from emotional to rational perception, we need to reflect the social dimension by making risk assessment frameworks readily explainable and broadly discussable. In this area where science enters the social dimension, the risk to science, if it becomes too abstract or obscurely academic, is marginalisation rather than a central role in the debate.

Biosecurity



Broadly, the term “biosecurity” means the prevention of harm to society and the environment from intentional and unintentional introduction of damaging biological agents. Such agents range from bacteria and viruses to weeds, plant diseases, insects, and animal pests.



Biosecurity breaches can be acute emergencies (e.g., last year’s European Foot-and-Mouth Disease (FMD) epidemic), or chronic ongoing background invasions (e.g., exotic plants, insects and fungi with imported produce).

Before the terrorist attack on the World Trade Centre of 11 September 2001 and the anthrax events in the USA, the emphasis in biosecurity was on prevention or mitigation of unintentional pest and disease incursions, mainly in relation to agricultural industries and the natural environment. Since “Nine-Eleven”, however, the pathway for incursion via terrorist activity has risen in prominence, and greater emphasis has been placed on preventing malicious introduction or spread of damaging agents, especially human diseases.

In fact Nine-Eleven has catalysed a reversal, or back-flip, in the prevailing trend for assessment, management and communication of biosecurity risks, especially in the USA where the focus is now on reaction to terrorist attacks, protection of crucial facilities, and controlling entry to the country, etc.

Old Approach	Recent Approach Pre 9/11	Approach Post 9/11
Address symptoms	Tackle causes	Address symptoms
Reduce probability	Reduce consequences	Reduce probability
Emergency response	Up-front mitigation	Emergency response
Top-down, expert led	Bottom-up engagement	Top-down, expert led

Our perception of bio-terrorism is loaded with dread and outrage to a much greater extent than our perception of non-malicious biosecurity breaches. The actual economic costs of non-terrorist breaches, however, far outstrip the costs of more high-profile terrorist outrages. The events of Nine-Eleven, for example, cost a one-off US\$83 billion, while alien invasive pest species cost the US \$143 billion annually.

The complexity of the situation is not helped by differences in approach underlying the two major international agreements dealing with biosecurity risks from the trade and conservation points of view. Under the 1995 World Trade Organisation (WTO) Agreement on the Application of Sanitary and Phytosanitary Measures (“SPS Agreement), quarantine-based trade barriers must be justified by risk analysis based on transparent scientific evidence. The Convention on Biodiversity (CBD), however, specifies that environmental policy decisions, including those relating to potentially invasive species, should be based on the precautionary principle. In other words, the WTO gives first priority to freedom of trade unless an unacceptable level of risk can be demonstrated, while the CBD gives biosafety first priority and discourages movement of biological material unless perceived to be safe.

Environment/Conservation Approach	Agriculture/Trade Approach
Keeping out invasive species	Quarantine & incursion management
Precautionary approach	Science-based risk analysis
Emphasized in Europe	Emphasized in the USA
Probabilistic – live with uncertainty	Deterministic – reduce uncertainty
Values public participation	Values economic evaluation
Seeks safe decisions	Seeks certain decisions

In Australia, further complexity is generated by the broad scatter of various biosecurity responsibilities across a number of different jurisdictions and agencies.

So, how can science contribute to dealing with biosecurity in world where human behaviour, social institutions, and globalisation all contribute to the spectrum of risk? Essentially the tasks will be:

- To understand and model a complex socio-economic-environmental system in terms that will allow hazard identification using inputs from public perceptions of risk.
- To assess levels of risk in terms of economic modeling, environmental sensitivity, spatial analysis, levels of uncertainty, and cost-benefit trade-offs.
- To communicate risks accurately and adequately, taking account of uncertainty issues and public perceptions.
- To determine and implement actions to treat risks with broad public support.

Biosecurity is a typical example of one of those “awkward” new areas at the intersection of disciplines. The necessary skills to develop new risk-analysis science at the interface of “safe” and “certain” will have to come from ecology, complex systems science, sociology, and economics² - and perhaps from other disciplines as well.

Global change, risk and sustainability

When it comes to defining what we want a sustainable future to encompass, the list is comprehensive. It includes, for example: clean air, clean drinking water, a safe food supply, clean rivers, lakes, groundwaters, estuaries & oceans, clean soils, clean, safe & healthy dwellings & workplaces, safe disposal of human, household & industrial wastes, biodiversity conservation, habitat conservation & restoration, aesthetically pleasing natural & built environments, and reduced environmental impacts on human health. In addition, we want all these to be long-term sustainable, and the risks to all of them understood, assessed and adequately managed. No small ask!

An understanding of the drivers of risk starts at the global level with a forecast of where we now appear to be headed by 2015. Data from the American CIA suggest:

- World **population** in 2015 will be around 7.2 billion – 95% in developing countries, fostering instability.
- Political instability and chronic poverty will likely lead to **food insecurity** and a 20% increase in numbers of malnourished people.
- More than 3 billion people will live in countries that are “**water stressed**”.
- **Environmental degradation**, particularly of arable land and tropical forests will continue.
- **Greenhouse** gas emissions will increase substantially.
- Disparities in **health** status between developed and developing countries will widen. AIDS will consume more than 50% of many health budgets.

For Australia, looking ahead to 2025, a recent CSIRO summary of our current trajectory sees:

- **Population** increasing by 25% to 25 million, with Australia seeing the equivalent urbanization of another city the size of Sydney.
- **Energy** demand increasing by at least 40%, and dependency on oil imports increasing.
- The proportion of people **older** than 65 increasing from 12% to 25%.
- **Climate change** causing average decreases in rainfall of 0.5 mm/day and a 10% decrease in crop yield unless water supply can be increased and drought- and salt-tolerant crops can be developed.
- Population driving up the **number and size of cities**, placing pressure on **water, biodiversity, inherited infrastructure, transport and communications**.

In the 20th Century, the global human footprint increased dramatically³. There were huge increases in: population (x 4), urban population (x 13), water use (x 9), SO₂ emissions (x 13), CO₂ emissions (x 17), marine fish catch (x 35), and industrial output (x 40). Human activities came to dominate, on a global scale, the availability of fresh water, nitrogen and phosphorus budgets, the CO₂ balance, fisheries production, and biotic turnover. As a result of this enormously increased pressure on the planetary ecosystem, human-induced evolutionary

² See the features on Complex Systems Science (CSS) in Network newsletter 16 and socio-economic integration (SEI) in Network newsletter 17 at: www.csiro.au/intranet/multi/sustnet/newsletters.htm

³ From McNeill, J (2000) *Something new under the sun: An environmental history of the 20th Century*. Penguin Press.

changes became evident in other species. For example: the emergence of new disease organisms, antibiotic resistance in bacteria, plant and insect resistance to herbicides and pesticides, changes in life-history characteristics of commercial fish stocks, and rapid changes in invasive species adapting them to new environments and food sources.

And what was the management response to the dawning realization of our human impact? Essentially *more of the same* – seeking to command and control the processes of change in simplified landscapes in an attempt to stabilize ecosystem outputs and sustain consumption patterns. The International Council for Science, considering resilience in sustainable development, has commented that “*short-term success of increasing yield in homogenized environments reinforces mental models of human development as being superior and largely independent of nature’s services.*”

Resilience and sustainable development

Human simplification of landscapes and seascapes, for production of a small number of target resources to be traded on markets, has stabilized resource flows in the short term. But it has done so at the expense of diversity – the redundancies and “checks and balances” of natural ecosystems – and by doing so has eroded long-term resilience to further environmental shocks.



The resilience of a system in the face of change is a function of the magnitude of the shock – in relation to how much change the system can absorb and remain in a given state. It is also a function of the system’s ability to self-organise, and the capacity for feedback, adaptation and learning. One thing is becoming very clear: tighter management tends to increase, rather than decrease, vulnerability, and any hope of sustainability depends on managing ecosystems for resilience, not for control. (So what are we to think about calls for a Factor-4 campaign – to double productivity on only half the land now used? Can this possibly be made compatible with resilience?)

In looking for sustainable stewardship of the ecosystem, the main issues are:

- Vulnerability, arising from erosion of natural support capacity – of resilience. We need to explicitly understand and recognize thresholds at which a system can change irreversibly to a different state. We need to be able to deal with both uncertainty and “revenge effects” – i.e., the all-too-frequent occurrences where our “solutions” cause new, unanticipated problems.
- How to “manage” complex social-ecological systems to sustain and enhance resilience. We need to create arenas for wide, flexible collaboration – “open” institutions that allow for learning, feedback and the building of adaptive management capacity.
- A need for indicators of ecological resilience, and of approaching threshold effects – early warning signs of gradual changes that can be monitored and responded to in time to head off sudden irreversible changes of state. Science has made a start in this area, for example with salinity hazard mapping at national and regional scales.
- A need for strategies for adapting to uncertainty – for fast, flexible responses to small indications of change. When dealing with the environment, essentially the only certainty is uncertainty! We have to be able to deal with it – and fast.

Taken together, these issues imply the need for a radical change in thinking about how we manage the resilience of complex social-environmental systems – away from trying to enforce

control, towards working with the system; away from conventional emphasis on trying to predict, plan and optimize what we do, towards fast, flexible responses. It brings to mind the differences between driving a car and riding a tiger!

Science, risk and society

Turning to consider the role of science in publicly debating risk, we are immediately faced with problematical non-science issues:

- How can democracy work when so many of the potential solutions to our problems come from cultures and expertise areas that are unintelligible to most of us?
- Do we trust “experts” to make decisions for us?
- As citizens, we all participate in the *politics of risk*, and thus inhabit a *risk society*. Although embedded in it, we struggle to understand this risk culture. It engenders distrust, alienation, skepticism and cynicism leading to a deficit in democratic participation.

Trust in “experts” is at an all-time low. The visible and vocal evidence of distrust is all around us, between ethical “green” groups and resource companies (e.g., Greenpeace and oil companies), between consumers and biotechnology giants (e.g., Monsanto with its GMOs and terminator genes), between corporate governance and stakeholders (e.g., in the affairs of Enron, HIH, One-Tel, etc), between politicians and citizens (e.g., “never, ever”; “core” and non-core promises), and even between the Church and its laity (e.g., recent scandals in major churches). How best can science contribute when *“An ever-increasing proportion of the population seems to distrust rational inquiry to establish both the factors and the uncertainties; rather they prefer their instincts, or even celebrate anti-intellectualism”*⁴ ?

Inputs from Complex Systems Science

Human society, together with the surrounding environment, constitutes a Complex Adaptive System (CAS) and, as such, can be approached for understanding using principles of Complex Systems Science (CSS) (see footnote 2). CAS theory bridges the divide between the biophysical and social sciences to help understand the interactions of, for example, climate, history, human actions, syndromes of global change, and elements of social and biophysical risk. It also provides a new way of interpreting ecological-societal interactions. The traditional view was of nature and society as systems in equilibrium with each other. The new view, however, is of non-linear relationships between entities in constant change and facing discontinuities and uncertainties from a continual series of synergistic stresses and shocks.

The CAS approach has implications for both economic valuation of natural capital and for policy. Current valuation practices attempt to capture the value of marginal change, assuming an essentially stable system near local equilibrium. Such valuation fails to recognize the inherent uncertainties and complexities associated with managing ecosystems and natural capital assets, and also ignores the slowly changing probability dynamics of critical ecological thresholds. A new approach is needed – a portfolio approach for natural assets – one that captures the significance and value of resilience, and of the environment’s capacity to sustain human “wellbeing.”

A CSS approach to global environmental risk will need to integrate:

- Economics and risk analysis
- Biophysical modeling, ecology, and societal perceptions and expectations

⁴ Sir Howard Newby, President, British Association for Science.

- The movements, fate, and effects of environmental stressors and contaminants, e.g., chemicals, drugs, pathogens.
- Climate change and climate variability
- Industrial ecology, using a whole-of-system approach
- Human population demographics
- Design of environmental monitoring networks
- Design of environmental databases, and the handling of legacy data issues
- Trade-offs between social equity and environmental justice (NIMBY issues, etc)

In doing so, this new area of science is likely to learn (or borrow) from a whole range of conceptual and technological applications in, e.g., human health and safety, transport systems, chemicals and hazardous materials, ionizing radiation, foods, electromagnetic fields, biological materials and exotic organisms, GMOs, terrorism, and global climate change.

To meet the challenge, Science will need to grow and develop in a number of areas, including:

- Definition of threats – particularly the concept of suites of interrelated threats rather than narrow perceptions of single threats.
- Vulnerability analysis (asking, for example: what are the most relevant and useful indicators; what types of vulnerability do they address; how scale-dependent are they; do they have a robust conceptual basis; can they be modeled; what would ideal indicators look like; and how will scarcity of data will be handled.)
- Economics at the interface with risk assessment
- Monitoring systems and compliance mechanisms for safeguarding both human health and the health of other species and ecosystems
- Design of new standards and associated verification procedures
- Analysis of uncertainty and error margins and, importantly, their non-technical communication
- The movement, fate and effects of chemicals in the environment
- The global energy system and carbon accounting
- Population and demographic studies in relation to the environment
- Design for resilience, and design of environmental networks
- Design, development and application of environmental databases and spatial information systems

Conclusion

Good science is necessary but not sufficient to deal with risk in a world where every person defines risk in relation to a unique, individual suite of perceptions. In our “risk society”, science has an important role in:

- Understanding vulnerability, resilience, and adaptation at a range of scales;
- Understanding sources and types of uncertainty, and identifying options for handling them; and
- Developing public policy approaches and tools for dealing with risk amid a sea of conflicting agendas, values and world views.

Science, however, is the servant here, and its role begins and ends with human perceptions and community values. Risk science works at the human coalface, not in an “ivory tower”.

Additional Reading:

Beer, T. (in press) Environmental Risk and Sustainability. Proceedings of the EUROSCIENCE Workshop, “Science for Reduction of Risk and Sustainable Development of Society”, Budapest, June

2002. NATO Advanced Research Workshop Series. Kluwer Publishers. Manuscript available electronically from Tom.Beer@csiro.au

The Budapest Manifesto on “Risk Science and Sustainability”, a declaration by attendees at the above workshop. See Network Newsletter 20 (pp 12-15) at: www.csiro.au/intranet/multi/sustnet/newsletters.htm

Anderson, Judith L. (1998) Embracing Uncertainty: The Interface of Bayesian Statistics and Cognitive Psychology. Conservation Ecology [online] at: www.consecol.org/vol2/iss1/art2/index.html

“Living with Risk in our Society.” Proceedings of a workshop sponsored by the Australian Academy of Technological Sciences and Engineering (ATSE), NSW Division, Sydney, 14 May 2002, edited by Dr Desmond Bright, published by ATSE. ISBN 1-875612-871-6. PDF file (750 KB) available at: www.atse.org.au/publications/reports/nsw-risk-2002.htm

Website – Risk & Policy Analysts Ltd. (RPA), UK: www.rpaltd.co.uk/

Globalisation an issue? “Glocalisation” could be the answer.

Developed nations have thoroughly embraced globalisation as the answer to economic growth. Big business, particularly trans-national or multi-national firms, have done a great job of painting globalisation as the necessary and desirable future for human society. And why wouldn't they? If the entire world is one giant marketplace, the pool of potential customers is huge. If taxes and financial restrictions remain predominantly national, the freedom to creatively manage investments across national boundaries looks limitless. If the rules of the market are manipulated to enhance access by the already-wealthy, then it appears just a short haul from competing to dominating – with all the desirable shareholder returns that implies

Business and government did such a great sales job that we, the community, accepted the desirability of globalisation pretty much without question. And there are some very appealing “hooks” in the sales pitch, based around greater choice and faster gratification. Think, for example, of: a wider variety of imported goods available to us, goods available “instantly” from anywhere, more customers for our own products, fast communication from anywhere to anywhere, expanded access to information, easier overseas travel, and more tourists to spend their money here.

When the anti-globalisation movement first raised its head with demonstrations and civil strife directed at the machinery of globalisation – the World Trade Organisation (WTO) and other trans-national commercial policy gatherings – we were stunned. Why were some people so unhappy? What was it all about?

Slowly, filtering through the economic-development hype, has come a more general realization of the significant downsides of globalisation as originally conceived. For example, standardization (or “MacDonald-isation”) of the marketplace across nations can displace local culture, local businesses, local knowledge, and local creative potential. And for developing nations, attempting to compete in a global marketplace under rules set by developed nations is rather like swimming with sharks.

These are some of the major “gripes” of the anti-globalisation movement, but other downsides are also starting to be noticed, such as unfettered consumerism and the non-sustainability of current transport usage. Rationalisation of manufacturing across national borders to achieve cost efficiencies and economies of scale, leads to “irrationalisation” of transport when the value chain is spread across vast distances (e.g., wood chips exported to Japan and reimported as computer paper, etc). Also complicating the transport puzzle is the huge increase in piecemeal

internet purchase orders by individuals everywhere, and their expectations of immediate delivery to the door from anywhere in the world.

Rejecting globalisation, however, in favour of closed local economies, is just not going to work either. While local cultures and business enterprises may flourish initially, it would eventually mean loss of many potential benefits from good ideas developed elsewhere; inward focus and diminished awareness; constrained knowledge and incentives; and also a lack of challenge for the more creative, adventurous, and energetic individuals and age-groups in the community. What a waste!

Is there a half-way house – a way of capturing the benefits and avoiding the downsides of both globalisation and “localization”? Is there a place we could call “**glocalisation**”? Can we use tools such as the internet and rational transport options to provide a “global network of local clusters?” In the provision of goods and services, can we decrease long-distance transport of physical materials (and people), in favour of moving ideas around electronically to empower local creativity?

Business strategist, Colin Benjamin⁵, Managing Director of *Life.Be in it™*, one of Australia’s trend sentinels⁶, sees globalisation as an extension of the Adam Smith view of the world – as a world becoming more standardized, commodified and predictable for investors looking for return on accumulated savings and capital. “**Glocalisation**”, on the other hand he sees as an extension of the new experience economy in which the principle of subsidiary applies – i.e., doing things at the lowest possible level to maintain growth and diversity. Colin sees the trend to glocalisation already with us:

Globalisation	TO:	Glocalisation
1. Products and services		I. Relationships and experiences
2. Growth, competition and control		II. Capacity, care and cost controls
3. Roles and functions		III. Complexity and communication
4. Authority and autonomy		IV. Anticipatory learning and autarchy
5. Master and servant contracts		V. Enterprise partnerships
6. Mass production of materials		VI. Micro-production of applications
7. A World-Wide Web of cities		VII. Global network of travelers and villages
8. Search for security and simplicity		VIII. Shared search for goals and meaning
9. Marketing of known-knowns		IX. Developing emerging unknowns
10. Uniform standards and conditions		X. Differentiated actions and systems
11. Experience of past and present		XI. Enacting emerging futures
12. Economies of scale and scope: mean that BIG is BEAUTIFUL		XII. Economies of speed and sensitivity: mean that SMALL is BOUNTIFUL

21st Century leadership, says Colin, will involve managing this shift from globalisation to “glocalisation”. For leaders, this will mean changing from the single-loop learning mode of *Observe-Reflect-Plan-Act*, to double-loop learning based on *Seeing-Sensing-Presencing-Enacting* – a shift from the conventional learning cycle to a new, emerging learning cycle. This

⁵ Colin Benjamin – colbenj@lifebeinit.org, of *Life. Be in it* International Pty Ltd, runs courses in strategic business planning and awareness in the Australasian region.

⁶ See the introductory theme on the role of “sentinels” in Network Update 14 at: www.csiro.au/intranet/multi/sustnet/newsletters.htm

shift will be vital to effective operation when familiar hierarchies give way to global networks of locally differentiated, vibrant clusters.

Under the glocalisation scenario, we have a truly exciting future ahead if we approach it the right way. A shared vision of a *global network of local clusters* will help us capitalize on the tools and benefits of globalisation – such as the internet and rapid communication of ideas – while preserving local and regional diversity for community benefit and a broader pool of creative variety.

Cluster convergence?

Since last month's feature on industry clusters, my brain has been chewing away on the apparent divergence of thinking behind eco-clusters as opposed to same-industry ("sectoral") clusters (e.g., "Silicon Valley"). Both types of cluster make good sense according to their particular logic:

In a sectoral cluster, participants are able to share infrastructure, supplier networks, distribution channels, and related niches in a broad market sector (e.g., IT, automotive, etc). In an eco-cluster, on the other hand, participants are interrelated by their ability to use and re-use each other's waste and secondary products regardless of the industry sector to which they belong. The sectoral cluster behaves, in some ways, like a large single-sector enterprise, while the eco-cluster functions more like a local ecosystem. The sectoral clustering concept has caught on with governments, as a way to build and strengthen natural industry groupings that have arisen, or have the potential to arise, as a result of local environmental or historic factors (e.g., the wine industry grouping in South Australia). Eco-clustering, however, is also beginning to attract more attention as a mechanism for increasing efficiency in the use of major resources such as energy and water.

My pondering has been about whether and how these two approaches might converge to harness the advantages of both. Thanks to the unexpected and "innocent" inputs of a seminar speaker from Germany, building on the earlier inputs from Colin Benjamin (above), I can now see how such a convergence might develop.

Eco-clusters are about the efficient local use of physical resources, and are therefore limited geographically to a particular place or locality. While some similar constraints may apply to elements of the supply and distribution networks of a sectoral cluster (e.g., the automotive industry), a sectoral cluster has greater potential for its linking interactions to become "virtual" – as the sharing of information, knowledge, IP, and elements of business systems and processes.

Now, turning to the innocent seminar input that produced the "Aha!" moment. It occurred when Drs Jeroen Kemp of the Fraunhofer Institute, Germany, speaking on "Management of Industrial Innovation and Knowledge" at a University of South Australia, "SmartLink" – www.smartlink.net.au - seminar on 28 November, described as one of his case studies the business system of the Euroshoe Consortium.

The distinguishing feature of the Euroshoe Consortium is a sophisticated, shared electronic CAD/CAM business system (Computer-Aided-Design & Computer-Aided-Manufacture), running across a large consortium of individual small Italian shoe manufacturers. The system gives member businesses access to the ultimate in customer orientation – mass customization of

shoes to the precise foot shapes of individual customers – while preserving the ability of each individual manufacturer to specialize and compete with their own brands and shoe styles.

As Jeroen Kemp explained it, each customer at a local Euroshoe retail outlet has their feet scanned by computer to produce precise 3-dimensional images, and is also able to select the desired shoe style from a large database covering the specialties of all Consortium participants. As soon as the order is completed, the details are transmitted electronically to the relevant manufacturer, who then proceeds immediately with CAM manufacture of the precise pair of shoes required by the individual. (Sounds like my idea of bliss – shoes that actually fit!)

Here is a sectoral cluster where the linkages or “glue” holding the cluster together are virtual rather than physical. Such a Consortium could function as a sectoral cluster even with its members geographically separated – even, in fact, with its members embedded in a set of different local eco-clusters. The physical linkages of eco-clustering and the information/knowledge linkages of sectoral clustering could well co-exist to give a dual system of virtual clustering across localized eco-cluster nodes – i.e., synergistic “two-tier clustering”.

In cases like the Euroshoe example, some constraints may well be imposed by the fact that, ultimately, a physical product is being delivered to customers who may be distant from the point of manufacture. So, from the sustainability point of view, the incurred transport impacts could become a consideration. However, if the virtual cluster were to use shared knowledge, IP, and business systems to deliver local products and services based on local resources, this might well translate to sustainable two-tier clustering. (Night-time data processing by day-time workers on the other side of the Earth looks like an early step in this direction.)

To conclude, it is also worth taking a preliminary look at how the concept of two-tier clustering might translate from the commercial to the residential realm. Many of our most credible sustainability thinkers see society moving gradually to less centralized, more modular community structures, with local capability for power generation, rainwater and stormwater collection, wastewater recycling, food production, local commerce, and greater community self-governance – in effect, to residential eco-clusters.

Lay across these residential eco-clusters a host of virtual knowledge services and regional, national, and international coordination networks, and we have two-tier clustering again – this time as the vision for a globally networked world of sustainable local communities – the essence of “glocalisation.”

However we look at it – from the professional or personal point of view – “getting clustered” and getting “glocalised” loom large in the not-so-distant future.

Time to put money where my mouth is!

One issue with doing a job like mine is that it “outs” in my consciousness all those areas where my personal actions are not meeting my professional sustainability rhetoric. If I were just “doing a job”, this might not be an issue. This job, however, is more like a “labour of love”, and the in-built values of the Heijis (John and myself) sit essentially right alongside the rhetoric.

It means we have become increasingly conscious of areas of unacceptability in our Australian suburban lifestyle, particularly with respect to energy consumption, water wastage, style of garden, modes of food preparation, garbage production, plastic waste, toxic household

substances, poorly designed houses, the need to use cars to commute to work (and for nearly every other activity), and the almost total absence of “community” in our suburbs.

Creative “demand-side management” has seen us bring our own domestic electricity and water consumption down below 70 cents (combined day & night tariff) and 50 litres respectively per person per day, but to do any better with our poorly designed, badly oriented, un-insulated, 3-bedroom, brick-veneer, suburban “box” would require a more comprehensive and expensive retrofit (including garden reconstruction) than the house itself is worth. While the “right” thing to do for sustainability would be to retrofit, and thus remove one existing energy- and water-inefficient house from the community, the financially sensible course of action is to sell it and build a new home embodying the best energy- and water-saving technologies now available.

So – time to put some money where my mouth is. To retrofit or build from scratch?

We had just made up our minds to retrofit, and were starting to make enquiries to find a “simpatico” building contractor, when chance suddenly thrust us onto the other path. Out of the blue, at exactly the critical time, has come a new (for Adelaide) experiment to build a sustainable true community – the Aldinga Arts Eco-Village (www.aldinga-artsecovillage.com).

The development has been designed with emphasis on:

- Orientation of homes for the incorporation of passive solar building designs to maximize energy efficiency, and bylaws to ensure energy- and water-efficiency principles are applied in their construction.
- ‘Open space’ to enable the development of a village common, community gardens, horticultural and recreational areas.
- Rainwater and stormwater collection, and the local recovery, treatment, and re-use of all greywater and sewage on surrounding community gardens and woodlots.
- Provision for future community power generation, e.g., by solar panels and a wind turbine.
- Community telephone and data networks to facilitate both “free” intra-community communication and the negotiation of favourable rates with external service providers.
- Opportunities for local commercial activity to help reduce commuting.
- Encouragement for community members to live in a clean, ecologically sustainable environment, to interact regularly, and to support, share, educate, and care for each other.

After a small flurry of activity, we are now members of this forming eco-community. We own a building block and are starting to work with an architect – www.energyarchitecture.com.au - on the design brief for an energy- and resource-efficient home. Ahead is a journey, and certainly a learning adventure. It is exciting but also scary. We will be living more closely in consultation and cooperation with neighbours than ever before. As typical suburban “introverts”, how will we cope with trading independence for community? The Eco-Village is even further away from where I work. Will I be able to cut commuting drastically and still maintain what I do electronically? What if I can’t? This is not a retirement community or community of “greybeard ex-hippies”. It involves a big proportion of younger age-groups. We are amongst the most senior. How will this affect us?

As of this past week, our first interactions with around ten or so of the people who will progressively become neighbours over the next year have been positive. The diversity of personalities is exciting, the commonality of vision for a humane, sustainable community is

reassuring. I will keep you posted periodically, especially on the technical issues that arise as the “eco-aware” house-building project proceeds.

Other Information Resources

POPULATION & RESOURCES – Report – “Future Dilemmas”

This important CSIRO Technical Report to the Federal Department of Immigration, Multicultural & Indigenous Affairs by Network members Barney Foran and Franzi Poldy of CSIRO Sustainable Ecosystems, was featured in the ABC Television Program “Four Corners” on Monday 4 November. It also featured prominently in the print press in the same week. Using data from a complex model of the physical economy (i.e., litres of this and kilograms of that), the report examines the implications of three Australian population growth scenarios (higher than current, current, and lower than current) for their effects on people, urban infrastructure, the natural environment, energy, water and a broad range of other interacting issues. It concludes that all population growth scenarios are physically possible, but all involve dilemmas in relation to difficult lifestyle, demographic and economic trade-offs. Find the full report as a series of PDF Chapters and a summary – “Dilemmas Distilled” – at www.cse.csiro.au/futuredilemmas or www.cse.csiro.au/research/Program5/futuredilemmas

WATER – “Blueprint for a Living Continent” – From the “Wentworth Group”

The blueprint for national water management and fundamental environmental reform from the group of concerned scientists known as the “Wentworth Group” has now been officially delivered to the Prime Minister, Premiers and Chief Ministers. It calls for urgent implementation of a National Water Plan to repair damaged rivers, and stresses the need to cut through the bureaucratic red-tape that is strangling urgently needed environmental reforms throughout Australia. It identifies three significant changes that governments can implement immediately - end broadscale clearing of remnant native vegetation; clarify water property rights and purchase urgently needed environmental flows for the Murray River and its tributaries. You can access the blueprint online through the WWF website at:

www.wwf.org.au/content/release_02_wentworth_blueprint0311.htm or download the PDF document directly at www.wwf.org.au/downloads/blueprint_for_a_living_continent.pdf [119 kB] [CSIRO’s John Williams, Steve Morton, Mike Young, and Dennis Saunders are members of the Group.]

WATER – Report – Perth’s Water Balance: The way forward

This report on Perth’s municipal water situation and options for the future, produced by the Western Australian Division of the Academy of Technological Sciences and Engineering (ATSE), is available through the ATSE website at: www.atse.org.au/publications/reports/wa-water.htm There is a synopsis on the site and the full report (625 kB) can be downloaded in PDF format). Perth’s water is provided through the Integrated Water Supply System (IWSS) which services the area from Quinns Rocks to Mandurah and incorporates the Goldfields and Agricultural Water Supply (GAWS). In the past 25 years, the south-west of Western Australia has experienced a 10% decline in average rainfall. Further, scenarios developed by CSIRO predict somewhat higher temperatures and a potential for lower rainfall, coupled with increased uncertainty, in this part of Australia over the next 70 years due to climate change. The extent of this decline, or whether it will occur at all is not known. The report looks at the problems and suggests a way forward.

GLOBALISATION – Paper from William E. (Bill) Rees – Globalisation and Sustainability

Rees, WE (2002) Globalization and sustainability: conflict or convergence? *Bulletin of Science, Technology & Society* 22(4): 249-268.

An examination of the condition of modern industrial society concludes that the contemporary myth of sustainability through globalisation is setting humanity on a collision course with biophysical reality. There is already sufficient evidence to show that mankind’s ecological footprint exceeds Earth’s carrying capacity. The analysis draws on evolutionary and socio-cultural history to demonstrate that modern society’s structures are maladaptive and unsustainable. The current trends suggest a bleak ecological future, but societal collapse is not inevitable. Sustainability can be achieved by adopting an enlightened view of economic development which sees the economy as a dependent subsystem of the ecosphere. The ecological-economic alternative recognises that the accumulation of economic capital is at the

expense of natural resources capital, and promotes qualitative development. [ISSN: 0270-4676 64 References. If you are unable to access the journal, let me know. I can help. Thanks to Network Member Carol Murray of CSIRO Black Mountain Library for the alert. See also the synopsis of Bill Rees's paper at Enviro 2002 in Melbourne earlier this year in Network Update 13 page 6 at www.csiro.au/intranet/multi/sustnet/newsletters.htm]

AGRICULTURE – Report – Riparian Areas and on-farm wetlands in the Australian Sugar Industry.⁷



A review for the Cooperative Research Centre for Sustainable Sugar Production by KT Bjornsson, A Brodie, B Dyer, G Lukacs, K Vella, D Walker & G Werren (Oct 2002); a Technical Publication of the CRC for Sustainable Sugar Production, Townsville. ISBN 1876679204

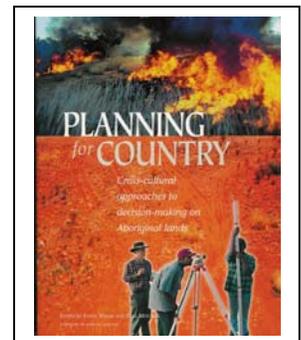
Since most sugarcane production occurs on the floodplains of eastward draining river systems along Australia's northeastern seaboard, management of riparian areas and on-farm wetlands is an important challenge for the ecologically sustainable development of cane-growing districts, and also ultimately for the health of coastal waters in the vicinity of the Great Barrier Reef.

Building on consultations with industry and other stakeholders, the report reviews available recent information for these areas on ecological function, rehabilitation techniques, and a range of planning and statutory devices to assist in melding best-practice agricultural production with objectives for ecological sustainability. Industry and stakeholder views on land management issues and key constraints are discussed, as are options for improved management of riparian vegetation and wetlands on-farm and within the farm business. The report also provides lists of recommended further reading. For a copy of the report, send a request to Deborah Cavanagh, Communications Officer, CRC for Sustainable Sugar Production – Deborah.Cavanagh@www-sugar.jcu.edu.au

INDIGENOUS LAND MANAGEMENT – Book Planning for Country: Cross-cultural approaches to decision-making on Aboriginal lands

Rural Australia is home to sparse Aboriginal and European populations both threatened with marginalisation, both with cultural values deeply rooted in vast landscapes and poorly understood by urban dwellers. Although the two sets of values are often at loggerheads, both confront the same concerns at land being degraded by wild fires, feral animals, native species extinction, thoughtless or insensitive development, and the absence of effective planning tools and concepts.

The difficulties are not helped by arguments between impractical extremes of scientific and environmental debate that fail to deal with the immediate needs of managers on the land – particularly those of indigenous land managers. This book presents a set of tested, successful tools and methods for participatory land-management planning with Aboriginal communities. It will be of interest to anyone who needs to address – or wants to learn more about – the critical issues associated with Aboriginal land and culture today. It is written for understanding at all levels and liberally illustrated with photographs, reinforcing the vital role of visual communication in participatory planning. Sustaining our rural landscapes will be critically dependent on combining the knowledge and strengths of indigenous and European cultures. There are many bridges to be built, and this book offers practical tools to help start building them.



⁷ Illustration courtesy of the Australian Centre for Tropical Freshwater Research (ACTFR).

Edited by Fiona Walsh & Paul Mitchell. Published 2002 by *Jukurrpa Books*, an imprint of IAD Press, PO Box 2531, Alice Springs, NT 0871 ISBN 1 86465 037 0 [Thanks to CLW's Maarten Ryder – Maarten.Ryder@csiro.au -- for the alert, and for presenting his copy of the book to the CSIRO Library.]

THE HUMAN FOOTPRINT – Three papers on the scale of human planetary impacts

Wackernagel et al (2002) On human use of the biosphere, *PNAS*⁸ 99:9266

Sustainability requires living within the regenerative capacity of the biosphere. The human economy depends on the planet's natural capital, which provides all ecological services and natural resources. Drawing on natural capital beyond its regenerative capacity results in depletion of the capital stock. Through comprehensive resource accounting that compares human demand to the biological capacity of the globe, it should be possible to detect this depletion to help prepare a path toward sustainability. The authors report a study to develop such an accounting framework, discussing and building on a number of earlier attempts to create comprehensive measures of human impact on the biosphere. Using their framework and existing data to translate human demand on the environment into the area required for the production of food and other goods, together with the absorption of wastes, they suggest that human demand may well have exceeded the biosphere's regenerative capacity since the 1980s. According to this preliminary and exploratory assessment, humanity's load corresponded to 70% of the capacity of the global biosphere in 1961, and grew to 120% in 1999. The paper also provides an extensive list of references on environmental accounting. [Thanks to Rob Bickford – Rob.Bickford@csiro.au - CLW Librarian, Adelaide, for the alert.]

Rojstaczer et al. (2001) Human use of global photosynthesis, *Science* 294:2549

Human use of photosynthesis products is pervasive, including direct use of plants for food and fibre as well as indirect use from grazing by domesticated animals. Population increases have led to speculation that the human footprint on the biosphere, in terms of the use of both plants and fresh water, is approaching the limit of planet sustainability. A key measure of human impact on the biosphere and hydrosphere is human use of terrestrial net primary production, which represent the net energy (production minus respiration) created by carbon fixation on land. The authors report a study incorporating contemporary data, many of which are satellite-based, to estimate the human appropriation of photosynthesis products and quantify the uncertainty in our knowledge of this appropriation. Because of uncertainties in key parameters, human appropriation of terrestrial photosynthesis products can presently only be defined within the range of 10–55% [note 40% quoted on the *Human Footprint* website – see below]. Consequently, it is still difficult to determine whether we are approaching crisis levels in our use of planetary resources. Refined measures will need high-resolution global data for agricultural lands and tropical forests. [Thanks to Rob Bickford – Rob.Bickford@csiro.au - CLW Librarian, Adelaide, for the alert.]

Robert M. May (2002) Sustainable development on a finite planet, *Trans IChemE* 80(B):87-92 (Lord Robert May of Oxford is Professor of Zoology at the University of Oxford, and President of the British Royal Society)

Scientific advances over the past century have improved most people's lives, in both developed and developing worlds. But increasingly we recognize that many of these benefits have not been produced in a sustainable way, particularly as human populations continue to grow. The focus of this paper is on some of the consequent problems of sustainability, on some of the possible technical advances that might alleviate the problems, and on the social difficulties inherent in acting today on behalf of a seemingly distant future. The paper is the written version of Lord May's Third John Collier Memorial Lecture to the Royal Society London. It highlights issues and roles of relevance to industrial chemists and chemical engineers. [Thanks to Lord May for personally making a reprint of his paper available for Network members. If you do not have easy access to the journal, I can send you a photocopy. Send name and mailing address to Elizabeth.Hejj@csiro.au]

⁸ Proceedings of the National Academy of Sciences (USA)

DEFINING SUSTAINABILITY – Paper – In case you haven't seen it yet – a reference that's an "oldie but a goodie"

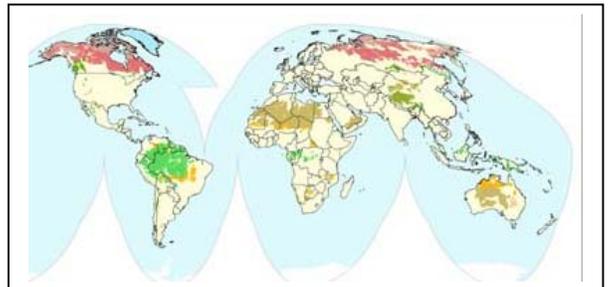
Goodland, R. and H. Daly (1996) Environmental sustainability: universal and non-negotiable, *Ecological Applications* 6(4):1002-1017

After deploring the mystification of the term "sustainability" and its tendency to be confused with the range of society's desires, the authors clarify the three linked and overlapping concepts of social, economic and environmental sustainability as the components of "sustainable development." They distinguish quantitative throughput from qualitative development, and mention intergenerational equity and scarcity of natural capital that together lead to the definition of "environmental sustainability" by the input/output rule, (i.e., keep wastes within assimilative capacities; harvest within regenerative capacities of renewable resources; and deplete non-renewables at the rate at which renewable substitutes are developed). After distinguishing development from sustainability and from growth, the paper describes the concept of natural capital and uses it to present four alternative definitions of environmental sustainability. Criteria are then presented for analyzing environmental sustainability, using the Ehrlich-Holdren framework in which "Population", "Affluence", and "Technology" are examined separately. The final section of the paper describes how one large development agency, the World Bank, seeks to incorporate these principles into its operations. [Thanks to CSIRO's John Williams for this reference. John regards it as the best serious discussion of the nature of "sustainability" and sustainable development. If you have trouble accessing the paper, let me know. Elizabeth.Heij@csiro.au I can help.]

Web Sites of Interest:

**The Human Footprint
Wildlife Conservation Society (WCS)
www.wcs.org/humanfootprint**

This site makes available summary world maps and full GIS datasets, produced in association with Columbia University's Center for International Earth Science Information, New York, showing the intensity of human population and a comparison of human-affected and relatively wild land areas.



It also provides interpretive text and scientific references. "The map of the human footprint is a clear-eyed view of our influence on the Earth," says Eric Sanderson, a landscape ecologist for the WCS, who led the report. "It provides a way to find opportunities to save wildlife and wild lands in pristine areas and also to understand how conservation in wilderness, countryside, suburbs, and cities are all related."

Humans take up 83 percent of the Earth's land surface to live on, farm, mine, or fish, leaving just a few areas pristine for natural ecosystems and wildlife. Furthermore, people have already taken advantage of 98% of the land that is suitable for farming rice, wheat, or corn. We appropriate over 40% of the net primary productivity (the green stuff) produced on Earth each year either taking it directly or keeping other organisms from using it through our agriculture and land use practices [but see the 10-55% estimate in the paper by *Rojstaczer et al. summarized above*]. We consume 35% of the productivity of the oceanic shelf, are fishing down food webs, and taking 60% of the available freshwater run-off. Although just estimates, these few statistics are testament to the unprecedented escalations in both human population and consumption during the twentieth century, resulting in entirely new environmental crises in the history of humankind and the world. The influence of human beings on the planet has become so pervasive that it is hard to find an adult person in any country who has not seen the environment around her reduced in natural values during her life time – woodlots converted to agriculture, agricultural lands converted to suburban development, suburban development converted to urban areas. Think of your life, of your neighborhood, of the neighborhood you grew up in -- what it was and what it is now.

**National Landcare Program and link to International Landcare
www.landcare.gov.au/**

The National Landcare Program (NLP), administered by the federal Department of Agriculture, Fisheries & Forestry Australia (AFFA), is one of a number of programs supported federally by the Natural Heritage

Trust. The NLP encourages landholders to undertake landcare and related conservation works by supporting collective action by communities to sustainably manage their environment and natural resources.



The Landcare model of facilitated local action has been so successful in improving environmental outcomes across Australia, that it is now being copied in a number of overseas countries. Landcare was presented by the Australian delegation to the recent World Summit for Sustainable Development (WSSD) in Johannesburg as an example of international best practice in participatory local management of natural resources. Significant activity is now happening to promote landcare internationally, through aid projects, training courses and international forums. These are increasingly recognised as opportunities to capitalise on Australia's record in developing the landcare model and technologies.

The above website provides access to Landcare groups, activities, and information materials. An associated free electronic newsletter, *International Landcare News*, is also available on request. If you want to subscribe or to find out more about the service, email to landcare.contact@affa.gov.au. Also note that the National Landcare Conference, "Respecting Values – Working and Learning Together" will be held from 28 April to 1 May 2003 in Darwin, sponsored by the NT Government and the Tropical Savannas CRC. Enquiries to the secretariat at dcem@desliens.com.au and information and pre-registration at www.landcareconference.nt.gov.au [Thanks to Network Member John Muir of Queensland DPI – John.Muir@dpi.qld.gov.au - for alerting us to Landcare's growing international profile and its role at the WSSD. John is ACIAR Farmcare – Landcare in Horticulture Coordinator in SE Queensland and the Philippines.]



The Arid Recovery Project www.aridrecovery.org.au



The stomach of this feral cat, shot at Roxby Downs, contained 24 Painted Dragons, 3 juvenile Bearded Dragons, 3 Earless Dragons, 3 Ctenotus skinks, 3 Zebra Finches, and a mouse – the remains of just a single meal!

Although Australia's extensive arid zone has been severely damaged since European settlement and is now one of our most degraded environments, few conservation projects have targeted arid areas in the past. The Arid Recovery Project, near Roxby Downs in South Australia, is a joint conservation initiative between WMC Resources (Olympic Dam Corporation), National Parks & Wildlife SA, the University of Adelaide and the Friends of the Arid Recovery Project. Initiated in 1997 to address the issue of arid zone degradation in Australia, it seeks ecosystem restoration through on-ground works, applied research, community and industry involvement, and increased public awareness. Its first practical aim is to restore a 60-square-km area of arid land, degraded by overgrazing (rabbits & stock) and feral predation (cats & foxes), to a semblance of its pre-European state by fencing out and eliminating all stock and feral pest animals, allowing regeneration of native vegetation and reintroducing locally extinct native species such as the Greater Stick-nest Rat, Greater Bilby, Burrowing Bettong and Western Barred Bandicoot.

Earlier this year, I was lucky enough to visit the Arid Recovery Project as a guest of WMC Resources. Land Manager, John Read – john.read@wmc.com - and a team of dedicated young ecologists are doing a great job with this initiative. You can help them by joining the **Friends of the Arid Recovery Project** (only \$10 for one year, \$25 for 3 yrs, \$40 for 5 yrs). Members, in Australia and overseas, include primary, secondary and tertiary students, local pastoralists and soil boards, National Parks Friends groups and employees, 4WD Clubs, Australian Geographic, local businesses, and members of the general public. Members receive regular updates on Project progress, as well as activities including open days, BBQ's, organisation of fundraising events, and opportunities to assist with endangered species monitoring and

feral animal control. Even if you don't live locally, as a member of the Friends group you will be kept informed of the Project's progress via regular newsletters, and will be playing a role in protecting Australia's endangered species and unique arid environment. To join the Friends of the Arid Recovery Project, visit the website or email to: arid.recovery@wmc.com . [I also have a number of hard-copy flyers and can mail one to you if you send your name and mailing address -- Elizabeth.Heij@csiro.au]

Opportunity to Comment on Draft Transport Policy

The total amount of freight carried around Australia is forecast to double in the next twenty years, with interstate freight almost tripling and container traffic expected to increase by 66%. Clearly something needs to be done now to deal with the implications for traffic congestion, the environment, and public safety. Submissions in response to the Federal Government's Green Paper, "Auslink: Towards the National Land Transport Plan", are invited and need to be submitted by Friday 7 February 2003. Auslink is the Government's vehicle for developing and funding an integrated national land transport infrastructure network. It is intended eventually to develop into a comprehensive National Transport Policy body. Information about Auslink and a copy of the Green Paper can be obtained from the Department of Transport & Regional Services (DoTaRS) at its website: www.dotars.gov.au/transinfra/auslink.htm

Training Opportunities in Systems Re-design & Eco-Innovation

Those intending to work, or already working, in urban or environmental planning, or natural resource management in the public or private sector may be interested in the new trans-disciplinary courses in Sustainable Development being planned for 2003 at the University of Canberra. Graduate options include Graduate Certificate, Graduate Diploma, and Masters. The courses aim to provide students with:

- an understanding of the interactions, consequences and underlying assumptions of non-sustainable systems of development (in construction, production, transport and agriculture); and
- an ability to apply research methods, systems design techniques, eco-innovation principles, and practical implementation strategies for overcoming the impediments to ecologically sustainable development.

A 3-day professional development short course will also be available (28-30 April 2003).

For information contact course convenor, Dr Janis Birkeland – Janis.Birkeland@canberra.edu.au
or Phone: (02) 6201 2693.

A bouquet – and a rare one at that!

The Federal Government gets a lot of stick from all directions, but this time plaudits are in order for the newly released National Research Priorities. Top of the list is "An Environmentally Sustainable Australia." Well done – to our political leaders for assigning top priority where it really matters, and also to all the important individuals who informed and lobbied behind the scenes. (Now it will be very interesting to see the types of projects to which actual funds are allocated!)



[The other three priority areas are: 2. Promoting and Maintaining Good Health, 3. Frontier Technologies for Building and Transforming Australian Industries, and 4. Safeguarding Australia. Find further information at www.dest.gov.au/priorities/]

Events of interest

Western Australia: Beyond Oil?

Perth, 21 February 2003. A Conference jointly organised by the Australian Institute of Agricultural Science & Technology (IAIST; WA Branch) and the Sustainable Transport Coalition. Information: Dr David Bennett, Convenor, Sustainable Transport Coalition, nrmc@ozemail.com.au (Ph 0438-210-251); or James Fisher, IAIST WA, jfisher@agric.wa.gov.au (Ph 0419-350-912).

Third World Water Forum

Kyoto, Japan, 16-23 March 2003. Information: <http://www.worldwaterforum.org/eng/index.html>
Efficient 2003 Conference – Efficient use & management of urban water supply

Tenerife, Canary Islands, Spain, **2-4 April 2003**. Information: www.iwatenerife2003.org
 Innovation in Water - Ozwater Convention
 Perth, **6-10 April 2003**. Information: <http://www.enviroaust.net/>
Eco-Innovation & Sustainable Development -- Professional Development short course
 Canberra, **28-30 April 2003**. Information from convenor, Dr Janis Birkeland: (02) 6201 2693 or Janis.Birkeland@canberra.edu.au
National Landcare Conference - Respecting Values - Working and Learning Together
 Darwin, NT, **28 April –1 May 2003**. Sponsored by NT Dept Infrastructure Planning & Environment and the Tropical Savannas CRC. Pre-registration at www.landcareconference.nt.gov.au and information from the secretariat at: d cem@desliens.com.au
Ninth International Conference on River Research – sponsored by the CRC for Freshwater Ecology
 Albury, NSW, **6-11 July 2003**. Information: www.conlog.com.au/NISORS/overview.html
Integrative Modelling of Biophysical, Social and Economic Systems for Resource Management Solutions – the MODSIM 2003 International Congress on Modelling and Simulation
 Townsville, Qld, **14-17 July 2003**. Information: <http://mssanz.cres.anu.edu.au/> or David.Post@csiro.au
Rangelands in the New Millennium – VII International Rangelands Congress
 Durban, South Africa, **26 July – 1 August 2003**. Information from : delegates@sbconferences.co.za or www.ru.ac.za/rqi/irc2003/IRC2003.htm
International Conference on Water-Saving Agriculture & Sustainable Use of Water & Land Resources
 Yangling, Shaanxi, P.R. China, **26-29 October 2003**. Working language, English. Information from local Australian contact: Lu.Zhang@csiro.au

Parting shot

Down with dust. Keep soil in its place!

If only it were that easy!

This photo of a recent dust storm advancing on Griffith, is a sobering reminder of the effects of the drought, and the need for the very best sustainable land management practices in our tough climate.



And finally – Reminders:

- Contact me if you would like to give feedback on Network newsletters or write a short spot on a sustainability topic for a future newsletter.
- Feel free to forward this newsletter to anyone who might be interested. The aim is for the Network to be as inclusive as possible.
- Newsletters and Network information resources can be found on the CSIRO Intranet at <http://www.csiro.au/intranet/multi/sustnet/index.htm>

[External Network members can find an archive of newsletters on the Black Mountain Library site at www.bml.csiro.au/sustnet.htm]

Milestone: Our Sustainability Network now has over 470 members.

Elizabeth Heij
 Network Facilitator

**MERRY CHRISTMAS, HAPPY NEW YEAR,
 & A GREAT HOLIDAY SEASON TO ALL**

