

Nature & Society

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Editorial

How much faith should we place in mathematical modelling? This question came to mind recently when, in reply to the Garnaut enquiry interim report, climate change minister Penny Wong said that the Government would stick with its election promise to reduce greenhouse gas emissions by 60% by 2050. This cut, let it be said, was a far better target than anything the previous Government had agreed to, but Garnaut had said that bigger cuts were needed, and more urgently. Further, he said that in the interests of equity, Australia should aim to reduce emissions by ninety-five per cent.

In general it is a good thing for governments to keep their election promises, but they also need to consider new information. Wong had defended the promised cuts by saying they agreed with the latest IPCC modelling of the climate change situation.

Mathematical modelling by the IPCC has improved greatly from one IPCC report to the next one. But it has been pointed out many times that the IPCC itself is hampered by having to get agreement from all the scientists involved and from their governments. It tends to have to lean towards the least worst case, and omit findings that upset the various governments and their agencies. The process takes time, so that by the date of issue reports have often been superseded by new data.

Any modelling can only be as good as its inputs. Although the models get continually refined, there is no way we can ever know whether every relevant factor has indeed been included, or that its effects have been accurately foretold.

In medicine we are often reminded of the synergistic effects of various medicines when taken together, and the complications lifestyle

choices can introduce, leading to unexpected results. Cocktails of pollutants added to the environment can also lead to drastic and unexpected effects. So it is with climate. Many scientists are now openly stating that climate shifts are happening much more quickly than expected. Feedback loops are accelerating as they interact and new ones appear.

Instead of relying on the predictions of climate models we need to go back to basics. It is now recognised (though not by everyone) that we

cannot go on with impunity digging up fossil fuels, carbon stored underground over millions of years of earth's history, and put it into the atmosphere without upsetting the balance. Similarly we cannot go on destroying the remaining forests without serious consequences. These things will undoubtedly change the

climate. You do not need numbers to understand this point.

Numbers are, however, very important when really understood. It is well known that statistics can quite properly be presented in different ways, one that will, say, maximise the risk and another that will minimise it in the public perception. Neither is deceitful, per se, yet the choice can be made to mislead.

So statistics and modelling are very useful, but often misunderstood and often relied on too

Mr. Stiglitz, the economist, contends that consumers eventually will have to change their behavior even more than they did after the 1970s oil shock. He says the world's traditional definitions and measures of economic progress — based on producing and consuming ever more — may have to be rethought.

*Wall Street Journal
24 March 2008*

Contents

NSF news	3, 4-5
Meat production and climate change	5-7
Book review: <i>World Made by Hand</i>	8-9
ACT otherWISE	9-10
Energy efficiency and the DODO	11-13
Letter from Professor James Hansen to the Australian PM	14
Farrago	14-15

heavily. Luckily the most useful maths needed to understand our current predicament is much simpler, yet it too surprises most people.

Take any number and double it and double again, then look at the result. If you start with one, doubling gives you two, then four. Four you can easily see, is greater than the sum of one and two. Try again: take five, ten, twenty, forty. Forty is greater than the sum of five, ten and twenty. Whatever number you choose, each doubling adds more than the sum of all that have gone before. This simple exercise can explain why we must stop the increase in population, resource consumption, pollution. Earth is finite, it cannot cope with ever increasing numbers of people, it cannot grow ever increasing quantities of food, it cannot absorb ever more pollution.

What is the problem, some may ask. We are not doubling, just growing by small amounts, one, two, three per cent, maybe. Such low growth in population, or the economy, worries some analysts.

Look again: growth of one per cent leads to doubling in seventy years. A growth of two per cent means a doubling in thirty five years. Growth of five per cent reduces doubling time to fourteen years. We do have a problem and it is growth.

People who think growth is necessary worry because the birth rate in most countries has gone down, and in some is now below replacement level. This is actually good news for the planet, and should be encouraged. No mention is made of our greatly increased lifespan that means population stabilisation requires lower birth rates. The world is already overpopulated by people and we keep increasing our demands, leaving too few resources and too little space for natural systems to cope effectively.

If we want to keep earth as the pleasant, habitable planet it is, then we must give up our obsession with material growth. To keep the planet habitable for humans and their ilk we must aspire to a lifestyle and social organisation that recognises that enough is enough, that we cannot have every material

thing we might fancy. As many an old folktale tells us, he who goes on asking for more eventually finds that he has lost everything. That is why our lack of biosensitivity, combined with a lack of understanding of some very elementary maths, is endangering us. We are in danger of losing everything.

Jenny Wanless

Vale Val Plumwood

Val Plumwood, philosopher and environmentalist, died from a stroke in February. Some years ago she had survived being subjected to three death rolls by a crocodile that had snatched her out of a canoe. She would not let the animal be destroyed,

maintaining that humans are part of the food chain for crocodiles.

In an obituary in *The Canberra Times* on 12 March, Tamsin Kerr wrote as follows.

Her close and personal interactions with animals and with country made her airy philosophies tangible. She taught the true nature of being earth dependent along with a spirituality of place that valued the uniqueness of each locale and recognised the world as an active agent.

We don't teach [kids] how to think mathematically outside the classroom. We live in a world awash with dodgy numbers. We're fed statistics, body mass indexes, interest rates, carbon dioxide levels, crime rates and more daily. We are told how much coffee, salt, fat and alcohol we should consume each day and we don't seem to care if the study only involved seven anorexic rats fed lattes for a week, we swallow such numbers whole.

*Kerry Cue
The Canberra Times,
13 February 2008*

Being almost eaten reinforced humanity's place in the ecology of the world – crocodiles (and other predators, both living and mythological) remind us that nature is not a separate economic resource under human dominion. Rather nature incorporates humans as part of the world's active spirit.

Am I just a cog in the wheel of the global economy?

From the back cover of
The Plain Reader: Making a Simple Life (1998)

Thanks to NSF member Jill Redwood for the delightful illustration in this edition.

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From the entrance use the intercom phone to call the NSF office on extension 52526.

By car: There is a two-hour car park in Balmain Lane, 300 metres to the south of the office.

By bus: The 34 bus from Civic drops you off at the foot of Eggleston Road. Walk 250m south up the hill and turn right; from there the entrance to the building is visible.

By bicycle: Plenty of bicycle parking on the ANU campus.

From Peter Ward's Under a Green Sky:

In our case, this cry must be: "I am scared as hell, and I am not going to be silent anymore!"

This book is my scream, for here in Nevada, on that day when heat was at its usual quotidian force of death, we sat on the remains of a greenhouse extinction, and it was not pretty, this graveyard, the evidence in these dirty rocks utterly demolishing any possibility of hyperbole. Is it happening again? Most of us think so, but there are still so few of us who visit the deep past and compare it to the present and the future. Thus this book, words tumbling out powered by rage and sorrow but mostly fear, not for ourselves but for our children – and theirs.

On 20 February we launched our new website www.biosensitivefutures.org. A brochure about the website is enclosed with this edition of *Nature and Society*. On the next page we print the speech by Professor Judith Whitworth at the launch. And, as you will see above, we are holding a members' workshop on 16 April. This will be an opportunity to learn more about how this website will become a powerful expression of NSF's vision.

Forthcoming NSF meetings

For the latest information visit our website www.natsoc.org.au and click on "What's On". There you will also find a link to maps to help you locate the venue.

Wednesday 16 April 2008 – an NSF Members' Workshop on NSF's Biosensitive Futures website - purpose, progress, prospects and participation.

Venue: the ANU Emeritus Faculty. A map showing the venue can be found on the ANU website. The building is called the Fellows Lane Cottage and is building 3T on this map. Fellows Lane runs off Fellows Road. The cottage is to the immediate north of the Law Faculty buildings and east of the South Oval.

Wednesday 21 May 2008 – 7:30 pm – A monster problem or child's play: coping with peak oil. Paul Tranter

Two major problems are associated with our ability to cope with peak oil: ignorance and denial. This presentation argues that a critique of a popular children's movie may provide an entertaining way of introducing people to the serious issues of peak oil, children's rights and child friendly cities. The Disney movie *Monsters*, is popular with both adults and children. *Monsters, Inc.* can be seen as an allegory about changing conceptualisations of children, an emerging energy crisis, and our responses to this energy crisis. However, a simplistic interpretation of the movie suggests that a technological fix will be found for the world's looming energy crisis: peak oil. A more detailed critical analysis of the movie suggests that there are far more important messages hidden beneath this humorous children's story. This presentation explores the likely impact of peak oil on children's well-being, and argues that although peak oil may present a crisis for children's rights, it can also be seen as providing an opportunity, if we can only see peak oil coming and think about how we can change our cities now to prepare for it.

Those members who were inspired by Paul's talk to us two years ago on child-friendly cities are delighted to welcome him back.

Venue: the ANU Emeritus Faculty.

Keynote address by Professor Judith Whitworth at the launch of the biosensitive futures website

Thank you very much for this invitation. I am conscious that many people in this room have been working for the future well-being of humankind and the natural environment over many decades, long before the environment was fashionable, before climate change was talked about, before carbon foot prints were a currency.

I particularly want to acknowledge my John Curtin School colleagues, Frank Fenner and Stephen Boyden. I'll come back to JCSMR in a few minutes.

The NSF motto is For healthy people on a healthy planet. No-one interested in health can ignore the

fundamental role of our environment. Our environment impacts on the availability of basics, such as food and shelter, and on physical and mental health. Over a billion people still don't have access to a safe water supply. Natural disasters like floods, earthquakes,

bushfires and so on claim hundreds of thousands of lives each year. Heat waves kill people, particularly the old, the very young and the weak. Infectious diseases still kill hundreds of millions and many such diseases particularly viral diseases are spreading from tropical to previously sub-tropical or temperate climates. The infections that plague humans often come from animals and are a direct consequence of our relationships with our environment. In the last 30 years we have seen a raft of new infections: ebola virus from bats, HIV 1 and 2 from primates, E coli 0157:H17 from cattle, hendra virus from bats, mad cow disease, lyssa virus from bats, H5N1 flu from chickens, Nipah virus from bats, and SARS from civets.

And it won't stop there.

The theme of health and nature is being taken up around the world, and next month we will be discussing the health research agenda for climate change at WHO's Global Advisory Committee on Health Research.

Around the same time the Earth Institute, led by Jeffrey Sachs, is convening a meeting on Climate Knowledge for Global Health, to discuss cutting-edge knowledge of climate variability and change

and its impact on health outcomes, particularly for the world's poor; and to identify how the health and climate communities can build an effective partnership for information exchange, education and joint research initiatives, and to promote science-based solutions on addressing climate-health challenges.

The core activity of NSF is the bringing together and distilling information from the life sciences relevant to understanding the processes of life, the human place in nature, the health needs of humans and the natural environment.

It is an organisation designed to stimulate informed discussion and debate, linking academia and community.

Essentially, it is a scholarly organisation, data based and data driven, rather than a vehicle for the

propagation of dogma or opinion.

This reliance on evidence has a major resonance for me. Increasingly governments are coming under pressure to use evidence to inform policy.

The impacts of climate in health in some cases are self

evident.

In health and in policy we have useful data sources eg Cochrane/Campbell collaborations but often a systematic review of all evidence can't reach a definitive conclusion.

We need more research, more evidence, more informed debate.

This is self-evidently true of many of the major environmental and health problems facing us today.

JCSMR has a close interest in these matters with which NSF concerns itself.

We are pleased to host the organisation in our JCSMR building, indeed in the office Frank Fenner occupied for very many years. Frank himself is of course a strong supporter of NSF, its patron, and very involved in its activities.

The founder of NSF, Stephen Boyden, worked in the School for nine years and is now one of our distinguished Visiting Fellows.

Much of our current research also resonates with the NSF agenda.

I believe that the community—in the fullest sense, a place and all its creatures—is the smallest unit of health, and that to speak of the health of an isolated individual is a contradiction in terms.

*Wendell Berry on p. 52 in
The Plain Reader: Making a Simple Life*

Guna Karupiah works on virus – host interactions, Arno Mullbacher on viral immunology and in particular on flu and herpes viruses, and Mario Lobigs on flaviviruses. These viruses are responsible for the most important insect transmitted viral diseases in humans, such as dengue, yellow fever and viral encephalitis. Ian Ramshaw works to develop new vaccine strategies for viral diseases, particularly HIV.

Jill Gready's work in collaboration with plant scientists at RSBS is particularly fascinating in relation to the interests of NSF. Jill works on Rubisco, an enzyme fundamental to life on this planet, that catalyses fixation of carbon dioxide. This is the most important reaction by which carbon enters the biosphere. She uses supercomputers and bioinformatics. Jill's work has potential to lead to better crops, more biofuels, and even to carbon sequestration as a method of combating climate change.

Let me expand a little on Jill's work as it is a great example of science of the future. Major problems facing the world today are climate change, water-use efficiency and disruption of the carbon cycle from burning of

fossil fuels. These problems are beyond the scale where incremental technologies will be effective - transformative technology is required.

Rubisco's efficiency in most land plants dictates how efficiently carbon is fixed, that is, how much light and nutrients are needed and how much water vapour must be transpired, for the carbon acquired. However, despite its critical role, Rubisco is paradoxically a very inefficient enzyme and this sets fundamental limits on the efficiency of photosynthesis.

Improving the efficiency of Rubisco is the Holy Grail of plant science. Food and fuel crops engineered to take advantage of more efficient Rubiscos could yield their products with smaller inputs of all three basic resources: light, water and nutrients. The solution of Jill and her colleagues is a rational in silico strategy for design of improved Rubiscos and proven experimental tools for validation.

So watch this space.

Finally, NSF looks to be an information and ideas bridge.

I see information as a necessary first step. Information and evidence are essential to inform policy.

The subsequent steps require action.

What NSF can do is help ensure that action is informed and rational.

NSF's aims and objectives fit beautifully with the notion of thinking globally. We need also to act, locally and globally.

Everybody can make a difference.

The new NSF website will help bring people together in understanding of what is needed to safeguard our planet.

Contraction and convergence is good for our health

First published in a slightly longer version in *Food Ethics* 2007; 2(4): 5

(Tony McMichael's talk to NSF on 19 March covered much of the material in the following article.)

The world is eating more and more meat, and meat production is contributing increasingly to global greenhouse gas emissions. Both excess meat consumption and a change in the global climate pose risks to human health.

In late 2006 the Food and Agricultural Organization (FAO) issued an important report, *Livestock's Long Shadow*, drawing particular attention to the impact of the livestock production sector on the world's climate. The major contributor is enteric methane from ruminants – cattle, sheep and goats.

Modern humans come from a long line of meat-eaters, starting from around two million years ago. Eventually farming emerged, livestock were domesticated, food supplies expanded (in return for harder work), and human populations grew. Those trends continued over ensuing centuries, and have accelerated dramatically in recent times. Globally, both total population size and total extrasomatic energy use (mostly from fossil fuels) by humans have increased about fourfold since 1900.

As wealth has accrued and food production has become increasingly mechanized, so unit costs have declined and consumer preferences have

What is the point of "labour-saving" if by making work effortless we make it poor, and if by doing poor work we weaken our bodies and lose conviviality and health?

*Wendell Berry on p. 54 in
The Plain Reader: Making a Simple Life
(1998)*

'risen'. Today's uptrend is for a one-third increase in total meat consumption in the world by mid-century. FAO argues that this is not a sustainable trajectory. Either our meat production methods must change radically, or consumption levels must decline. Or both.

So, the wheel has come full circle. The ancient dietary shift to meat two million years ago that boosted our cerebral capacity has led to a modern crowded and wealthier world in which there are too many of us wanting to eat too much meat – mostly from ruminants. Hence the now-substantial contribution of the livestock sector to global total greenhouse gas emissions. Estimates by both the UK Stern Report (2006) and the FAO indicate that this sector contributes around one-fifth of total emissions. Methane from the ruminant gut is a problem because, molecule for molecule, it causes much more warming than does the better-known greenhouse gas, carbon dioxide.

Nutrition scientists recommend an individual intake of around 50-100 gms of meat per day, to enhance the diet and to provide sufficient iron and vitamin B12. The high-income world is, on average, now way above that level, being within the range 200-300 gms per day. The US has the highest per-person daily intake. In contrast, the average intake in Sub-Saharan Africa is around one eighth of that American level.

As a world community, we must now consider the various facets of this environmental and public health dilemma:

1. Meat consumption is now rising rapidly in many parts of the world.
2. There are great differences, at the moment, in per-person levels of meat consumption – some of this reflects cultural preference; some reflects access and affordability. The latter represents a moral challenge in inequity.
3. The livestock sector is contributing a substantial (though under-recognised) proportion of global greenhouse gas emissions.
4. There is moderately persuasive epidemiological evidence that the risk of large bowel cancer increases at higher levels of red meat

consumption. The risks of breast cancer and of obesity and heart disease may also be increased (especially in relation to the high fat content of meat from intensively produced livestock).

In our recent paper in *Lancet* we propose that the world should commit to reducing the global average daily intake of meat (especially red meat from ruminants).¹ This would be part of the evolving portfolio strategy (across various sectors of commerce, energy use and human behaviour) to mitigate climate change. The fairest strategy would be 'contraction and convergence', wherein the world's nations agree to reduce average per-person meat consumption (currently just over 100 gms per day), and to do so equitably. High-consuming populations would reduce their intake and low-consuming populations could increase their intake up to the agreed average level.



To avoid an increasing contribution to global warming from the livestock sector, we recommend a global average target figure of 90 gms of meat per day – with not more than 50 gms from ruminant animals. Indeed, many populations have potential access to other, often healthier, sources of meat; in Australia it would be good for the environment and for the nation's health if more kangaroo meat (lean, and containing

omega-3 fatty acids) were eaten.

This would be a win-win strategy. Global warming would be slowed. Health risks would be reduced in high-consuming populations, and there would be gains in nutritional status in lower-income countries where deficiencies of iron, protein and energy in the diet would be reduced, conferring particular benefits on child health and development. Any increases in cancer, heart disease or obesity-related diabetes in those lower-income countries would be limited by the ceiling intake figure of 90 gms/day.

This strategy, phased in over several decades, would be good for the planet, good for assisting global equity, and generally good for population health.

AJ (Tony) McMichael

1. McMichael AK, Powles JW, Butler CD, Uauy R. Food, livestock production, energy, climate change and health. *The Lancet* 2007 (Sept 13); 370: 1253-63.

Following Tony's talk, the following points were made in discussion with the audience:

- Termites produce more methane than livestock
- Organically-raised cattle produce 40% less greenhouse gases and use 85% less energy over their lifetimes (in terms of their full environmental load) than intensively-raised feedlot cattle
- Fisheries operations consume 12.5 times more energy than is provided through their catch
- A new positive feedback: as the arctic ice cover recedes, blueberries are expanding and moose are eating them. Blueberries are more methane-ogenic than grass
- 97% of mammalian flesh on the planet is *Homo sapiens* and their domesticated mammals. (One audience member thought that this under-represented the mass of rodents.)

Not enough time?

On your deathbed, what if someone told you you could have ten years more of your life? Too late, you've spent them staring at a piece of furniture! Just think ...

- people on the shows you watched don't care about you, would ignore you if they met you, despise you — they just need you to make sure their show goes on, and they become rich
- you're a fan of that TV personality — then one day you discover they have stolen years of your life
- you have this friend who can do all these wonderful things: play an instrument, dance, whatever. You ask, "where do you find the time?" He says, "by not spending 3-4 hours a DAY— US average — staring at a piece of furniture"

Get a Life!: The Little Red Book of the White Dot
by David Burke and Jean Lotus, 1998

If any society tries to resist globalisation, then it would be out of the loop. I mean, the people will have lost their ability to, say, grow their own food, and they'll be told "Okay, if we can't have your forest for raw material, you can't have access any more to the world food market". ... But it is intolerable to the global system that people be allowed to remain in their traditional cultural and economic spheres, because they are the market.

Jerry Mander p.28, *The Plain Reader: Making a Simple Life* (1998)

A statistical aside

It seems that very few people are actually comfortable with statistics, or understand them well enough to make use of them. If they were, Australians would be vastly more frightened of cars than they are of sharks, snakes or spiders! We are just not good at understanding probabilities, and levels of risk. Hence the problem of getting a sensible reaction to the risks involved in climate change.

A common misunderstanding of statistics is sometimes shown by the reaction to a simple statement such as 'half the population is below average in intelligence'. Intelligence, for better or worse, is measured on a numerical scale, the IQ, or intelligence quotient. That being so, and because the general population fits a *normal* distribution, that is it

fits a bell curve, it can be properly said that half the population has IQs below average, just as half the population has an above average IQ, barring the comparatively small number whose scores are exactly average. A mathematical average is found by summing all the individual scores and then dividing by the number of

individuals.

Confusion arises because in everyday speech average means ordinary, normal, not exceptional. On this basis the main bulk of the population within the bell curve would be considered average.

It should be noted that *average* is not the only word with a distinct mathematical definition here, so is *normal*.

Various governments say they want an improvement in the literacy and numeracy of school children. It is to be hoped that they focus not only on the ability to perform numerical operations, but on what the numbers mean. A considerably improved understanding of statistics would benefit politicians, school children and the general population.

"Your Stuff: If It Isn't Grown, It Must Be Mined". Where does your stuff come from? Before the store, before the factory, where did it really begin? If it isn't made of wood, cloth, or other living matter, it was dug out of the ground.

*Jeremy Faludi,
World Changing website
December 2007*

Book review: **World Made by Hand**

James Howard Kunstler,
Atlantic Monthly Press, 2008.

What does the future hold? How will my family be living 20 years from now, when the effects of climate change are an everyday reality, when oil supplies have dwindled, when antibiotics may have lost their effectiveness, and even when nuclear weapons may have been used on our cities and when pandemics may have decimated the population?

One man who has thought much about these questions is Jim Kunstler, whose *The Long Emergency* (2006) explained better than any other book the breadth and depth of the implications of peak oil. In this novel he switches from the societal and economic trauma of the

years immediately following the oil peak to the personal and individual lives of people a decade on from that trauma.

The setting is rural upstate New York in the 2020s. The US and state governments have ceased to be effective, encephalitis and flu epidemics have swept through the population and fuel oil disappeared a decade before the novel opens. Many men are infertile, possibly due to “the bomb.” Children and the very old are few. Kunstler inserts us into the minds of the main characters, so we begin to see this changed — and changing — world through the eyes of the narrator and others.

There are no consumer goods in 2025 and people make do with items traded by horse and cart or by boat. These goods are largely scavenged or leftover from today’s consumer society. Buildings have been plundered and garbage dumps are being mined. Also missing are antibiotics and anaesthetics and the story reminds us that, whatever our view of civilisation and modernity, anaesthetic dentistry is one of civilisation’s unalloyed benefits. By focusing on anaesthetic dentistry, Kunstler does not need to mention hospital services or pharmaceuticals; throughout the book he uses an unexpected example of the changes people face and the reader easily fills in the blanks with what might, at first glance, have been more likely examples.

The narrator, who was once an IT salesman, has come to see the natural world in a far more engaged way than he once did: he sees not a fish, but a trout (of a particular age and as a particular dish); not a bird, but an osprey; not a stream, but ripples and flows that have meaning. As people’s engagement with nature has increased, and also been transformed, so too their moral code is adjusting to the new times: people remember the old mores but necessity and convenience are subtly forging a new pragmatic moral code. Social fundamentals are changing in 2025 – this is not a static world.

In Kunstler’s small town, the previously unnoticed unraveling of community spirit is reversed by the arrival of a migrating Christian cult who, fleeing the anarchy elsewhere, bring both security and organised rejuvenation. Other Christian evangelicals are in the background dominating the airwaves

before the power failures put an end to radio transmissions and the few remaining intermittent newspapers.

It’s far from bucolic bliss in Union Grove; many cannot adjust to the new necessities and mental instability is common. But more insidiously, gangs of various sorts play a large, but not quite dominant role. Hostage and ransom rackets are a feature of city life. Vigilance, courage, trusted neighbours and the willingness of individuals to meet force with force themselves, are needed when there are no

police, courts or jails and a shortage of ammunition has ruled out many firearms. Conflicts grow easily when the institutions of law and order are diminished and individuals do not feel constrained by them or by convention.

The drug trade has fallen away as imports disappear and the raw materials for methedrine are no longer manufactured. Marijuana grows prolifically in the wild and home made beer and wine is popular. Alcohol is drunk, traded, used as fuel and as an antiseptic. Opium is cultivated for its use as an anaesthetic while those inclined to addictive behaviour have been weeded out by natural selection.

Infrastructure that relies on fuel or electricity is no longer operating. Without electricity, buildings that are more than a few stories high or rely on air

In effect, oil has been like free energy. I don't think any of us can fully grasp just how much of a leap it has been for humanity to move from a society that relies on the daily solar income to living off the capital of ancient stored sunlight. Having oil has been simply magic. You push the button, things work. We fly around the world and buy any kind of exotic fruit whenever we want.

[This energy bonanza has lead to] extraordinary injustice and inequality caused by this global industry of greed which benefits only a minority of humanity.

Graham Strouts
The Free Energy Delusion, 2007

conditioning are vacant. Even a town's gravity fed water supply fails when maintenance is no longer possible, cement is scarce and trade skills were lost in the pandemics. Rivers are becoming the thoroughfares as the pot-holed roads deteriorate.

Rumours mix with truth. The postal service no longer operates and news is spasmodic and unreliable so that even major national and international events become known only months after they have occurred, through a process of Chinese whispers. "Who really knows any more?" the narrator asks.

The US dollar is worth only a small fraction of its 2008 value, so gold, silver and bartering are also used for transactions; but the real change is that there are far fewer transactions anyway, so money appears to be less important in Kunstler's 2025 than it is today. All food is local and community townsfolk produce or forage most of their own. If Kunstler is right, most of the "survivalists" today with their "stocking up" are locked into thing-centric thinking when more complex, subtle and long-term preparation is required: real physical health, having the qualities that make one welcome as a community member, the ability to take and hold a leadership role, genuine kindness under stress, craft and music-making skills, stoicism and practical knowledge of the natural world are what will serve people and communities far better in 2025 than "guns and ammo".

In Kunstler's world, people gather into communities which are far more cohesive than the loose, porous neighbourhoods of today. There is Union Grove, a small town struggling to be reborn as a community, there is a "trailer park" of petty criminals and there is a large farm that is becoming a feudal fiefdom under its benevolent dictator landowner. And there is the aforementioned Christian cult, out to evangelise, but also trying to be a good neighbour now that it has chosen to settle in Union Grove.

This post-peak oil world is also afflicted by climate change, but climate change is not Kunstler's forte and it shows, not only in the way that he drops it into the plot when he remembers, but also by the limited range of manifestations of climate change that he mentions. So, as you read through *World Made by Hand*, you have to insert your own climate

change phenomena as you go. 2025 may not be as comfortable as Jim Kunstler imagines.

Some parts of *World Made by Hand* are incredible (deliberately so), others relevant only to the USA; but it is a testament to Kunstler's craft that he has given even the most thoughtful futurists new things to think about and new ways to think about them.

Of course this is a novel – one person's imagining of the future. But a novel, to succeed, has to represent a plausible system; it cannot be a narrow reductionist analysis. And there lies its power. Since writing *The Long Emergency* Kunstler has been on speaking tours and written his weekly blog. He has received thousands of comments on his work and has been paying attention to these and to emerging events.

You don't have to live in the USA or to agree with

everything the author proposes to get a lot of ideas from *World Made by Hand*, ideas that can be used as a springboard to your own thinking about the future and your part in it.

Keith Thomas

In the 1950s, oil producers discovered about fifty barrels of oil for every barrel invested in drilling and pumping. Today, the figure is only about five for one. Sometime soon, that figure will become one for one. Under that latter scenario, even if the price of oil reaches \$500 a barrel, it wouldn't be logical to look for new oil because it would consume more energy than it would recover.

*Jay Hanson
www, 6 September 2007*

ACT otherWISE - Youth Leadership for Sustainable Communities

In 2005, The Nature and Society Forum successfully gained an ACT Health grant to initiate a community-action based Sustainability and Health strategy for the ACT. The NSF team led by Valerie Brown, Wendy Rainbird and John Harris, together with Geoff Pryor, initiated a series of workshops with "doers" of the community to think and act creatively about what it would be like to live sustainably and healthily in the ACT. Our follow-up workshops led to a range of creative ideas and plans for a range of projects which ultimately received funding amounting to over \$200,000. The Youth Leadership for Sustainable Consumption was one of these and it later changed its name to ACTotherWISE.

What is ACT otherWISE?

ACT otherWISE is part of a growing national otherWISE network, made up of young people and their communities who are living and acting otherwise towards a more sustainable Australia. The project aims to empower young people to become

leaders within their communities, by identifying actions they can make to their lifestyles, and the lifestyles of their communities, more sustainable. The project does this through a workshop, action support and network and by supporting youth in undertaking personal and community projects.

Following the support and vision of numerous ACT community groups and organisations, and in partnership with the International Young Professionals Foundation and RMIT University, ACT otherWISE was able to run its first Youth Sustainability Workshop in Canberra, with the assistance of an ACT Government Environment Grant, toward the end of 2006. Since this time the project has grown and been involved in the education and support of over 100 youth in Canberra.

Last year

2007 was an exciting year for ACT otherWISE as further investment was secured to continue the program including more sustainability workshops and activities. The project now has over 100 young Canberrans in our network, and has worked to support a number of youth projects addressing sustainability.

In 2007 ACT otherWISE ran its second facilitator training and five youth workshops. These included workshops with a Venturer Scouts troop; two lots of Year 10 students at Orana High School; a mini workshop at the 2007 Youth InterACT conference; and a workshop open to all comers.

This Year

So far this year we have run a youth planning day, a waterwatch activity and another facilitator training session. By June we will run four youth workshops, publish a booklet on what young people in the ACT are doing to live more sustainably, run an event for World Environment Day, host Greenscreen, a short film and music night, in Garema Place and run an energy savings workshop. I'm sure there will be many more exciting projects on the agenda for the second half of 2008.

Youth Projects

In between workshops, ACT otherWISE has supported youth from the workshops in their various projects, which included obtaining some funding through a Youth Change Makers grant provided by the Foundation for Young Australians.

The projects include:

- A Uranium documentary by youth, for youth, which has been shown at the Dendy cinema in Canberra and will be shown at a green, youth-run, event (Greenscreen) in early May.
- A sewing group which ran a sewing workshop for youth in August and has held three successful clothes swap events with more planned.
- Supporting 3 workshop participants and 10 other members of the network to attend a youth LEAD workshop run by OzGreen. Each of them returned from the workshop inspired and motivated to do more to create a sustainable and healthy Canberra.
- Greenscreen – a green gig and film night to be run on 2 May 2008 in Garema place in conjunction with the conservation council,

- Workplace greening – a small group of youth in the workplace are busy scheming the next youth project aimed at greening the places where they work!

Community and the ACT otherWISE network

ACT otherWISE continues to build networks in the community, as well as run other activities for young people and their communities in Canberra. We welcome involvement from business and community groups, so if you have ideas or a group of young people you would like us to run a workshop for please get in touch. Over the next couple of years we are also looking for financial support, for individual events, youth projects and other funds just to keep us moving along, please contact one of the project officers on the email provided below if you are interested in providing this kind of support.

Getting in touch

If you would like to get involved in ACT otherWISE we would love to hear from you!

Contact us on otherWISE@consact.org.au.

For more about the program, see <http://ozotherwise.wordpress.com>. You'll also find us on Facebook!

Rachael Millsom

From the moment of birth, when the stone-age baby confronts the twentieth-century mother, the baby is subjected to these forces of violence, called love, as its mother and father have been, and their parents and their parents before them. These forces are mainly concerned with destroying most of its potentialities. This enterprise is on the whole successful.

R D Laing

Energy efficiency and the DODO¹.

Using an understanding of efficiency to leverage sustainability

To climb out of the many sustainability impasses humanity is creating for itself, new intellectual 'lenses' are required. Best known among these are 'triple bottom line' and 'ecological footprint'.

Measures used to calculate them are contentious, and many people shy away from them because of uncertainty over what they mean. They are in part based on the efficiency with which we use resources, efficiency being thought of in terms of money, time and energy. In our global heating/peak oil times, anything that helps understand energy conversions so that we are empowered to act confidently to reduce the energy associated with living, must be good. Since the private commuter car is outrageously inefficient in energy terms and its consequences for global heating are life-shattering, yet so many aspire to possess one, it is worth taking a comprehensive view of the energy efficiency associated with the car.

Car advertisements, and motoring editors, frequently extol the environmental virtue of the

hydrogen-fuelled car, claiming that its only emission is water. That is true, but it ignores the fact that producing the hydrogen and getting it to the motorist will be energy, resource and pollution intensive.

It is also often argued that public transport is heavily subsidised and car use heavily penalised, quite ignoring the large public costs (including health care)

¹ DODO: Driver Only Driver Owned commuter car. The point of this characterisation is to draw attention to two of the most environmentally damaging features of our relationship with the urban commuter car: built to transport 4+ yet transporting only one and, accessed via private ownership rather than rental or shared ownership, thereby insisting on intensive use – the default means of transport for all trips – to repay cost of ownership.

associated with providing the infrastructure for large scale motoring and its consequences.

Arguments such as these assume limited versions of efficiency restricted to chosen participants and to today's market values. If we look instead at an engineering version of efficiency and apply it comprehensively to our transport realities, a radically different picture emerges.

Efficiency in everyday discussion means whatever its user intends. It is *interpretation dependent* and therefore relatively arbitrary. In engineering terms however, it is the ratio (in percent) of useful work done by a device to the work supplied to the device to do that work and, in our sustainability case, *from cradle to grave*. Work is quantified as Joule or kWh and while energy is available to us by different means with differing environmental consequences,

we do know that its circumspect use is *always* worthwhile. In this article I try to provide a comprehensive view and to let you know where the efficiency statements I am using come from.

From such a perspective the private commuter vehicle or DODO, is less than 1% efficient which compares poorly with incandescent light globes which, at some 3% efficient, are slated for replacement with compact fluorescents. Compact fluoros are ten times more efficient *over all*.

... The masters of bespoke are Bentley and Rolls Royce ... a significant part of Bentley's business is making its cars bullet proof to AK47 standard. ... Cigar humidors and refrigerators are common inclusions as are pop-up drink decanters, office equipment, dividers to exclude the chauffeur ... [The \$1.2m] Maybach is built only after extensive meetings with each buyer... One European client who bought a number of Maybachs to be placed around the world wanted them upholstered and trimmed to match the interior of his Boeing.

*AFR magazine
November 2007, p 27*

Gross energy inefficiency is sometimes justified e.g. the helicopter (the most energy *inefficient* 'automobile') used as an ambulance or for fire fighting. Mass commuter transport based on DODOs operating at less than 1% efficiency, in the face of much more efficient combinations of bicycles and trains (bike-rail), cannot be justified in this way. Consciously pouring over 99% of its energy requirement into the environment as heat just to push a driver around is obscene and incongruous when bike-rail is faster (over all), cheaper and healthier!

To say that we do this because petrol is cheaper than bottled water is part of the reason but that demeans us as thinking, moral beings. A primary driver for this incongruous behaviour is the failure of the public to recognise efficiency as a precise concept that can measure the effectiveness of what

we do AND our failure to address the broad context that must be used to assess its viability (= live-ability).

Car engines are roughly 15% efficient. Each litre of petrol generates 85 energy units of heat for 15 of motion. No-one wants engines moving about by themselves - we want to move ourselves, so the engine is put into a multipurpose vehicle, roughly 15 times heavier than we are. So, 14 parts of the 15 energy units made available for motion by the engine are used to push the car; one part to push us. Therefore 99% of the energy in the fuel mobilises the vehicle, 1% mobilises us, hence 1% efficient!

This is only the beginning of a kind of unwitting madness few would subscribe to if they had to pay for it personally and up front. The energy efficiency of the commuter car is actually much less than 1%.

Energy is used to design, make, market and distribute cars. The amount is equivalent to roughly half the energy in the fuel that will go through them in their lives. Then there is the energy required to maintain them during their lives (drive in for service and the service station uses energy). When it's clunked its last, recycling costs more energy while the unrecycleable components become polluting land-fill.

So much for the vehicle. There is also the energy required to create the fuel and get it to us. While we might legitimately ignore the energy cost of creating the oil upon which conventional petrol or diesel are based we cannot do the same with biofuels which, in today's situation, still often cost more energy to produce than they deliver. In our haste to replace rather than conserve fossil fuels, governments are encouraging food crops (cane and beet sugars, corn, canola, palm oil etc.) as feedstock for biodiesel and ethanol. The current state of the art means that they can cost as much energy to get to the bowser as they deliver (zero net energy out = *zero efficiency*).² Being food, fuel crops compete directly with crops sold as food, driving (!) up the price of food. This is fine for farmers but disastrous for poor people who have to buy their foods and, in that the net energy

gained is low or even negative, is an insult to the environment and to anyone concerned about it. The story with biofuels is not over yet; the prospects for improving net energy gains from biofuels based on algae rather than foodstuffs ("second generation" biofuels) look very promising. Nevertheless, even with biofuels created with less energy than they deliver, the primary point of this article remains: using them in a process that throws >99% away, is madness.

Fuel based on other fossilised hydrocarbons such as coal and tar sands also cost a significant portion of their outputs especially if their processing is to be done cleanly. The same will apply to hydrogen if it is to be driven by nuclear power which will require secure waste management for tens of thousands of years – which brings us to the energy costs of security, viz. monitoring and "defence" for which read: "armies and wars".

There are many interesting details this short article cannot explore. For instance, long-distance rural buses in Australia regularly travel three million kilometres, so the embodied energy in these buses works 10 times harder than that in the average commuter car. On the other hand buses (and trains) often run half empty or worse and so they too could use their embodied energies better.

Having a car only makes sense within enabling infrastructures.

These range from oil-based (asphalt) roads through hospitals, police, lawyers, insurance actuaries to, as already mentioned, the armed forces which generate part of their reason for being by securing fuel supply lines.

On top of all these energy costs of travel is the energy cost of repairing the environmental damage done by the planet's billion plus cars and their infrastructures – i.e. the damage that goes beyond what the biosphere's self-cleansing mechanisms can cope with. Few of these debits are recognised and when they are, they are not debited to the DODO ledger!

In these terms the energy efficiency of the DODO is a good approximation to zero and we can no longer make good its damage, we will simply have to accommodate it and watch it get worse.

If we resist doing what reality commands, our trouble is certain to be worse. What does reality command? Well, first of all (and especially for the benefit of the enviro-progressives I have met recently, who want gold medals for buying hybrid cars) we'd better drop the idea that there is any way whatsoever to preserve our system of happy motoring. The car as a mass market phenomenon, and enabler (dictator, really) of all our daily life arrangements, is finished. We'd better find something else to talk about.

*James Kunstler
in his weekly blog, 3 September 2007*

2 C.f. *Science*, as reported in *The Age* thus: "Biofuel crops 'increase' greenhouse, says report" (9/2/2008, p.9).

Driving this madness are social systems that, in common with their individual members, do not recognise efficiency in the sense I outline it here. To mention a few: social systems nominate cars as sources of esteem, fun and overwhelming *interest* and, as already pointed out in footnote 1, they require that we *purchase* them to access their charms. Imagine how differently we'd use them if we rented them, even if rent were cheap, which it would be if we all did it? The ways we use to measure their cost are distorted to favour them, presenting them in a much better light than they deserve. For instance, we regularly ascribe less than 20% of greenhouse gas production to them, laying most of the blame for greenhouse gases at the feet of electricity generators. But so much of our electricity goes to drive DODO commuting either directly or indirectly through infrastructure provision! Electricity generators should of course clean up their acts, but it is important to recognise that our demands "drive" their production and so the goods and services that demand electricity should also be accounted for in the statistics we use to present sources of greenhouse gases. Some of these matters have been exposed by environmental economists and others but we ignore their work because there is no political constituency pushing us or our governments to recognise it.

Most difficult of all, DODOs have been the most successful of wealth drivers. It required the temporary discounting of environmental debt but, we could not have had the developed world with all its technical sophistication without them. Those who recognise the debt just hope their children will find ways to pay the environmental debt and forgive them the limits of their perception, in the process.

Other than house-ownership no other sufficiently large economic engine existed at the time³. New developments such as IT exist precisely because of the wealth generated by providing for nuclear families, their suburban homes and automobiles.

3 A side "benefit" of the car as wealth generator arises from its short life. Cars are replaced at some ten times the frequency of the suburban house.

Progress — the theory that you can get something for nothing; the theory that you can gain in one field without paying for your gain in another; the theory that you alone can understand the meaning of history; the theory that you know what's going to happen fifty years from now; the theory that, in the teeth of all experience, you can foresee all the consequences of your present actions; the theory that Utopia lies just ahead and that, since ideal ends justify the abominable means, it is your privilege and duty to rob, swindle, torture, enslave and murder all those who, in your opinion (which is, by definition, infallible), obstruct the onward march to the earthly paradise.

*Aldous Huxley
Apes and Essence, 1949*

Bicycles and trains could not have filled this role. This is not to say that other less resource intensive things could not now replace automobiles as wealth generators. Nor does it say that other less environment intensive wealth generators, c.f. social goods like energy audits and refits, could not be the primary development path for countries like China.

So we "owe" the DODO. But, it has overstayed its usefulness and the time has come to leave it, to grow out of it and, to give the planet a chance of recovering.

The same efficiency arguments apply wherever energy is demanded. Here it was motion, specifically urban commuting; elsewhere it might be heating, cooling (air conditioning, refrigeration) or even eating; food is, in the main, metabolic fuel. What would it take for example to improve the efficiency of eating?

What e.g. would it take to privilege eating wild rabbits for their efficiencies in converting sunlight to meat and for the improvements to farming efficiencies through reducing the soil damage their vast numbers cause? More, per kg of lean meat, the "food miles" required to get rabbits to us in any part of Australia would be low. But all that is a story for another day. Suffice it to say, there is no reason for economics to exclude these engineering realities from its calculations, other than the absence of a market and appropriate measures! Governments we need you now as never before!

As a postscript: In 1971, as a young engineer intent on becoming an environmental scientist, I bought an old bicycle and began commuting on it - alone. Unbeknown to me, that decision was to keep me alive because, in addition to its planetary benefits, it kept me fit enough to survive, so far, 25 operations. Efficiency can do that for you too. So, join me to create a "constituency for efficiency"?

Frank Fisher

Growth

The ideology of constant growth is the ideology of the cancer cell...

Edward Abbey

Extracts from a four-page letter:

27 March 2008

The Hon Kevin Rudd, MP
Prime Minister of Australia
Australian Parliament
Canberra, Australian Capital Territory,
Australia 2600

Dear Prime Minister,

Your leadership is needed on a matter concerning coal-fired power plants and carbon dioxide emission rates in your country, a matter with ramifications for life on our planet, including all species. Prospects for today's children, and especially the world's poor, hinge upon our success in stabilizing climate.

I recognize that for years you have been a strong supporter of aggressive forward-looking actions to mitigate dangerous climate change. Also, since your election as Prime Minister of Australia, your government has been active in pressing the international community to take appropriate actions. We are now at a point that bold leadership is needed, leadership that could change the course of human history.

I have read and commend the Interim Report of Professor Ross Garnaut, submitted to your government. The conclusion that net carbon emissions must be cut to a fraction of current emissions must be stunning and sobering to policy-makers. Yet the science is unambiguous.....

Feasible actions now could still point the world onto a course that minimizes climate change. Coal clearly emerges as central to the climate problem

Choices among alternative energy sources - renewable energies, energy efficiency, nuclear power, fossil fuels with carbon capture - these are local matters. But decision to phase out coal use unless the CO₂ is captured is a global imperative, if we are to preserve the wonders of nature, our coastlines, and our social and economic well being.

Global climate is near critical tipping points

Prime Minister Rudd, we cannot avert our eyes from the basic fossil fuel facts, or the consequences for life on our planet of ignoring these fossil fuel facts. If we continue to build coal-fired power plants without carbon capture, we will lock in future climate disasters associated with passing climate tipping points. We must solve the coal problem now.....

Sincerely,

James E. Hansen
Kintnersville, Pennsylvania
United States of America

Please contact the NSF office for a printed or electronic copy of James Hansen's full four-page letter and his attachment Fossil Fuel Facts.

Farrago

Response to climate change

In *Quarterly Essay*, issue 28, in late 2007, Ian Lowe replied to the correspondence that resulted from his essay in issue 27.

He made the following points. The latest IPCC synthesis, released in November, showed the need for urgent and concerted response on climate change. We need to ensure that global emissions peak before 2015 and then decline sharply. So Australia and the USA need to reduce emissions by 20 to 45 per cent from present levels by 2020.

Mark Diesendorf's analysis showed that we could cut our emissions to less than 70 per cent of 1990 levels (equivalent to almost halving our current emissions) by using technologies that are safe and available now.

Poaching doctors

The British medical journal *The Lancet* has taken up the issue of wealthy countries poaching doctors and other health care professionals from poorer countries.

About 13,200 physicians trained in Africa are working in Australia, Canada, Britain and the USA. This is despite there being endemic shortages of doctors in sub-Saharan Africa, with about one physician for every 8000 people.

If governments fail to stop the flow of doctors from poor to rich countries, the number of patients per physician in sub-Saharan Africa could rise to 26,000 in the next four years. The number of doctors treating patients with HIV in those African countries could fall from 21,000 to about 10,000. As many doctors in poorer countries have practices in the cities treating the relatively wealthy middle class, so the ratio of patients to doctors in rural areas is worse than the above figures indicates

The Canberra Times, 23 February 2008

The human epoch

A group of geologists have suggested that human action on the planet is so great that it is influencing the rocks being laid down today, so they have coined the term *Anthropocene*.

The label has been used informally so far but geologists at the Stratigraphy Commission of the Geological Society of London are urging the International Union of Geological Services to make the name official. If nothing else it will help us to focus our minds on what we are doing to the planet.

New Scientist, 2 February 2008

Salt control

Salt entering the Murrumbidgee River from Canberra's Lower Molonglo Water Quality Control Centre (sewerage works) may become a problem in the near future.

Actew, the ACT's electricity and water supplier, has a licence from the ACT Environment Protection Agency that specifies the maximum amount and concentration of salt that can be discharged into the river. Currently the amount of salt is well below the specified maximum but the concentration is close to the limit.

This could mean that Canberra will need the one hundred million dollar water purification plant that was proposed with the intention of putting purified waste water back into the enlarged Cotter dam. A water purification plant using reverse osmosis is a desalination plant by another name, so it may be needed to reduce the salt concentration of water released into the river.

Treating ten gigalitres, about a quarter of the annual outflow, would reduce the salt concentration significantly, thus satisfying the licence condition. Another approach could be to encourage residents to switch from powder to liquid laundry detergents. If enough residents made the switch it would reduce the salt concentration by a satisfactory amount. It is estimated that it would be possible to reduce salt by about ten per cent by dealing with it at source. - *The Canberra Times*, 28 February 2008

Ethical Shopping

Julian Lee, a journalist with *The Sydney Morning Herald*, was asked to write an article on the ease, or otherwise, of buying 'ethical' products. He was given two days and a shopping list to use for his research.

What he found was that it is very difficult to find out how ethical various products are. The exercise led to a change in perspective and shopping habits for Lee and his wife.

He cites the problem of palm oil as an example. Palm oil plantations have been in the news as the destruction of tropical rainforests and peatlands in Indonesia and Malaysia to enable their establishment has resulted in enormous emissions of green house gases. It is destroying richly biodiverse ecosystems that were great carbon stores, and is further endangering the orang outangs. Yet the reason for establishing the plantations is to satisfy the demand for the oil largely driven by its use in making biofuels to 'save' the environment. But palm oil is also an ingredient in one in ten products stocked by supermarkets, including lipstick, Cherry Ripes and Tim Tams.

Then there are banks, insurance companies and superannuation funds. Is your money ethically invested? Possibly you would be horrified if you knew what you were financing.

Lee's family's experience of a year using their money as ethically as possible has led him to write a book *How Good are You? Clean living in a dirty world*, published by Random House for \$24.95.

This book would make it easier for others who want to clean up their shopping and their investment habits.

The Canberra Times, 27 February 2008



Contributions for the next edition of *Nature and Society* are invited now from all members. They should be sent to the editor, Jenny Wanless, 22B Jensen St, Hughes ACT 2605, ph 02 6281 3892, or to our office by 15 May 2008.

Contributions may be sent on paper or electronically. This journal was prepared using Microsoft Word and PageMaker 7.0.2.

Items in *Nature and Society* do not necessarily reflect the opinions of the majority of the Forum members, but are published in the hope of stimulating thought and discussion.

Jenny Wanless and Keith Thomas prepared this edition together with the named contributors; Jenny and Keith also contributed the unattributed items and provided the quotations.

Nature and Society Forum's major projects

ANSI: The National Sustainability Initiative is endeavouring to establish a working display site in Canberra that addresses all aspects of sustainable building and lifestyle. Contact Wendy Rainbird

Biosphere Reserve Nomination: supporting the nomination of the ACT as a UNESCO Biosphere Reserve, part of UNESCO's Man and the Biosphere program. Contact Ian Anderson

Biosensitive Futures: interactive website launched in February provides authoritative information on social and environmental issues for public discussion. Also kits on the same lines for use in discussion groups. Contact Stephen Boyden. Visit www.biosensitivefutures.org

SEE-Change: community based discussion and action groups to encourage local involvement in sustainability activities. Contact Bob Douglas

Sustainability and Health project: a number of groups focussing on different aspects of this topic, including art and transport, youth film makers, local communities. Contact Valerie Brown

Climate Friendly Planning and Housing: extending knowledge of how to build or retrofit houses to use less water and fossil fuel energy while enhancing liveability. Contact Derek Wrigley

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