

Nature & Society

The Journal of the Nature and Society Forum

October-November 2011

Editorial

The Federal Government has been battered by the ferocity and strength of the campaign against the carbon tax. A mighty effort has been made by the Opposition and large sections of the media and industry to persuade the general public that they will be hurt, and that this is an unwarranted attack on our way of life.

When the Convoy of No Confidence made its way to Canberra a couple of months ago it was much smaller than had been expected; none the less there are clearly many people deeply upset about the carbon tax. In an interview one woman who came with the convoy said they were unhappy because of the communistic courses of action being taken by Australia. Do they really think this type of Government action is communism? In fact the carbon tax is supposed to give way to a carbon trading scheme, a strictly capitalist measure, within a few years.

This dispute is intensely worrying because it shows that many people have completely failed to grasp the fact that we are in very serious trouble. Indeed reading the newspapers, or listening to talkback radio gives us the impression that the nation is full of people who believe the idea of global climate change is a communist conspiracy to take over the world. If the majority of the population believe that we are not harming the life supporting abilities of the Earth then there is little chance of getting any good policies in place.

Last year the Australian Psychological Society decided to properly test Australians' understanding of climate change away from the heat of political debate. They conducted in depth research, asking multiple questions that took respondents from half an hour to an hour

to complete, giving people time to reflect. The results were strikingly different from the replies received to the single simple questions asked in political polling.

The results of the Psychological Society study show that 68% of those polled would vote for action. Over 77% say that if we do nothing there will be bad outcomes, but 48% think action will cost too much. These results show a certain lack of coherence, but also show that the public could approve of action if the media and politicians would give them a chance.

Unfortunately it is very difficult for most people to grasp the importance, the danger, of an apparently small increase in a gas making up less than one per cent of the atmosphere. They might understand it better when they hear that we have dug up and put back into the atmosphere the carbon sequestered by millions of

years of plant growth. Indeed there are many figures around that show that humans are now a geological force in our own right.

According to Mike Sandiford (15 June 2011) geologists have estimated that natural erosion on average moves about ten billion tonnes of sediment from mountain to sea each year.

The impossibility of an escape to space is just one of many examples of how our bodies, and those of our fellow organisms, are inseparable from the environments in which we live. In our futuristic ambitions we should not forget that our minds and bodies are connected to Earth as by an umbilical cord.

*Theunis Piersma, New Scientist,
13 November 2010*

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Agriculture has produced a big increase in that amount, which is now about 28 billion tonnes per year.

Modern mining has shifted even more rock and sediment. As a species we mine about seven billion tonnes of coal and 2.3 billion tonnes of iron ore each year, not to mention the even greater amount of overburden that is moved to access what we want to mine. In Australia alone our annual exports of iron ore and coal total about 600 million tonnes, vastly more than the natural erosion rate. The Olympic Dam project is expected to extract about 14 billion tonnes of rock over a 40 year period.

Often we hear the argument that volcanoes are to blame for global warming, but in fact our output of carbon dioxide is about a hundred times greater than the output from volcanoes. We have caused earthquakes by building and filling large dams. We cause subsidence and instability by mining and by extracting water and oil in large quantities.

It has been estimated that the Earth's 'metabolic rate', the rate at which heat is released from the Earth, is about 44 trillion watts. The International Energy Agency estimates that our human energy system is already operating at about 16 trillion watts. This human energy system is currently on track to double in 34 years. If we keep this up, we will soon be a force equal to that of the whole plate tectonic system of the Earth. Anyone who imagines this is not having an effect on the Earth is simply kidding themselves. And remember that we are also causing mass extinctions as great as those that have, periodically, devastated the whole zoological and botanical balance of life on Earth.

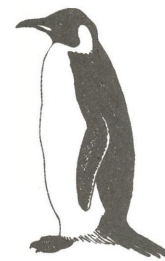
As far back as 1923 Robert Sherlock, penned a geological text entitled *Man as a Geological Agent*. Even then, when our population was only a third of today's population, there were comparatively few cars, and giant earth moving machines were decades away,

Sherlock said that "Man's work is as worthy of a place in geological text books as are the actions of the sea or of the rivers."

Today, when our activities are beginning to rival the mechanisms of plate tectonics, we really need to wake up to ourselves. There should be no room for denial. This is not a time for thinking of capitalism or communism: realism is what is needed. We are powerful, and we are cutting away at the actual base of life on Earth. We need a new economic system, a new political system, and new understanding of what we as a species are doing to destroy ourselves.

Instead of rip-roaring political debate that is not debating anything but is rather a vicious slanging match to see who can most confuse the issue, we need serious conversation about what needs to be done. We need education, intelligence and good will, or we will destroy ourselves and most of the other passengers on Planet Earth.

Jenny Wanless



Emperor

Most interesting of all, perhaps, is the question whether man, by his prodigious combustion of coal ... is producing more carbonic acid [carbon dioxide] than can be eliminated by ordinary natural processes. If this production is excessive, the result eventually may be an unwelcome change in his atmospheric surroundings.

...Man...may be approaching a stage when he should pause to consider whether his use and alteration of the crust of the earth itself are for the future as well as for present advantage.

Arthur Woodward, Keeper of Geology in the British Museum, in the preface to Robert Sherlock's book, Man as a Geological Agent, 1923

Sustainability means ...

Any social system based on the use of non-renewable resources is by definition unsustainable. Just to be clear, nonrenewable means it will eventually run out. Once you've grasped that intellectual complexity, you can move to the next level. Any culture based on the nonrenewable use of renewable is just as unsustainable. Trees are renewable, but if we use them faster than they can grow, the forest will turn to desert. Which is precisely what civilization has been doing for its 10,000 year campaign, running through soil, rivers, and forests as well as metal, coal and oil.

Lierre Keith
p 23 in *Deep Green Resistance*, 2011

Nature and Society

Editor: Jenny Wanless

Publisher: Nature and Society Forum

ISSN: 1038-5665

Nature and Society© is the journal of the Nature and Society Forum, GPO Box 11, Canberra ACT 2601, and is published six times a year.

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Where we are

The forestry building of the Fenner School of Environment and Society at the Australian National University in Canberra.

From the entrance, turn left past the School's office and our office can be found on the right at the end of that corridor. But ring before coming as the office manager works only part time: 6125 2526.

By car: There is very limited meter parking 200 metres to the north near Union Court.

By bus: The route 3 bus from Civic drops you in Daley Road. Walk 100m south-east to the Forestry building.

By bicycle: Plenty of bicycle parking outside our office.

Morality (1)

If someone gives you a moral rule, the first thing to do is to examine not the rule, but the exception. Who is not bound by that rule? Who gets to do the exact opposite? It will always be those in power — that is why moral rules exist. Any thinker who actually tries to apply universal moral rules universally is considered insane, bizarre, ridiculous — because the purpose of universal morality is the exception, the violation. Governments disarm citizens by denying them weapons, while retaining monstrous weapons in the hands of the state. It is the same with “morality.”

Stephan Molyneaux
YouTube video September 2011

Coming NSF meetings

Our meetings are generally at the Emeritus Faculty on the ANU campus. The building, Fellows Lane Cottage, can be difficult to find, so allow yourself plenty of time if this is your first visit to this location. On the ANU website, the building is number 3T at map reference C3.

Wednesday, 16 November, 7:30pm at the ANU Emeritus Faculty

Dr Geoff Mosley

Geoff Mosley's talk will discuss the nature of a viable steady state alternative to economic growth and what will be needed to make the transition. He will explain how we will need to incorporate measures in the transition to deal with the damage already caused to the physical and social environment and by any further delay. The changes will affect every aspect of life including values, institutions for governance, social and trade relationships, and use of physical resources including energy.

Tuesday 22 or Wednesday 30 November, 5.30 pm (to be decided and advised) NSF end-of-year gathering - at Frank Fenner's old home, Corner of Monaro Crescent and Torres Street, Red Hill

During the gathering Stephen Boyden will speak about the proposal for a permanent memorial to Frank Fenner, in the formation of a Frank Fenner Foundation.

Contributions of food and drink for refreshments would be much appreciated.

Wednesday 7 December Member discussion on the future of Nature and Society Forum - *Venue and times to be advised*

The discussion will take place in the light of NSF's recent history and the proposal for a Frank Fenner Foundation.

Morality (2)

A creation is ethical in direct proportion to its value to those whom it most affects.

Harry Palmer, in the 2011 movie Avatar

NSF news

Annual General Meeting 2010-11

The new board, elected at the AGM, is as follows:

Chair: Rory Eames

Secretary: Jenny Wanless

Treasurer: Susan Nancarrow

Ordinary board members: Val Brown, Catherine Gross, Jane Olsen, Wendy Rainbird and Gilles Rohan.

A motion to extend the period in which the AGM must be held, making it not later than five months after the end of the financial year, instead of three months, was passed by the meeting. This will make it much easier to get the accounts audited.

Unfortunately ill health prevented Stephen Boyden from attending the meeting, but a prepared statement from him was read out by Jenny Wanless. Stephen is proposing that NSF should investigate the possibility of establishing a Frank Fenner Foundation as a memorial to Frank.

Report on the July meeting

Feeding the world *with* biodiversity and *without* climate change: a win-win

Dr Maarten Stapper

Soils, the foundation of life on Earth, are degrading to lower and lower fertility. To make matters worse, some of the best soils on the planet lie beneath cities, road systems or dams. The resulting outcomes of food insecurity, biodiversity loss and climate change have received all the attention, but the soil itself is largely ignored.

Maarten's interests are in regenerating soils and rehabilitating landscapes with biological agriculture to feed the world and slow global warming. He questions current science, as specialists naturally

concentrate on their own specialities, and do not view soils in an holistic manner. Multi-disciplinary research projects are unable to get to the causes of system problems: they tend to address symptoms as it is so difficult to study interactive connections between various parts of the landscape (or of the human body!).

Biological and organic agriculture are agroecological methods to regain soil health with soil organic carbon and soil biology. Both draw on local resources, knowledge and skills, both need farmers to become biosensitive. Biological agriculture sits between the opposites of industrial agriculture with large scale use of synthetic fertilizers and chemicals, and organic agriculture with no use of these. Biological agriculture makes use of the best of both worlds. The use of small amounts of synthetic fertilizers and herbicides keeps a

productive and profitable system operational without breaching critical thresholds.

Biological agriculture also makes use of shelter belts, cell grazing, and other techniques to reduce grazing pressure on the land, maintain soil moisture and microbiological health of the soil. Even salt scalds can be remediated by suitable treatment, doctoring the soil with 'compost tea' to increase

microbiological activity and the like. Cattle and sheep benefit from shelter belts, but so too does general biological diversity. Furthermore, cutting down forests heats the land, exacerbating global warming. Restoring a treed landscape helps to cool the land.

Despite endorsement by UN agencies in three major reports since 2006 dealing with world food production and poverty, the idea of biological agriculture seems to have been ignored by public agricultural science in the developed world. At CSIRO Maarten was unable to secure funding to conduct research on biological farming systems. As a result he left CSIRO in controversial circumstance four years ago to continue working with farmers on biological agriculture as a private consultant and teacher. This was shown on the ABC in the 2 June 2009 *Australian Story* 'Back to Earth' (<http://drmaartenstapper.com.au/index.php>).

Is the accepted technique of genetic modification (GM) a solution to feeding the world? In Maarten's opinion it is not. The GM approach also treats

The world produces enough food for everyone, yet nearly a billion people are going hungry. Our food system is broken. Without urgent action global hunger will only get worse. Achieving (a future in which everyone has enough to eat) will mean changing the beliefs and practices of businesses, governments and – most importantly – each of us.

Andrew Hewett, Oxfam News, September 2011

symptoms of problems not their cause. That is, degraded soils need to be improved. In all organisms genes switch on and off to adapt. Plants in healthy soils become more productive as improved conditions determine different gene expression.

Sometimes GM is used as an answer just because the wrong question has been asked. Efforts to breed grain with a lower glycaemic index for instance, ignore the fact that wholegrain flours already supply that lower GI and healthier, better nutrition. The better answer would be to encourage people to rely on whole grain products, rather than milling away all the healthy fibre from their food.

It is a considerable concern that there are no published studies to show GM safety in long-term soil health or generational animal feeding. Such research would be a relatively cheap way of convincing protesters that GM food is, in fact, safe. Why are there no such official publications when unauthorised ones show many health problems in second and third generations?

Maarten asks why do people accept being guinea pigs and subjected to easy money making by vested interests for chemical and pharmaceutical industries? And we ask, what will happen to our food supply when industrial agriculture becomes totally impractical as peak oil really bites?

Actually there is already some good news, in that many Australian grain growers have now adopted no-till farming. Given the good reports from many of Maarten's farming clients, not to mention those with whom Michael Jeffery and his team have worked, maybe change is just around the corner, forced on us by the realities of the climate and of peak just-about-everything which we will no longer have the luxury of ignoring.

Jenny Wanless

Renaming species

The dominant culture is amnesiac. Entire species and biomes are not just wiped out, but forgotten. And worse, they are deliberately erased, scratched out of history. People don't recognize this culture's pattern of ecocide because they don't mourn for all that has already been lost, been killed.

Everyone knows what a penguin is, right? Well, the name didn't always refer to the cute Antarctic birds. The name, which means 'fat one', formerly referred to the great auk, the seabird that populated Atlantic islands in vast numbers. Only when the great auk was hunted to extinction (and then forgotten by most) did the moniker move to the Antarctic.

Abundant cod swam off the coast of Newfoundland and other Maritimes. They were so numerous that it took a long time to fish them to the brink of

extinction. And yet you can still buy cod at the grocery store. How can that be? Because the name has been taken for marketing reasons. If you buy something labeled cod, you no longer get true Atlantic cod (*Gadus morhua*). Instead you get something that has been deliberately mislabeled" rockfish (*Sebastes* spp) or Alaska pollack (*Theragra chalcogramma*) or the poisonous oilfish (*Ruvettus pretiosus*) ...

All this gives grocery shoppers and eaters a sense that things are fine. They hear news about bad things happening to fish, but there's still plenty to eat at

the store, so what's the problem? But if you take a moment to think about it, this renaming is deeply disturbing. It's like going home to find that a serial killer has murdered your family and replaced them with bystanders plucked off the street, renamed after your dead kin. The killer sits there in your house, grinning, insisting that everything is fine.

Aric McBay
Deep Green Resistance 2011, p36

We choose to spend money, as we should, to combat our most dangerous possible threat. Today the most dangerous issue we face is the long-term one: the problem of climate change.

That's not to suggest the defence budget should be cut; it's rather an attempt to think logically about these issues. The changing environment may turn out to be nothing more than a chimera, but it may also prove to be an existential danger to our entire way of life.

It doesn't really seem to be worth staking everything taking a chance.

Nicholas Stuart, The Canberra Times, 16 July 2011

Stewardship

We tried ruling the world; we tried acting as God's steward, then we tried ushering in the human revolution, the age of reason and isolation. We failed in all of it, and our failure destroyed more than we were even aware of.

Dark Mountain Manifesto 2010

Report on the August meeting

Donnie Maclurcan

While our political parties are bogged down in a web of negativity, thinking that the sky will fall in unless our economies keep growing ad infinitum, Donnie Maclurcan is busy persuading people that in fact there are other ways forward.

He directs our attention to the many parts of the future already in place that will enable our societies to move ahead, rather than collapse. Around the world people are experimenting with such movements as cohousing, landshare, slow (local) food. Free and open source software is opening up knowledge and empowering people. Alternative energy sources such as solar are gaining acceptance. The Happy Planet index is trying to show that GDP is not the only way to measure economic and social wellbeing. The big move to smallness in products, and intangibles such as internet services, is part of a move to 'weightlessness' in our economy.

Although these things provide grounds for critical hope there are a lot of confusing signals. Striking examples of these are offered by big food chains also running small organic food chains, or McDonalds sponsoring bike rides. Companies window dress their major money spinners by having a green or health aware small chain to provide a positive image. The ordinary consumer (almost all of us!) still makes many short car trips that could be made on foot or bicycle. Aircraft manufacturers are developing planes that emit lower levels of greenhouse gas, but plan to fly ever more miles. As a society we still harbour various dysfunctional beliefs.

Donnie is certainly not an unthinking optimist. He says we are already in overshoot. A reassessment in 2008 of the Club of Rome conclusions found that their predictions were on track for collapse by 2050. Whatever efforts we make tend to suffer from a rebound effect: the idea of a paperless office was as far from reality as could be. Gains in efficiency are negated by increased consumption.

We are looking to the wrong leaders, if we want to reach a post growth future. We need to change our beliefs. The North or Western World needs to de-grow so we can all have an equal footprint. We need to make seven shifts.

One, change ownership from private to collective. Examples of this exist in community car and bike pools.

Two, we need to move from being dominators to being nurturers, as in the Peckham experiment, moving away from bullying and excessive competition to small cooperative groups.

Three, technology must be appropriate to people and place.

Four, corporate globalisation must give way to integrated autonomy, as in sister city relationships and transition towns.

Five, subsistence as poverty must give way to subsistence as sustainability.

Six, expert knowledge should move towards collective wisdom, e.g. Wikipedia.

Modern science-based civilization is but a thin veneer over fundamental medieval notions divorced from empirical evidence
Andrew Glikson, 2011

Seven, social needs should be assessed then solutions found for distributing assets fairly, so people are not left out.

Communities should be small enough so that the knowledge, passions and skills of each person are known, respected and used.

One of the main problems that we face in finding a way forward is that we have no model to aim for. This leaves us feeling helpless. But there are hints. Islamic banking does not charge interest on loans. Early Christians, too, were not allowed to charge interest. At present we cannot imagine anything better than capitalism; we need to look for new ways – such as companies and institutions that are not for profit. We need to look at our assets, and what we have that can provide for our real needs.

Humans have an inbuilt optimism, and many of us, while being pessimistic about the future, can retain that optimism, which may help us make the necessary changes.

There are many questions to answer. How do we resolve the tension between social networking and the dominance of the big players? How do we get beyond zero emissions, and provide a grid so society does not collapse? In housing we need to share space and the asset base, how can we do it? How do we release people's creativity, and work out novel solutions? And how do we recognise a solution that is outside our experience, so that we can create a new future?

Jenny Wanless

Wind power and ecology

The survival of the world ecosystem, including of course ourselves, requires that we harness renewable energy in an environmentally tolerable way. One source of power is wind and it is vital that we assess the impact of current developments. We are destroying our only home, the Earth, on a scale that no other species has even remotely approached. Wind power has a long history. It has been an important local source of energy, for pumping water, grinding corn etc., for almost two millennia and during the last century millions of improved small wind turbines have been usefully installed on farms. In the last three decades a dramatic change has occurred with the development of enormous horizontal axis three-bladed wind turbines, all having vast blades with tip speeds of 100 kph whirling on top of massive towers, many more than 100 m high, built on huge concrete bases set into excavated ground. These huge machines have been built in large groups on dedicated land called wind farms.

An alternative approach has been the development of small machines often fitted to rooftops, even in cities. Quiet vertical axis machines have been widely set up in a number of countries, notably in Finland. One advantage of this “distributed energy production” is that the overall wind power is more constant than it is in large concentrated installations of the wind farm type, but the huge three bladed machines now dominate the landscape in many areas around the world and form the basis of several multi-billion dollar companies with immense lobbying power. Increasingly, people living near these vast machines have suggested they are detrimental to their health and there are some reports of abnormalities appearing in farm animals.

Most of the discussions have centred on the effects of the noise made by the wind farms, and many thousands of people have reported sleep disturbances and serious health effects forcing them to leave the area they have called home. The wind

turbine companies refuted, even ridiculed these complaints, and pointed out that many common sources generate noise of greater intensity. The thousands of reports from doctors dealing with people suffering stress, sudden bursts of tachycardia, and hypertension would seem to be harder to discount, but these reports have not yet been prepared as a coordinated scientifically controlled study. The turbine companies and organizations buying clusters of the turbines often have considerable power over affected communities, through agreements with local administrators and contracts with residents for use of the land. In many cases the residents of wind farms have had to sign agreements forbidding public complaints.

The advocates of the new large machines respond to complaints by residents and their doctors by stating that people would not complain if they received

adequate payment for the use of their land as a wind farm. There have been many statements belittling distressed or even seriously ill people, often along the lines that they are just awkward and resistant to progress. Objections are increasing however, and in a recent decision the Victorian government has decreed that wind turbines must be at least 2 km away from inhabited areas.

With audible noise, the loudness of the sound is often emphasised whereas it is only one factor. Consider the effect of music. It can have profound effects on behaviour even when very quiet. This can be shown experimentally. If you play Mozart to mice for a few hours they find their way out of a maze much faster than mice that have had to listen to noise. Similarly music can alleviate pain and is now used

clinically for this purpose. The loudness of the music is almost irrelevant. It is the sequence of harmonic tones that is important in producing the effects. It is surely similar with noise. If you are nodding off to sleep and the wind picks up, starting a group of wind turbines and your brain picks up a quiet crunch-

Festinger's investigation (into a doomsday cult's beliefs) led him to develop the theory of cognitive dissonance. According to this idea, people find it uncomfortable to hold two conflicting beliefs in their head at the same time, and will perform all sorts of mental gymnastics to reconcile the two.

When evidence conflicts with cherished beliefs, most people are happier to explain away even the most compelling data rather than abandon their beliefs. So smokers will question research showing links between their habit and ill health rather than give up, drivers convicted of speeding will convince themselves that the speed limit is too low rather than conclude that they put lives at risk, and politicians will argue for the effectiveness of their policies even when their ideas have obviously failed. This approach pervades our everyday lives and helps our beliefs emerge unscathed through even the most devastating of evidential attacks.

Richard Wiseman, New Scientist, 12 March 2011

crunch-crunch, in an irregular and unpredictable sequence because the various turbines are not synchronous, you may not imagine a monster approaching but primitive circuits in your amygdala, prefrontal cortex and other areas of your brain will automatically fire off a stress response, triggering an increase in adrenaline and cortisol secretion. This fundamental mechanism has been an important factor in our survival as a species but we have not adapted to these previously unknown disturbances. Not good for a restful sleep.

After looking at evidence from several seemingly disparate areas of research it seems to me that the effect of the current wind farms is not confined to the noise they make. I am convinced that the evidence suggesting tissue damage both to people and to a wide range of other species is strong enough to sound a warning of environmental damage far beyond 2 km both on land and on water.

That the disturbance caused by the new large turbines is not trivial is highlighted by a recent decision by the UK Ministry of Defence (MOD) objecting to plans to build wind turbines on the north-west coast of England and the south-west coast of Scotland. Why? Because the vibrations, the “seismic noise” from such wind farms would interfere with the MOD instruments that detect terrorist bombs.

So, what do we know about the seismic noise of wind turbines? Quite a lot actually, but it has not yet received as much attention as it warrants. Like the UK MOD, scientists seeking to find evidence of gravitational waves have extremely sophisticated equipment designed to detect vibrations in rock, soil and water. Any device producing such vibrations can interfere with their research, so several centres, notably the Laser Interferometric Gravitational Wave Observatory (LIGO), University of Oregon, near the Stateline Wind Project, and the VIRGO European Gravitational Observatory in Pisa, near a small wind farm, have done detailed measurements of the generation and transmission of seismic vibrations from large wind turbines. Both of these centres were able to detect seismic vibrations

travelling through soil, rock and water. The vibrations were correlated unambiguously with the operation of the wind turbines. The distance travelled by these vibrations may surprise those who talk about siting homes no closer than 2 kilometres from the turbines. The seismic vibrations remained strong beyond 10 kilometres and were still detectable at 18 kilometres.

It is important then to ask the question whether vibrations can affect health. Here we can refer to a quite extensive literature on communication between creatures. These range from the simplest multicellular organisms such as *Physarum polycephalum*, a yeast that can at times join with its neighbours and coordinate joint behaviour by transmitting vibrations from cell to cell, to a wide range of insects that transmit information to others of their species using a range of different mechanisms. In most species the frequencies used

are below 20 Hz and transmission is through solids, usually the fine stems of flowers and leaves. The vibrations produced in a plant stem by a small insect are so tiny they are undetectable without very sensitive equipment. For a small insect however they are immensely significant, sending information about potential threats, about food, and of course courtship. Most marine creatures, some of them very small, transmit information through water, also usually by low frequency vibration. All fish are very sensitive to low frequency vibrations and any angler will tell you that merely walking on the side of a lake will send most fish scurrying out of range of their net.

The sensitivity of earthworms to vibration is well-known not only to anglers but to predators that have learned to bring the worms

to the surface by a carefully calculated series of taps on the ground. Here it is important to note that there are many reports from farmers that seagulls no longer follow the plough in areas near wind turbines. It has been suggested that the seagulls have learned that the worms have all been driven away and that in that area the farmer’s plough will not bring breakfast

Three main drivers are sickening the global marine environment and all are a direct consequence of human activity: global warming, acidification, and a dwindling level of oxygen, a condition known as hypoxia.

We have underestimated the overall risks, and the whole of the marine degradation is greater than the sum of its parts.

Pollution has also taken a heavy toll, rendering the oceans less resilient to climate change. Run-off from nitrogen-rich fertilisers, killer microbes, and hormone disrupting chemicals, for example, have contributed to the mass die-off of corals, crucial not just for marine ecosystems but a lifeline for hundreds of millions of people, too. The harvesting up to 90% of some species of big fish and sharks, meanwhile, has hugely disrupted food chains throughout the ocean, leading to explosive and imbalanced growth of algae, jellyfish, and other ‘opportunistic’ flora and fauna.

Marlowe Hood, The Canberra Times, 22 June 2011

to the surface. They must go elsewhere for their food.

How many of the species found in the soil and waterways have been affected by wind farm vibrations? We do not know because the necessary environmental and ecological studies have simply not been done. There are many anecdotal reports but it is surely urgent that we learn a great deal more. Of particular concern is that many farmers have reported that bees are no longer seen in the vicinity of wind farms.

What is known of the effect of vibrations on people working in industry? Here there is a great deal of information, but it is not widely known. Much of what has been discovered over the last three decades is reported by Mariana Alves-Pereira and Nuno Castelo Branco of Portugal. These extensive studies report numerous serious illnesses and, yes, many deaths, mainly from unusual cancers. A particularly characteristic finding is a thickening of the fibrous sheath surrounding the heart, the pericardium. Diseases such as type I diabetes and epilepsy developing late in life were also found and unusual malignant tumours were seen in the lungs, colon and brain. Rage attacks occurred in some individuals and sudden attacks of non-convulsive mental defects were seen. These illnesses were caused by low frequency vibrations and developed slowly over many years, with deaths usually occurring after five years of exposure. The low frequency induced disease complex is called Vibro Acoustic Disease, or VAD and is thought to be the result of disruption of the fine fibres that connect the cells of the body. This disease complex is not yet widely recognised clinically or legally and this has seriously delayed diagnosis. Detailed experimental studies of VAD pathology have been reported. A characteristic finding is the production of excess collagen in the absence of an inflammatory response. This results in the thickening of blood vessel walls and abnormal gas flow in the lungs. Other findings in the experimental studies were unusual cell death without the usual "cell suicide" mechanism of apoptosis.

So, what can we expect from the noise and vibrations caused by wind farms? Many of the illnesses caused by industrial vibrations would not be associated with wind farms by doctors seeing such patients. Someone develops a heart disease, a brain tumour or gets a stroke five years after a wind

farm starts up a few kilometres from their home. Or they have their first epileptic fit very late in life, or they get a cancer in the lung or bowel. Few doctors today would make the connection with the wind farm. A diagnosis of VAD could be made by detecting a thickening of the pericardium, but this would not be done unless the clinician suspected VAD. The association of this disease with wind farm operation is not widely known.

Putting all this together, it seems obvious to me that there is a very urgent need to study disease rates and death rates in the areas near wind farms and in "control" areas more than 10 km away. There is also an urgent need to organise clinical and epidemiological studies to seek further evidence of the diseases and pathology described in the studies of industrial Vibro Acoustic Disease. There is similarly a very urgent need for veterinarians and

ecologists to follow up the reports from farmers all around the world of abnormalities in farm animals near current large wind turbines, as with chickens that are hatching with crossed beaks and other abnormalities, and stock of many types being

born with unusual abnormalities. Above all I feel that there is an urgent need to study the epidemiology of organisms that live in the soil and water around wind farms. These organisms are known to communicate by low frequency vibration. All of this must be correlated with precise measurements of noise and vibration associated with wind turbine operation. Such measurements must be made on the turbine towers, on surrounding soils and on surrounding buildings out to at least 10 km.

And what of the prospects for wind power today? A potentially extremely valuable source of auxiliary power I would say, but definitely not if it continues to be developed for massive commercial gain as at present. Instead of covering the planet with small quiet wind turbines feeding continuously into an international power grid we have "wind farms" springing up as concentrated power producing enterprises that are as much like a farm as an open cut coal mine.

Max Whisson, MB,BS FRCPath, is a retired pathologist with a strong interest in ecological issues. He invented the Whisson Windmill, a device for extracting water from the atmosphere. < symbiont@bigpond.com >

If we don't fight hard enough for the things we stand for, at some point we have to recognise that we don't really stand for them.

*Paul Wellstone
Source unknown*

The wind power controversy

Wind power often appears in environmental images as one of the iconic clean sources of electricity that will reduce our dependence on fossil fuels, as for example, in the Federal government's advertising program on the carbon tax. In Lester Brown's 2011 book *World on the Edge*, he tracks the rapid development of wind power on a global scale as part of the shift to renewable electricity generation. Between 2000 and 2010 according to the Global Wind Energy Council, world wind electric generating capacity increased at a frenetic pace from 17,000 megawatts to nearly 200,000 megawatts.

Wind power also seems to have an ability to generate considerable conflict. On both energy grounds and with respect to threats to countryside, James Lovelock (2009, p. 81) states that "Europe's massive use of wind as a supplement to base load electricity will probably be remembered as one of the great follies of the twenty-first century – an example of impressive engineering misused by ideology and as inappropriate as passenger transport by hydrogen-filled airships". Likewise Prince Charles is given as one of a number of exemplary environmental sustainability leaders in a recent book on this topic (Parkin, 2010). Yet on the question of wind farms, his position has consistently been that they are "a horrendous blot on the landscape" and if they have to be built at all, it should be well out at sea.

Rising concerns about the adverse health effects of wind farms were aired in an ABC Four Corners program ("Against the wind", 25 July 2011), and also explored by a Senate committee, with its final report in June 2011. The committee report states that it "received many accounts of adverse health effects in submissions and during its hearings. A significant number of submissions gave actual accounts of serious symptoms of ill health that witnesses said occurred after wind turbines began operating in close proximity to their residences" (Senate Community Affairs References Committee, 2011, p. 7).

Ruth Corrigan lives near the Capital Wind Farm near Bungendore, energy from which is being used for Sydney Water's new desalination plant. Her account (submission no. 622) to the Senate committee is typical of the commonly reported diminished quality of life after wind farms begin operation: "To the northwest of our home there are 17 turbines ranging from about 2 to 4 kms from us, to the south there are another 10 or so ... When the wind blows from the NE the noise from the turbines can be heard inside and outside the house, constant and relentless, over the sound of wind in the trees. It is particularly loud at night when the constant sound is often accompanied by a whoomp or pulse, which can be felt as well as heard. We are often startled awake sometimes as many as 4-5 times a night with the noise sounding as though a truck is coming in, sleep loss of up to 3 hours a night is not uncommon.

Since the existing turbines began operating in mid 2009 I have suffered frequent nosebleeds, sometimes on a daily basis, and headaches as well as a feeling of fuzziness in the head and almost constant tiredness".

Another example comes from a resident of the "West Wind" wind farm in Makara, New Zealand (Thorne, 2011, p. 282): "We . . . get the low-frequency thump/whump inside the house, is very similar to a truck driving past or boy racers sub woofer 100 meters away . . . we have no line of sight turbines and the closest one in 1.35 km away. There are however 27

turbines within 2.5 km. The sound is extremely "penetrating" and while we have a new house with insulation and double glazing, the low frequency modulation is still very evident in the dead of night".

The contrasting position from the wind industry and its advocates (including many people supporting renewable energy) is that there isn't an issue concerning noise and vibration. The parallel with a sound akin to that of a refrigerator is made, for example. Consider the comments to the Senate committee (submission no. 204) from Dr Mark Diesendorf, Deputy Director of the Institute of Environmental Studies, University of New South Wales: "Noise is rarely a problem beyond a distance of 500m and very few dwellings in Australia are within

From past experience, I would venture to guess that the eagerness to move to wind power on the part of industry and governments internationally will result in a reluctance to support research that may conclude that caution is required when locating wind turbines close to residential communities. Of course, I speak from an American perspective where history has demonstrated how quickly Americans adopt new products, without requisite research on harmful effects, and how reluctantly they relinquish these products when evidence proves that they may be harmful.

The Noise From Wind Turbines: Potential Adverse Impacts on Children's Well-Being
Arline L. Bronzaft *Bulletin of Science Technology & Society* 2011 31: 291

400m of a large wind turbine. Licence conditions for wind farms should, and mostly do, set objective, measurable noise limits". Similarly, a National Health and Medical Research Council (NHMRC) Rapid Review of the evidence in July 2010 acknowledged that while a range of effects such as annoyance, anxiety, hearing loss, and interference with sleep, speech and learning have been reported anecdotally, there is no published scientific evidence to support adverse effects of wind turbines on health.

However, there are good grounds for questioning the above. An NHMRC Scientific Forum on Wind Farms and Human Health held in June 2011 (a year after its Rapid Review) had four presentations from those regarded as experts in the area. Of significance is the wide divergence in the assessments presented. Those challenging the wind industry position included Dr Bob Thorne, whose expertise is in noise assessment and monitoring. In contrast to the wind industry position that there are no adverse impacts on people from wind farms, Dr Thorne stated that there is already peer-reviewed research on the deleterious effects of wind farm noise on people. Complaint histories to regulatory authorities are another form of evidence. For example, in the period April 2009 to March 2010, 906 complaints were made to Wellington City Council, New Zealand concerning the noise from the wind farm at Makara. The Te Rere Hau wind farm in New Zealand recorded 378 complaints over an 11-month period, and is the subject of a legal review of its compliance (Thorne, 2011).

Another presentation was from Professor Mariana Alves-Pereira from Lisbon, Portugal. Her team has been systematically studying the effects of infrasound and low frequency noise (<500 Hz) in both human and animal models since 1980, and more recently in relation to wind turbines. She makes the point that the dBA scale commonly used to measure audible noise de-emphasizes all acoustical phenomena below 500 Hz, and ignores infrasound. Her research work to date suggests that in-home infrasound and low frequency noise generated by wind turbines can lead to severe health problems.

The peer-reviewed journal the Bulletin of Science, Technology & Society of August 2011 is devoted to the issue of wind turbines and health, with papers from medical and other professionals such as those

in the noise measurement and assessment field. Robert McMurtry (2011), a former Dean of Medicine at the University of Western Ontario, puts forward a scheme for the diagnosis of adverse health effects in the environs of industrial wind turbines, in order to facilitate future research efforts. He reports that there was multidisciplinary confirmation of the key characteristics of the adverse health effects in the environs of industrial wind turbines at the first international symposium on this issue held in Ontario in October 2010.

The adverse effects include issues such as continuing sleep disruption, fatigue, annoyance producing increased levels of stress and/or psychological distress, headaches, tinnitus, ear-ache, difficulties with balance, cognitive impairments, hypertension, palpitations, nausea, and compromised quality of life. In addition, there is

a striking similarity internationally in the pattern of complaints, with a predictable pattern of symptoms with exposure to wind turbines, and amelioration when the exposure ceases. Additionally, there is a revealed preference for victims to seek restoration away from their homes.

In fact, telling primates (human or otherwise) that their reasoning architectures evolved in large part to solve problems of achieving dominance is a little like telling fish that their gills evolved in large part to solve the problem of oxygen intake from water. We swim in politics as a fish swims in water.

Denise Dellarosa Cummins

With respect to the number of people affected, John Harrison (2011) (Emeritus Professor in Physics, Queen's University, Ontario, Canada) states that wind turbines cause annoyance in about 20% of residents living within a distance currently considered acceptable by regulatory authorities, and that for many of this 20%, the annoyance and sleep disturbance leads on to adverse health effects. In addition, anecdotal evidence and field studies suggest that turbine noise has a character that makes it far more annoying and stressful than other sources of noise at the same A-weighted sound level. The characteristics of wind turbine noise are linked in part it is believed to the amplitude modulation associated with the blade passage past the tower. A "pulsing" infrasound and low frequency pattern able to be transmitted for longer distances enhances annoyance, and is readily able to penetrate walls and resonate inside rooms. Because wind farms are unique sound sources, and the sound propagation varies significantly under differing wind and weather conditions, Thorne (2011) suggests that full-time real-time monitoring of wind farms is required to check for compliance. Further, the complex character of wind turbine noise means that

compliance measures based on a specified noise number alone (e.g. a dBA level) will fail to address the noise issues.

It is apparent that the wind turbine issue has become very polarized with widely varying positions being adopted. Where noise problems are acknowledged, some academics such as Professors Simon Chapman at the University of Sydney and Keith Petrie at the University of Auckland subscribe to the mass hysteria ideas promoted by controversial British psychiatrist Simon Wessely. Such assessments primarily implicate people's fears and anxieties about new technologies to explain noise complaints and sleeping difficulties that appear in conjunction with wind farm developments. [I am not persuaded by such arguments, given the seriousness of some of the adverse health effects observed. In addition, some people are obliged for health reasons to move away from their properties]. At the other pole are people such as the US paediatrician Nina Pierpont (2009), whose proposed pathophysiology posits direct disturbance to the body's balance system, with low frequency noise or vibration stimulating the organs of the inner ear, and visual stimulation from moving shadows also acting in a discordant fashion. On the latter, residents' complaints sometimes extend beyond the noise and vibration issues, to visual factors such as blade glint and flicker, and the red glow from warning lights on the top of each tower (essentially light pollution).

Many unanswered questions arise, and much research remains to be done. The Senate report (2011) recommends as a matter of priority adequately resourced epidemiological studies on the possible impacts of wind farms on human health.

In addition, the committee recommends the development of separation criteria between residences and wind farms. Various health authorities have recommended setback distances in the range of 1.5 to 2 kilometres. McMurtry's (2011) schema for adverse health effects includes domicile within 5 km of industrial wind turbines as a criterion. Until the necessary studies are done, the Waubra

Foundation in Australia recommends a precautionary approach of 10 km. Thorne (2011) suggests that further detailed research is needed to establish setback distances.

Offshore wind farms are potentially one way of avoiding the noise issues linked to onshore wind turbines, but even here noise can be a problem, as sound propagates readily over water. Using an example with 64 offshore wind turbines, Harrison (2011) finds that for the "worst case scenario" the setback of the wind farm needs to be 20 km offshore. Denmark is looking to push the wind share of its electricity to 50% by 2025, with most of the additional power coming from offshore.

Over a thousand submissions were made to the Australian Senate inquiry (Senate Community Affairs References Committee, 2011, p. 67), with 535 being pro-wind farm, 468 being anti-wind farm, and 14 being neutral. It should be noted that those who are initially pro-wind farm can later switch to being anti-wind farm, after the wind farm is installed. According to the Acoustic Ecology Institute in the USA*, many people living near wind farms report that noise from large wind turbines is much more disruptive than they had been led to believe by project planners.

The need for a pragmatic approach to conflict management is perhaps best summarised in the following comment from the same institute: "If the thousands of wind farms likely to be built in the coming decade are placed too close to homes, the industry will be faced with an echoing chorus of complaints and resistance for years to come, even if it manages to invent much quieter machines. Better to be conservative,

accepting the fact that even occasional atmospheric effects should be factored in to siting decisions today, so as to build a reservoir of good will, rather than a rising tide of complaints".

Murray May

* <http://www.acousticecology.org/>

Three main drivers are sickening the global marine environment and all are a direct consequence of human activity: global warming, acidification, and a dwindling level of oxygen, a condition known as hypoxia.

We have underestimated the overall risks, and the whole of the marine degradation is greater than the sum of its parts.

Pollution has also taken a heavy toll, rendering the oceans less resilient to climate change. Run-off from nitrogen-rich fertilisers, killer microbes, and hormone disrupting chemicals, for example, have contributed to the mass die-off of corals, crucial not just for marine ecosystems but a lifeline for hundreds of millions of people, too. The harvesting up to 90% of some species of big fish and sharks, meanwhile, has hugely disrupted food chains throughout the ocean, leading to explosive and imbalanced growth of algae, jellyfish, and other 'opportunistic' flora and fauna.

*Marlowe Hood, The Canberra Times
22 June 2011*

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Wind energy debate

Some readers may be appalled to see two articles urging caution with wind farms, and may infer that I am anti-wind farm. In fact I am not. I first saw a row of wind turbines along a ridge in New Zealand many years ago, and thought it a wonderful and exciting sight. I also like the wind turbines across Lake George, on the way into Canberra.

Having visited a wind farm recently, I admit they are rather overwhelming. They are incredibly big. The only thing that worried me about them was the enormous amount of concrete they need to anchor them to the earth – but I assume the proponents have done their sums correctly, and the wind turbines produce far more energy than is used in their construction.

However the arguments about wind farms remind us that when it comes to energy, the only free lunch we are entitled to is that provided by a hunter gather life style. Our very first efforts to change from that lifestyle, the clearing of land and the development of farming started the long, and initially slow, chain of

events that has led to the current position in which we are endangering the whole planet.

It is possible that early wind mills, as in the Netherlands, had no adverse environmental effects. It is even possible that the miller and his family, who lived in the mill, were lulled to sleep by the sound of the sails rather than being annoyed by them. But almost all other forms of extra somatic energy had definite deleterious effects on the humans nearby. Even the humble fire can now be blamed for emitting cancer causing fumes.

Once industrialisation really got under way, humans really started to suffer from the black and grimy effusions from industry. Poor people in particular have suffered from proximity to many forms of energy production.

Likewise many people have suffered and are suffering from the noise from railways, roads, aircraft. There is no doubt that some people are much more affected by noise, or any nuisance, than others are. Their discomfort and disease, should not be scoffed at or ignored.

Today there are objections to every form of alternative energy you can name, wind, tidal, coal seam gas, hydro, biofuels, solar, nuclear. The objections to each are known, and to a large extent valid. This would leave us dependent on coal and oil; but the objections to these are even more known and valid.

What should we do? The public, economists and governments are going to have to face the fact that we cannot go on producing more power, and more people.

That way lies destruction. We need to concentrate on producing less, consuming less. Fewer people each consuming less could give the planet a chance to recover from our depredations.

Jenny Wanless

Sustainability

Sustainability means not turning resources into junk faster than nature can turn junk into resources.

Steve Goldfinger

Farrago

Rare earths

There are a number of elements known as rare earths, transition metals and metalloids, some with names that are beginning to sound familiar: neodymium, erbium, tellurium, hafnium, tantalum, technetium, indium, dysprosium, lanthanum, cerium, europium, terbium and yttrium. With names like that they seem to be crying out for a poet to laud their virtues.

In fact without them our technological society would grind to a halt. They are essential components in the batteries in wind turbines, they enable touch screens and mobile phones to work. And they get thrown away whenever any of these devices are thrown away.

At present China is the major or only supplier of most of them. It is not that they are genuinely rare, they occur around the world, but usually in low concentrations, difficult to mine and process. Europium and terbium could be in short supply in just a couple of years, and the demand for yttrium outstripped supply last year. Tantalum is notorious because mining for it is endangering the mountain gorillas.

[Editor's comment - If anything should make us take the idea of manufacturing to make the recovery of components easy, rather than throwing away so much of value, these elements should be the spur. They should also remind us that expecting technological advances to rescue our over-consumptive society is a vain hope. We are quite capable of over consuming any resource.]

New Scientist, 18 June 2011

Nitrogen fertiliser

Industrially produced nitrogen fertiliser has been helping to feed at least half of the human population for many years, but this benefit has come at a heavy cost to the environment. Nitrogen pollution in Europe costs each European citizen about \$1000 per year. About forty per cent of that is to repair damage.

Somewhere between forty and seventy per cent of the nitrate applied to soils is washed into freshwater streams or the ocean. There it nourishes algae, causing blooms that suffocate aquatic life and generally lowering water quality.

New Scientist, 7 May 2011

Natural nitrogen fixers

Legumes are famous for fixing nitrogen from the air, so are often used in crop rotations to maintain soil fertility. Their ability to fix nitrogen stems from a symbiotic relationship with nitrogen fixing soil bacteria, called rhizobia, a relationship that evolved about 60 million years ago

Since 1909, when Fritz Haber developed his industrial method of fixing nitrogen from the air to make ammonia, farmers have become reliant on industrial fertilisers, but now there is some interest in engineering other food crops to copy the legumes.

The signalling network used by legumes to communicate with rhizobia is similar to the signalling systems cereals use with the soil fungi that deliver other nutrients to their roots. They are essentially signals from the fungi that say 'let me in'. Links

between land plants and fungi stretch back 400 million years. Maybe rhizobia used this old fungal signal to trick their way into legumes.

If these signals can now be tweaked in some way to get the plant defence system to allow colonisation of the roots, it may be possible to get fungi to produce nitrogen supplies for cereals.

Another way to achieve this could be to find other plant dwelling bacteria which already fix nitrogen, but do not need to form nodules. A number of such bacteria that reside in grasses are already known. The most

productive ones found so far are in Brazilian sugar cane; possibly they could be persuaded to cohabit with cereal crops.

New Scientist, 7 May 2011

The primary function of government in a post-growth society will be to protect, expand and enrich our social, cultural, and natural capital... In a post-growth society, the measures of achievement will be more diffuse and will tend to focus much more on the development of each person's inner potential, creativity and social contribution... so society will inevitably be less competitive... Instead of higher incomes, the central objective of a post-growth society is to provide opportunities for human fulfilment and self realisation. Pursuit of wellbeing... individuality and the flowering of human potential... opportunity for intellectual and cultural growth...

Clive Hamilton, Growth Fetish

Dumping oil rigs

There will be about 6500 old oil rigs to dispose of by 2025. International treaties generally stipulate that these must be removed from the ocean at the end of their productive life. This means severing the rig from the sea floor, raising it on a large vessel and disassembling it on land, leaving the ocean floor as it was. This is labour intensive and costly.

There is another school of thought, that rigs with their superstructure removed could be toppled on their side, or towed to new locations, to make handy new reefs. These would provide new habitat, and could be stepping stones, as it were, for species displaced by warming oceans. They would protect areas from bottom trawling and the environmental damage that causes. They could protect long lived, late maturing, endangered species such as orange roughy.

The Department of Resources, Energy and Tourism has drafted a public discussion paper on rig decommissioning as a first step in developing a final policy for the disposal of Australian oil rigs as they reach retirement age.

Ashley Fowler et al,
Australasian Science, July/
August 2011

Gorilla lessons

Whatever you think of keeping great apes captive, we could certainly learn a lot from them. Koko, a forty year old, 140 kg lowland gorilla, resident in California, has a working vocabulary of more than 1000 signs, and also understands about 2000 spoken English words. As well as using sign language, Koko uses communication cards, books and multimedia, and watches films. She describes herself as a 'fine person gorilla'. She can make up phrases to name things for which she does not have a name.

However possibly the most impressive, and certainly the saddest piece of communication at the Gorilla Foundation where Koko lives was by a previous male gorilla called Michael. He used sign language to tell researchers that his mother had been killed. His signs said 'squash meat gorilla. Mouth tooth. Cry sharp-noise loud. Cut neck.'

The Canberra Times, 26 September 2011. For more on Koko, see www.koko.org

Out with bottled water

Greg Stewart was one of the students taking part in an Innovations class in April 2010 at the University of Canberra. The group was challenged to come up with a product or service that would be good for the community.

Greg had the idea that they could get the University community to do without bottled water. They sought the support of the University Sustainability planner, other students and the campus businesses in their plans. The skills of students in industrial design and marketing were enlisted, business support and their agreement to take part were essential.

After a year of hard work, and a two month phase out period for bottled water, the University declared itself a bottled water free environment on World Water Day in March this year. The former sales of

140,000 bottles of water per year have ceased. Attractively designed durable water bottles are available. There is an increased supply of fresh, free drinking water through bubblers and refill stations offer a choice of chilled water, some sparkling or flavoured.

The University of Canberra Monitor, 2011

Hepburn wind

The Hepburn Community Wind Farm in Victoria is Australia's first community owned wind farm. It is the outcome of an initiative by the Hepburn Renewable Energy Association back in 2005 when members were frustrated by the slow pace of Government action on climate change. Hepburn Wind launched its share offer in July 2008.

The co-op now has nearly 1600 members, who between them have invested more than eight million dollars. The co-op is very democratic, with each member having an equal vote. The first two turbines, with a combined capacity of 4.1 megawatts have been erected near Daylesford.

It is intended that In addition to generating a return for investors, a portion of the profits will go towards supporting local projects. Hepburn Wind is creating the Community Sustainability Fund that will invest in local sustainability initiatives over the next 25 years.

Aim High, Australian Ethical, Winter 2011

There are large areas not in use for housing, food production or industry. They are environmentally barren, mediocre aesthetically, free of wildlife, dogs, children's play areas, or opportunities for healthy, strenuous exercise. Few people can be seen on these areas at any one time.
If green belt must be built on, surely golf courses should be the only sites under consideration.

Mary Work
Letter to Daily Telegraph, UK
Sept 2011



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 25 November 2011.

Contributions may be sent on paper or electronically - electronic submission is preferred.

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

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.

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