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Pathways to a Sustainable Future

Mark Diesendorf[1] reviews two books which assess ways of protecting our environment.

Paul Hawken, Amory B Lovins & L Hunter Lovins, *Natural Capitalism: The Next Industrial Revolution*, London: Earthscan, 1999, 396 pp, ISBN: 1 85383 461 0, $37.95 PB

David Yencken & Debra Wilkinson, *Resetting the Compass: Australia's Journey Towards Sustainability*, Melbourne: CSIRO Publishing, 2000, 400 pp, ISBN 0 643 06385 4, $39.95

Is the biosphere essential?

There is a commonly held view that protection of the natural environment is purely a matter of aesthetics and ethics. As a result, most politicians treat it as an insignificant issue, compared with oiling the wheels of the economy. Most neo-classical economists, who believe that they are engaged in a value-free enterprise, dismiss it entirely. For the majority of Australians, who have little experience of undamaged bushland or pristine beaches, the environment is a picture postcard from Club Med or a Wilderness Calendar evoking an unattainable Garden of Eden. Far greater reality is given to the technological achievements of the industrial society: skyscrapers, jumbo jets, Holdens, space travel, antibiotics, heart transplants and personal computers. Rapidly entering from the wings are genetic engineering, new materials and nanotechnologies. Where on this crowded stage is there room for all that green stuff?

This question has been addressed by an experiment costing hundreds of millions of US dollars. In the heart of the Arizona desert, sealed under a cluster of huge glass domes, scientists and engineers have attempted to 'create' a kind of self-sustaining mini-Earth, containing a variety of representative species and ecosystems, including a tropical rainforest, an ocean with a coral reef, a desert, a wetland and a savanna. This ambitious project is called Biosphere 2, where Biosphere 1 is of course our own Earth.

In 1991, eight scientists entered the dome complex to try to live entirely off the land. Carbon dioxide levels gradually increased, oxygen levels decreased and other environmental conditions changed as well. While cockroaches thrived and various other life-forms continued within the domes, many species died off. For their own survival, the scientists had to leave the domes before the experiment could be completed.

Biosphere 2 confirms what ecologists and anthropologists have learned from other sources of evidence. Despite our truly marvellous technological achievements, we humans are totally dependent for our survival upon the pre-human biosphere. The biosphere is a complex

system of interacting species and habitats, more than the sum of its individual parts. Yet we humans are blithely changing the Earth's climate, removing the atmospheric ozone shield that protects us and all life forms from harmful ultraviolet light, destroying the soils, polluting the atmosphere and waterways, depleting the artesian waters, changing the face of the land, and mixing genetic material from species that cannot breed together naturally. Through the destruction of habitat from agriculture and suburban sprawl, the release of feral animals, the dissemination of harmful environmental chemicals, hunting and fishing, and permitting corporate control over genetic resources, we are driving to extinction countless species, both known and unknown, both cuddly and ugly, and are disrupting ecosystems and delicate cyclic mechanisms that have evolved with the Earth over billions of years. In the words of epidemiologist and environmental health scientist, Tony McMichael, we are destroying the pillars of our own life support system.

Ultimately the economic and social well-being of our societies depend upon the health of the biosphere. For hunter-gatherers this was easy to see. If they collected or killed too much of their food resources or polluted the land that supported them, they died. To avoid such a fate, Australian aboriginal tribes chose not to take exactly the same routes and camp sites on their seasonal journeys, harvested tubers and fruits without destroying the mother plants, and protected species through their system of totemism.

But, for the inhabitants of industrial societies, the connections are not so easy to see. Electricity, a high-grade form of energy, which can be used for heating and cooling, lighting, running machinery and electronic equipment, comes out of clusters of little holes in the walls of our homes. We are only dimly aware that behind the power points are power stations burning coal dug from the ground, and that this combustion produces in our atmosphere an invisible blanket of greenhouse gases which is growing denser, letting through the incoming rays of sunshine, while absorbing the outgoing infra-red radiation from the Earth.

Two approaches to ecologically sustainable development

Like Australia's *State of the Environment Report (SoE Report)* of 1996, *Resetting the Compass* documents these and other impacts of humans on their environment. It discusses the main forms of human pressure on the environment -- population, consumption and technology -- and the main environmental issues: flows of energy, materials and wastes; human settlements; the atmosphere; land and inland waters; biodiversity; estuaries; and the sea.

The authors of the SoE report were not permitted to recommend policy options and practices for saving the Earth and its destructive human inhabitants. That could be politically embarrassing for governments of both major parties, which are highly responsive to the demands of the most environmentally destructive industries: energy, agriculture, motor vehicles, mining and metals. Unlike the SoE report, *Resetting the Compass* indicates in broad terms the kinds of changes that are necessary for moving onto a sustainable development pathway. Although it does not classify the actions according to implementing groups, it is clear that most of the actions considered in *Resetting the Compass* would have to be implemented by governments, either Federal or State. Unfortunately, the important role of local governments is not addressed explicitly.

Like the SoE Report, *Resetting the Compass* is not a one-day read. Rather it is a valuable reference book that is suitable for secondary and tertiary students, teachers, lecturers, environmental activists, environment managers, politicians and public servants.

While *Resetting the Compass* approaches sustainable development mainly in terms of actions by government, *Natural Capitalism* takes mainly a business approach. It is a sequel to *Factor Four*, which was published in 1997, presenting a convincing case that goods and services could be produced profitably with one-quarter the materials and energy use of present production. However, even in as that book was being printed, case studies were being identified of factor 10 improvements.

Natural Capitalism does not dwell on the environmental crisis. Rather, it motivates the business reader by pointing out the need for "the next industrial revolution". It argues that

> "capitalism, as practised, is a financially profitable, nonsustainable aberration in human development... It liquidates its capital and calls it income. It neglects to assign any value to the largest stocks of capital it employs -- the natural resources and living systems, as well as the social and cultural systems that are the basis of human capital."

Existing capitalism is contrasted with Natural Capitalism, which is defined to be capitalism "as if living systems mattered". It seeks 'win-win' solutions for which ecological and economic sustainability can be achieved together. It offers a business strategy that "will gain decisive competitive advantage through the rational employment of resources, money and people. The essence of the book is

> "the thesis that 90 to 95 percent reductions in material and energy [use] are possible in developed countries without diminishing the quantity or quality of the services that people want...The secret of achieving large savings in such a chain of successive steps is to multiply the savings together, capturing the magic of compounding arithmetic. For example, if a process has ten steps, and you can save 20 percent in each step without interfering with the others, then you will be left using only 11 percent of what you started with..."

Natural Capitalism has case studies on an advanced motor car technology called the 'hypercar', industrial wastes, manufacturing industries, buildings, fibres, food, water and climate. These case studies offer the strongest motivation for the business reader: the potential for substantial cost savings combined with greatly reduced environmental impact. Other motivations include:

- reducing the risk of consumer boycotts and legal actions;
- securing product differentiation and market advantage for products and services made in environmentally sound and socially just ways;
- enhancing consumer loyalty by meeting community expectations for better practice.

(Diesendorf in Dunphy, 2000).

Despite its substantial contents, *Natural Capitalism* is so well written that it can be read in a few sittings. It is inventive, gripping, and has many quotable quotes. So, why is it that so few of the authors' excellent technological solutions are actually being implemented?

In a book which frequently uses words like 'business opportunities', 'efficiencies', 'innovation' and 'profits', one cannot expect to find an analysis of the power structures opposing efficient energy use and renewable energy, or the agribusiness. That the authors are aware of these forces can be seen by the numerous references to subsidies to environmentally damaging industries. Clearly, community action is needed to push governments into levelling the playing field. Without the security of changes being set in place by legislation or environmental tax reform or institutional change, many businesses will be reluctant to invest in new ways of doing things. Similarly, many of the authors' examples of highly efficient technologies and systems would need some measure of coordination and planning across industries. They are unlikely to emerge if left to the market. If government will not play the role of planner and coordinator, who will? However, perhaps in order to sell their excellent product, 'natural capitalism', the authors of that book have played down the political role of powerful businesses, industries and peak organisations, such as chambers of commerce and business councils, in impeding ecologically sustainable and socially just development and the need for government action to help create the social and organisational structures and infrastructure that will foster such development.

As an example of what Australia could do about a major environmental issue and the different approaches taken by each book, I now consider global climate change resulting from the human-induced greenhouse effect.

Climate change

There is no serious scientific controversy questioning the observations that the levels of greenhouse gases (GHG) in the atmosphere are increasing and that a substantial part of this increase results firstly from burning fossil fuels and secondly from land clearing. It is also uncontroversial that, if this increase continues, it will result in significant climate change involving increases in global average temperature, changes in rainfall patterns, and increases in the frequency and magnitude of extreme events such as hurricanes and droughts. Indeed, it is already observed that the temperature of the Earth's surface has increased by 0.6C over the 20th century. The principal uncertainties are about how the rapidity and local impacts of these climate changes.

In 2000 it was announced that Australia's 1998 GHG emissions had already reached 117% of the 1990 level, compared with the official national target of stabilisation of GHG emissions at 108% of the 1990 level in 2010. Both these weak targets should be seen in the context of modelling by the Intergovernmental Panel on Climate Change, which suggests that, to stabilise atmospheric concentrations of GHG, emissions by the rich countries may have to be reduced to 10-20% of 1990 levels by some time in the second half of the 21st century. It is my view that, based on continuing improvements to existing technologies, such a long-term target is technically feasible, although it appears to be very expensive at present.

A feasible medium-term target for Australia, based on small improvements to existing technologies, is a reduction to 50% of the 1990 emission level by 2030. This target is similar to Denmark's official target for 2030. However, since Australia is currently far less efficient in its use of energy than Denmark, it could achieve greater cost-savings in achieving this target. By the time the 50% target is achieved, the technologies required for a 10-20% target will be much less expensive. Furthermore, if realistic values of the environmental and health costs of burning fossil fuels are included in their prices via carbon taxes, even the 10-20% target may be already cost-effective.

A genuine greenhouse response strategy would aim to implement institutions, practices and technologies that enable both short-term and long-term GHG reductions to be achieved simultaneously. Unfortunately the emphasis of the Federal Government has been on short-term measures with limited long-term potential for reducing GHG emissions -- e.g. burning 'waste' timber from the logging of native forests, and building a conventional form of tidal power station in the remote north-west of Australia. Is this to avoid disturbing the coal industry?

The approach of *Natural Capitalism* is to emphasise the role of industry in increasing profits by using energy more efficiently. The evidence that this can make a substantial contribution is already extensive for electricity and heat use. Much of it has been assembled previously by Lovins and his colleagues, e.g. in *Factor Four*. However, in the field of transport, the approach of reassuring business leads to excessive emphasis on perpetuation of the car as the principal mode of passenger transport, albeit in the more efficient form of the hypercar. The well proven and more effective approach, of discouraging the use of the car and increasing the use of mass transit, cycling and walking in our cities, is relegated to an afterthought.

An overall strategy for achieving my proposed 2030 target is quite simple to state, although some measures will be politically difficult to implement. In general, the economic savings achieved by substantial increases in the efficiency of energy use and the removal of subsidies to inefficient energy use will be used to fund the transition to an energy supply system based on a mix of renewable energy and natural gas sources for electricity and heating/cooling. For example, the economic savings achieved by reducing future investment in land and infrastructure allocated to car use within cities can contribute to the funding of improved public transport and facilities for cycling and walking. Moreover, some of the urban land currently allocated to motor vehicles can be reclaimed for public transport, especially bus lanes and light rail, and for human powered transport (walking and cycling). New institutions will be required to ensure that the economic savings are actually used to fund the cost of the transition. In the long term, additional funding for a more sustainable energy system would come from a carbon tax or charging for tradeable emission permits.

Since market failure is endemic for environmentally sound practices in the energy sector, the community must insist that governments assist the transition by removing the barriers and providing appropriate infrastructure, laws, institutions, planning processes, pricing signals, funding and education/information. However, because they reinforce one another, the benefits of implementing the whole package, or most of it, are greater than the sum of the benefits of each action taken in isolation. Natural Capitalism needs reinforcement with government action to shape the market. Then, when people are given real choices, they will respond.

Resetting the Compass discusses greenhouse responses in parts of three chapters. The chapter on Energy reviews energy use and energy reserves in Australia, the environmental impacts of different energy sources (mislabeled 'uses'), the energy efficiency of the Australian economy, pollution reduction by fuel switching and efficient energy use, and broad policy measures for reducing environmental impacts. The chapter on Atmosphere (which also deals with air pollution and stratospheric ozone depletion), reviews greenhouse science, mentions that "the Australian Government is pursuing policies that enable Australia to increase its greenhouse gas emissions" and summarises additional technical measures for using energy efficiently and reducing the greenhouse impacts of transport. The chapter on the Sustainability of Settlements discusses *inter alia* the role of public transport and urban form.

Conclusion

There is little overlap between the two books and both are excellent investments for those who wish to become better informed about environmental protection. Although *Resetting the Compass* has a greater emphasis than *Natural Capitalism* on the non-technical barriers to greenhouse response and broad government policies to overcome them, neither book is strong in proposing specific policy options and actions for each sphere of government. This is addressed for transport and urban form in books by Newman and Kenworthy (1999) and Newman, Laird, Kenworthy and Bachels (2001), and for both energy and transport by work in progress at the Institute for Sustainable Futures (e.g. Diesendorf, 2000).

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