

Futurewatch

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New Zealand

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Environment

Climate change

From the Research - A. Ice

K. Kawamura et al report, *Nature*, 23 August, 07, pp. 912-913, that a new chronology of Antarctic climate change over the past 360, 000 years supports theories that “insolation” in the higher northern hemisphere latitudes is the driving force for climate cycles in Antarctica covering the last four interglacials, with a southern phase lag of a few millennia.

D. G. Vaughan, R. Arthern, *Science*, 16 March, 07, pp.1503-1504, explain that the difficulties in predicting ice sheet behaviour, especially in Greenland and Antarctica, have to do with process at the margin and base. The transience and complexity of water flow friction and sediment formation beneath the ice streams challenge scientific ingenuity, while theories about the boundary where the ice sheet begins to interact with the ocean is open to constant revision.

M. Truffer, M. Fahnstock report, *same issue*, pp. 1508-1510, that satellite data show that ice sheets can change much faster than is commonly appreciated, with worrying implications for their stability.

Space climatologist **J. Hansen**, *New Scientist*, 28 July, 07, pp. 32-34, (reported from *Environmental Research Letters*, doi:10.1088/1748-9326/2/2024002), argues for policy changes now to restrict global warming to less than one degree above year 2000 temperatures. Studies on the rate of change of ice sheet behaviour show a number of feedbacks which collectively could be impossible to stop if the current policies affecting greenhouse gases and resulting temperature rise are pursued. Additional global warming of 2-3 degrees are expected to cause local polar warming of about 5 degrees over Greenland, leading to disintegration of the ice sheet. The West Antarctic ice sheet is more vulnerable because it can also be attacked by warming ocean waters. Hansen has scientific support, *Science*, 8 June, 07, pp. 1412-1415, in raising public concern about the moderate tone of the recent IPCC fourth report 07. They agree with the factual basis but consider that the language fails to get across a coherent statement of risk for decisions by policymakers.

S. A. Zimov et al, *Science*, 16 June, 06, pp. 1612-1613, examined the effects of increased carbon concentrations in the permafrost in the steppe-tundra of northern Siberia and Alaska, which incorporate depths of "yedoma", a loess soil from the last ice age containing large amounts of carbon-rich vegetation and animal bones. Current increases in permafrost thaw are causing the "yedoma" to release its carbon over the next century.

G. Walker, *Nature*, 12 April, 07, pp. 718-721, reports on studies from various centres investigating the permafrost, which, while not complete, support the picture that the "refrigerator of the far north" is being unplugged, and the scenarios of 90% of the permafrost disappearing by 2100 are reasonable. Some feedback loops such as increases in moss cover could slow the reactions, while decomposition in oxygen-free lake depths will produce increased methane.

Sinks

P. Hogberg, *Nature*, 14 June, 07, pp. 781-782, explains the latest analysis on the role of boreal and temperate forests as carbon sinks. The relationship of carbon and nitrogen in forests is complex, but overall trials are showing increase in growth in these forests, especially if less affected by major pollution. However it is the carbon balance, the net ecosystem production (NEP) between ecosystem carbon fixation through photosynthesis and its release back into the atmosphere through plant and soil respiration, which is crucial. While some forests are found to be carbon saturated, overall many higher latitude N. Hemisphere forests still have carbon absorption capacity.

Oceans

Q. Schiermeier, *Nature*, 3 May, 07, pp. 522-524, reports that turbulence, or mixing, of oceanic waters was not much considered by the climate models, but data show that this is not a simple process, with some major puzzles. Climate change models might need considerable revision, especially regarding the impacts on the thermohaline conveyor which moves warm water north through the Atlantic.

C. H. Greene, A. J. Pershing, *Science*, 23 Feb, 07 pp. 1084-1085, describe research into the effects of an atmospheric regime change in the Arctic Ocean during the 1980s-1990s which led to changes in the circulation of the ocean currents. These included an increase in the inflow of relatively warm, high salinity water into the Barents Sea, north of Scandinavia and Russia, and an increase in the outflow of relatively low salinity water into the North Atlantic, south along both coasts of Greenland, with significant impacts on the ecosystems in these waters.

Air

Nature, 3 May 07, p. 511, reports recent findings that seabird colonies are the largest concentrated sources of atmospheric ammonia, though overall their output is exceeded by livestock, synthetic fertiliser and oceans. The penguins are the largest contributors in Southern Ocean below latitude 45 degrees.

P. Pilewskie comments, pp. 541-542, **V. Ramanathan et al** report their research into the warming trends in Asia amplified by brown cloud solar absorption, *Nature*, 2

Aug, 07. Atmospheric solar heating is problematic since some effects are cooling. Their studies in the atmosphere at several levels above the Indian Ocean show that the brown cloud resulting from biomass burning in the dry season and fossil fuel consumption is warming the upper atmosphere twice as much as on the Earth's surface. This may be why the elevated areas of the Himalayan glaciers are retreating.

R.A. Kerr, *Science*, 2 March, 07, p. 1217, reports on several studies, particularly using models, which reveal much wider impacts of aerosol based brown cloud than had previously been realised. Mostly originating in Asia, the aerosols, by their heating and cooling effects, can increase rainfall in Australia, slow the cooling of the warm-water currents flowing north through the Atlantic, increase the warmth in southern Europe in season and central and north-eastern Asia.

Responses

R. Pielke et al, *Nature*, 8 Feb, 07, pp. 597-598, call for a focus on adaptation policies to climate change, along with greenhouse mitigation. The recent **Stern Review on the Economics of Climate Change** and the **IPCC Report** support this focus which has been a taboo for over a decade. The timescale demands that while mitigation is essential it will take a long time to take effect; rapid population is affecting coasts and water supplies resulting in unsustainable developments; and those who will suffer the most from climate change impacts are demanding an international change to the promotion of resilience in vulnerable societies.

J. Lovelock, The Revenge of Gaia, Penguin, 06, agrees that clusters of positive feedback mechanisms will produce a vicious attack of accelerated global warming. Sustainable development is an appeasement which will not serve. Fossil fuel consumption must be stopped now. We must behave as if Earth is alive and respect its system of boundaries and restraints. He explores some of the Earth's cycles of warmer and cooler climate for relevant insights. As the major alternative energy source for fossil fuel, Lovelock argues strongly for nuclear power; fission at present, and fusion possible a few decades hence. This would form the basis for a transition period towards a heavily populated planet operating in a more Gaia-friendly and healing mode.

Eds **W. N. Adger et al, Fairness in Climate Change**, MIT Press 06, examine the prickly issues of finding meaningful solutions as the injustices of climate change compound the present global inequities bearing heavily on the most vulnerable, together with a number of National Adaptation Programs of Action.

Scaling Up: Global Technology Deployment to Stabilize Emissions, **F. Wellington et al**, World Resources Institute, 07, offers a coherent vision combining the technologies available, the investment required and the policies which can offer the most effective incentives. It builds on the framework of "wedges" of manageable technologies devised by **Pacala and Socolow**.

"Geoengineering" the climate through artificial modifications is a controversial approach though strongly advocated by some scientists, *Nature* 17 May, 07, pp. 132-136. "Radiation management" to block some of the sun's radiation from reaching Earth is receiving particular attention. This would put several million tons of sulphur into the upper atmosphere annually, producing long-lived aerosols to cool the climate and buy time for other emission reductions.

Time, 19 April, 07 Double Issue (Pacific edition), **The Global Warming Survival Guide**, offers 51 things you can do to make difference.

Regional and national

International political scientists **E. Economy, K. Lieberthal**, *Harvard Business Review*, June 07, examine the constraints imposed in Chinese economic growth by its environmental risks. China's Environmental Protection Agency (EPA) in a 2006 report, estimated this cost at 10% of GDP annually. Multinational companies doing business in China need to factor this into their strategies, to avoid nightmares ahead. The four major environmental challenges are water, energy, soil erosion and air pollution. Population impacts in terms of morbidity, ill health, need for migration and resulting social unrest present further political challenges.

The major hurdle to improvement lies in the political structure, not only in the top level, but in the freedom allowed to the local officials to be entrepreneurial. Building in financial incentives for environmental protection has had limited success, but foresightful multinationals can win local official support and help environmental protection by policies and opportunities to encourage change.

L. Xue et al were members of a Chinese-International expert Task Force on Environmental Governance, commissioned by the official advisory China Council for International Cooperation on Environment and Development. Summarised in *Environmental Politics*, August 07, are their twenty-five recommendations. The Government has set an objective for 2020 of quadrupling GNP while maintaining social equity, in which a healthy environment is equally important. The Task Force recommendations require major changes in four main issue areas:- government capacity to enforce laws and oversee implementation of environmental programmes; engaging the business sector in environmental management; engaging civil society, through greater transparency of information about environmental conditions and government decisions; and establishing domestic and international policy coherence and capacity.

State of the Environment in Asia and the Pacific 2005: Synthesis: Economic Growth and Sustainability, UN ESCAP 06. This overview includes the Pacific Island states and Australasia. It strengthens the linkage of sustainable development to the dominant Asian imperative of economic growth, while noting the increasing pressures which are aggravating environmental degradation and risk. It urges greater focus on eco-efficient production and consumption and investment and more effective decision making at all levels, plus true measures of sustainability. The unique challenges of population pressures for the fragile, narrow-resource based Pacific Island States are noted.

Australia is facing a national crisis which could transform the country, changing where people live, their food and leisure activities as well as their economic well-being. Adaptation is problematic, a challenge also for other critical areas in SW US and SW China. Rainfall has increased in the North over the century, while temperatures rises have been accelerating for the past two decades. Some of this is natural variation, but it is intensifying in frequency. Perth, Sydney, Melbourne and BHP are completing or planning desalination plants at huge cost in money and energy requirement. "Water will still come out of the tap, but at what cost?" asks a leading climatolo-

gist. Population growth is starting to be questioned. *New Scientist*, 16 June, 07, pp. 8-11.

Business Review Weekly, June 7-13 07, pp. 31-36, reports on the effects of the climatic change to farms, tourism and economies in the richly-productive Murray-River system. Current water-efficiency may not be enough for long term survival; plans are moving into severe restriction scenarios for beyond 2008.

P. Toohy, *Sydney Bulletin/Newsweek*, 31 Oct, 06, pp. 31-38, reports on a visionary proposal by an Australian Senator to develop a new migration to the North, to the areas sustained by the monsoon rains. A new Ministry of Northern Development and Water with the intellectual firepower and adequate budget will be needed. Water is power and it should be controlled nationally, not by states. Cattle growers, both Aboriginal and others, are already moving strongly to develop northern grazing lands. Sound research will be needed for development, maintenance and preservation of the environment and the production systems. There are huge issues regarding risks:- cyclonic weather, fire and pests.

Wet or Wonderful

The Silent Deep: The Discovery, Ecology and Conservation of the Deep-Sea, **T. Koslow**, Univ. of Chicago Press/Univ. NSW Press 07, provides insight into one of the major ecological challenges to our understanding of planetary biodiversity, and the potential human impacts, which will be compounded by the effects of climate change on the abyss.

Solving the Crisis in Ocean Governance: Place-Based Management of Marine Ecosystems, **O. R. Young et al**, *Environment*, May 07. Awareness that the growing crisis in marine ecosystems is largely because of failures in governance. Support is growing for a practical approach, place-based management; a strategy which manages all the human activities occurring in specially demarcated areas, taking into account biophysical, socio-economic and jurisdictional aspects, which this specialist group from Univ. Calif. Santa Barbara describes.

World's Water 2006-2007: the Biennial Report on Freshwater Resources, **P. Gleick et al**, Island Press, 06. Contains chapters on:- water and terrorism; preserving and restoring instream water allocations; seawater desalination; floods and droughts; environment and water; and water risks facing business and industry. Additional water briefs on a range of topics include the growth of bottled water and water on Mars, plus many data tables.

T. Bennion notes that water allocation in NZ is now a contested issue, as farming activities are polluting important waterways while irrigation is competing with hydro development. Maori interests are concerned since their customary rights under the Treaty of Waitangi include both use and stewardship. Market mechanisms are generally seen as likely to advantage a wealthy minority. *Te Karaka Koanga*, 06.

The Silicon Cycle: Human Perturbations and Impacts on Aquatic Systems, **Ed, V. Ittekkot**, et al Island Press, 06. Silicon is the most abundant component of the Earth's crust, and a special international scientific team is investigating the human impacts of the cycle as it reaches the waters and oceans. It is essential for formation of shell material in the minute creatures such as the planktonic community, which are the

base of the aquatic food chain. Eventually the disturbance of this cycle could affect carbon absorption and atmospheric oxygen.

Mind Expanding

The environmental problem of the disposable nappy is challenging enough for landfills, but eco-conscious parents and technological innovations are finding solutions. Besides old fashioned cloth, there's an Australian product, the (almost, at 68%) biodegradable nappy, made from renewable plantation wood pulp, chlorine-free, with cornstarch bio-plastics. *Ecos*, April-May 07, pp. 30-31,

Beavers are making a comeback in the European ecosystems, as ecologists realise that the animals are natural ecosystem engineers, *New Scientist*, 25 Aug, 07, pp. 42-45. They build waterworks which create habitats for wildlife, boost water quality and reduce the threats of droughts and flooding. The cherishing of special trees only needs some chicken wire protection.

C. J. Dolan, *Scientific American*, June 07, describes a more grandiose plan to restore the animals that disappeared from Pleistocene North America over thirteen thousand years ago. Their relatives are found today in other regions. Cheetahs, lions, elephants and mammoths all could become free-living (though some might need winter quarters) in reserves and be beneficial for ecosystems since the loss of these megafauna from the global food chain resulted in an explosion of animals further down, such as monkeys and ants, whose predations destroy the ecosystems.

Infinite Nature, **B. R. Hull**, Univ. Chicago Press, 06. To avoid the trap of environmental fundamentalism which can polarise the reframing of our current dilemmas, there are twelve ways to map the terrain of nature and values:- anthropogenic; evolving; ecological; finite; healthy; fair; spiritual; human; rightful; aesthetic and moral.

Economics/Business

Economic thinking and rethinking

A. Offer, Oxford economics professor, **The Challenge of Affluence**, OUP, 06, (interview, *Challenge*, March-April 07), examines the question of why increasing wealth does not make people happier. He argues that it is not about how much people have or how little, but that well-being is about managing one's life over time. This means finding a balance between the desires of the present and the rewards of the future; in economic terms, exponential discounting. Psychological research indicates that people do not evaluate the future in these terms, but rather have a myopic, short-term focus, and their choices are time-inconsistent. Since calculating best choices is difficult, humans rely on societal conditioning to strengthen their commitments. Commitments are also costly which is why the rich are better able to develop commitments about overeating than poor people. As new temptations arise there is a time lag since the societal determination may not have developed.

Our ultimate objective is to feel good about ourselves, which is sustained by the authentic approbation of others, leading to reciprocal relationships he calls "the economy of regard". Even in the most advanced economies our greatest satisfaction in dollar terms comes from outside of the market, eg in the raising of children. Education has

increased choice and well-being overall but there are negative consequences, especially for children. Over the past fifty years the mental health of young people has measurably been affected.

E. Wolff, A. Zacharias, *Challenge July-Aug 07*, argue that wealth inequality needs to be factored into any measurement of income inequality. The principal components of household wealth, assets such as homes and retirement assets, do not generate current income but they are significant for household economic security or well-being. For those at the bottom of the economic ladder negative net worth, indebtedness is a serious economic problem which does not appear in the standard income measures, and this factor has many flow on factors which add to negative security. The authors apply this argument to the picture of economic well-being in the US over the 1980s and 1990s, relating to the wealth of the rich, the level of overall inequality and the disparities among racial and age groups.

J. Stiglitz, Nobel economist, **Making Globalisation Work**, Penguin/Allen Lane/W. W. Norton, 06, surveys the iniquities of the global economy, and the mechanisms by which the developed nations exercise dominant influence over many developing ones. The result is destabilisation:- economic and political, which affects us all. After assessing prospects for fairer terms for those worst affected he offers some proposals, including increased funding for development and spending to draw economies out of their downturns, and argues for a global reserve currency to avoid the problems of the US dollar.

Greening economies and business

More radical alternatives for economies not grounded in growth, from leading exponent, **M. Albert**, **Realizing Hope; Life Beyond Capitalism**, Zed Books, 06, develops his ideas about Parecon, participatory economics. This is based on a concern for human-well-being and development which respects ecology. The market is replaced with workers' and consumers' councils which interact to arrange the quantity of goods and services to be produced.

Alternative Currencies as a Challenge to Globalisation: A Case Study of Manchester Local Currency Networks, **P. North**, Ashgate 06., is a very closely researched study, not only of the case study, but of worldwide global alternative trading currencies and their role in a possible democratic, decentralised economic system, which can also promote environmental sustainability.

Another leading businessman, **Lord Browne**, *Financial Times*, 16 May, 07, p. 11, proposes an International Carbon Fund to set the framework within which market forces can find an efficient solution to control of carbon emissions. This Fund would set targets in terms of the emissions reductions needed to keep carbon below an agreed ceiling; it would allocate quotas; and monitor and verify action on reductions as well funding mechanisms for clean, low-carbon development.

Cleaning Up: A Special Report on Business and Climate Change, *The Economist*, 2 June, 07. Business making real efforts to cut carbon, in response to moral and economic pressure, yet emissions continue to rise. More incentives are needed for business to really rise to the challenge.

Business Review Weekly, June 21-27, **feature story, K. Burgess**, reports that Australian business faces a climate of opportunity in the face of the emissions trading scheme proposed by the government although the scheme is still embryonic. It has two years in which to fully understand its own emissions performance before mandatory reporting starts; those who get in early with carbon reductions can obtain free permits, but there are more details to be clarified regarding non-emitting companies.

J. Lash, F. Wellington, *Harvard Business Review*, March 07, offer methods to map risks and opportunities for businesses seeking competitive advantage under the challenge of climate change.

K. Burgess, *B. R. W.*, 13-18 Sept, 07, reports that IT companies are approaching their new "green" role by:- going beyond educating their customers about which products to use and how, by encouraging their customers to make behaviour changes, and use green-inputs which they have developed in the systems, which can boost the green credentials of the whole supply chain.

Special report, Sustainable Banking, *Financial Times*, 7 June, 07, covers a variety of aspects of the ways by which the largest global banks, imitated by their smaller colleagues, are embracing sustainability and environmental concerns. The FT Sustainable Banking Awards in London covered five categories including:-Sustainable Banking (leadership, innovation, best practice and organisational structures ensuring sustainability; Emerging Markets, Advancement in Carbon Finance.

Trade and emerging or fragile markets

The Elephant and the Dragon: the Rise of India and China and What It Means for All of US, **R. Meredith**, W. W. Norton, 07. A reporter for Forbes magazine provides expert analysis of these emerging countries, the changes they are undergoing and the effects they are likely to have on global geopolitics. The two complement each other, but there are social, environmental political and geopolitical risks in the changes.

China's Trapped Transition: the Limits of Developmental Autocracy, **M. Pei**, Harvard Univ. Press 06, acknowledges the stunning achievements of the recent decades but emphasises the contradictions between these and China's chronically sclerotic and corrupt institutions of governance. The evolutionary reforming impulse of markets is frustrated in China by its "trapped transition", and there are few significant forces which can provide the sustainable momentum to break through.

The proposed **Pacific Agreement on Closer Economic Relations, PACER**, with Australia and NZ will benefit the two larger economies rather than those of the Pacific Island states, according to a recent report for the **Pacific Islands Forum**, *Islands' Business*, Sept 07, pp. 36-37. The loss of tariff revenue will be severely felt in economies such as Vanuatu, Fiji and Tonga where it can provide from a quarter to a third of government revenue. If the Compact states (formerly US) join, then they will have to lower tariffs on US imports. Nor is there any likelihood of greater mobility in unskilled labour, abundant in these states. Free trade agreements by the larger economies with China will cut the small states out of opportunities for niche product exports.

S. Firth, *The Contemporary Pacific, Vol19/1, 07*, foresees a gloomy prospect for the small Pacific states, even as they suffer the transformational effects of globalisation, in trade, labour and security. For some remittance income forms a large part of their economies, while for others unregulated investment in their natural resources contributes to a corrupt political system with consequent political unrest. The inequalities in the region are likely to intensify.

Futures Thinking

On foresight and (In)probability

The Black Swan: The Impact of the Highly Improbable, **N. N. Taleb**, Random House, 06, is an applied statistician's name for those rare, extreme impact events which are made to seem predictable by later explanations. Humans find factoring-in randomness and uncertainty difficult and have an uncontrollable urge to be precise. The academic mainstream looks at probability the wrong way, constrained by the parameters of the Gaussian bell curve which ignores large deviations. Concentrating on the consequences of Black Swans, which are known, rather than on the probability that they will occur, might be most useful.

M. Pina e Cunha et al, *Futures, Oct 06*, use two sets of axes for viewing foresight: centred on future or present; and as microscopic practice or macroscopic analysis. This yields the four modes of foresight:- strategic planning, visioning, scenario thinking and planned emergence. In their further discussion they seek to counter the usual construction of foresight as a technical, analytic process. Rather it is a complex, but human process permeated by the tension between the need to know and the fear of knowing.

Swiss foresight academic **M. L. Neugarten**, *Futures, Oct 06*, provides useful guidance for the more sophisticated environmental scanner (called foresight and competitive intelligence), with special attention to blind spots, passive and active vision, and the importance of peripheral (contextual) vision rather than the dominant focused and central ("foveal") vision.

Dutch futurists, **J. Quist, P. Vergragt**, *Futures, Nov 06*, examine the past, present and future of backcasting with special attention to recent developments to broaden stakeholder participation and focus on follow-up/implementation. They propose methodological frameworks for participatory backcasting with associated tools and methods, plus details of two case studies where the methods have been applied.

Science/Technology

Issues in science and policy

Psychologists, **P. Bloom, D. S. Weisberg**, *Science, 18 May, 07, pp. 996-997*, outline development psychologists' research with children, which explains the basis of much public resistance to science, especially in the US. This problem is a human universal, to do with what children know and how they learn. Childish intuitions in making sense of objects and people can clash with scientific discoveries about the nature of the world, and for some this persists into adulthood. The childish intuition also

attributes design and purpose to the world, which can make acceptance of theories such as evolution difficult. There is also a commonsense psychology of dualism, in which the mind and brain are distinct, which also conflicts with modern scientific understanding.

The Honest Broker: Making Sense of Science in Policy and Politics, R. Pielke, Cambridge U. P., 07, is an insightful contribution to the dilemmas faced by scientists who move outside of the roles for which they are trained. Four modes are examined, the scientist as: pure scientist; science arbiter; issue advocate; and honest broker. The challenge is for the scientist to separate carefully which inferences stem solely from the science and from personal views as a citizen.

China is supersizing its science, *Science*, 9 March, 07, pp. 1354-1356, with major budget increases in R & D. Big science projects involve new facilities such as the Shanghai Synchrotron Radiation Facility to generate powerful x-rays to study molecular structures, major new study centres in aviation remote sensing, engineering materials science, space weather, agricultural biosafety, and probable facilities in radio astronomy, geomagnetic exploration, oceanographic research and much more. There are criticisms of the emphasis on mega projects, the inflexible allocation of funding and the focus on machines rather than on the researchers.

The Chinese State Medium and Long-Term Planning for Science and Technology is also promoting technological innovation, reports A. W. Wolff, *Issues in Science and Technology*, Spring 07, in core areas such as electronic components, new generation broadband wireless, high-end machine tools, advanced, large, nuclear power plants, water pollution treatment and more. China could become a major source of innovation.

Weird, wonderful or breaking news

Nature, 23 Aug, 07, pp. 855-858, reports on very recent research which could give a more revolutionary twist to the already revolutionary field of RNA interference, which modifies the expression of genes with microRNA (miRNA). Hitherto it was considered that the miRNA dampened this expression but the new discoveries suggest that some miRNA boosts the expression.

The Economist, 16 June, 07, pp. 83-86, reports on the paradigm shift underway regarding the understanding not only of RNA, but of cells, their elements and building systems. Genes were once thought to be the information sources for the building of proteins, but now they are understood as RNA factories, and their types are manifold, possibly more in number than genes. Consequently, the picture of how our cells regulate themselves, how certain diseases develop (and likewise how they might be treated) and possibly how evolution can be revised.

D. Fox, *New Scientist*, 9 June, 07, pp. 35-38, reports that the search for extra terrestrials could change, if they are based on alternative chemistries other than forms based on carbon, water and proteins and DNA. Life elsewhere in the universe may be adapted to other liquids such as sulphuric acid, ammonia or methane. Unless oxygen is present, such life forms will be simple, because complexity requires oxygen.

Teleporting is coming close to reality with the development of a new approach, which would transmit a beam of several thousand particles down an optical fibre from

one location to another. The original beam can be reconstituted when the messenger pulse strikes a special type of receiver. Scientists in Brisbane, Canberra and Dunedin are studying the method, which could be a key requirement for quantum information networks. *New Scientist*, 16 June, 07, p. 16.

H. A. Atwater, *Scientific American*, April 07, describes plasmonics technology which allows the squeezing of electromagnetic waves into tiny structures which can carry huge amounts of data. Etched onto special surfaces, they could provide superfast computer chips and ultra sensitive molecular detectors.

The Economist Technology Quarterly, 8 Sept, 07, pp. 25-26, reports on the application of biomimetics to architecture, with the natural systems found in nature adapted into buildings to provide cooling (from termite mounds), keep interiors dry (pinecones), desalinate water (fog beetles) and smart paints (lotus leaves).

The Ritual House: Drawing on Nature's Rhythms for Architecture and Urban Design, **R. Knowles**, Island Press, 06. This Californian professor argues that modern culture separates the house from its ritualistic purposes which respond to natural rhythms, and require large amounts of energy. By incorporating natural rhythms in designs we can create shelters that are unique to their climate and their relationship with the sun, and a haven for our spirits.

Nano - and biotech

Manchester Business School Researchers **P. Dewick et al**, *Technological Forecasting and Social Change*, Nov 06, explore the effects of destruction, diffusion and development caused by two major technologies, nanotechnology and biotechnology, on five industrial sectors across three regions over this century. They find there are likely to be differences across countries and time. Implications of this are examined.

Monash Univ. law academics **D. M. Bowman, G. A. Hodge**, *Futures*, Nov 06, examine the character and implications of nanotechnology, with special focus on the challenges to current regulatory frameworks in Australia. There appear to be regulatory gaps between the commercial advances in process and community expectation of safeguards and protection. There are opportunities to consider and prepare before the technology is fully implemented.

Waikato Univ. academics **D. Munshi et al**, *Futures*, May 07, explore a map of the nanoworld, perceiving eight nodes of the technology, with various scientific, social, and ethical aspects of the relevant discussions. Scientists, policy makers, entrepreneurs, educators and environmental groups all have distinct perspectives in the nano issues.

A. D. Maynard et al, *Nature*, 16 Nov, 06, pp. 267-269, discuss the issues around safe handing of nano-technologies, which they frame as a series of grand challenges where the safeguards and security systems can be developed.

The Genesis Machines: The New Science of Biocomputing, **M. Amos**, Atlantic Books, 06. All physical systems can be viewed as performing computations; it is down to the skill of the investigator to make them perform useful ones. This key message is the basis of a survey of the developing intertwining of biology and computer science, with a final section on the possibilities of DNA self-assembly and synthetic biology.

Newsweek/Sydney Bulletin, 5 June, 07, pp. 69-73, eminent molecular biologist **L. Silver** provides a popularised survey of the scientific "mavericks" who are pioneering synthetic biology, aiming to create novel forms of life from scratch.

Choosing Genes for Future Children: Regulating Pre-implantation Genetic Diagnosis, Human Genome Research Project, NZ Law Foundation/Univ Otago, 06 explores the options for legal ethical and regulatory policy which will be adopted in NZ and internationally.

The Third Domain: The Untold Story of Archaea and the Future of Biotechnology, **T. Friend**, Joseph Henry Press, 07. Until recently life was understood to divide into two: -bacteria and eukaryotes, a vast domain of which multi-cellular plants and animals formed a small section. Now there are archaea, which are single celled and found in strange places, such as our mouths and guts and in extreme environments: - hot, acid, alkaline.

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