

## Shaping a Sustainable Future

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Tena koto, tena koto, tena koto katoa.

I began with a greeting in the language of the tangata whenua for two reasons. The first is that achieving sustainability in such countries as Ao Tearoa New Zealand, Australia, Canada and the USA must involve genuine reconciliation with the respective original owners of the land. The second reason is that the culture of the tangata whenua includes the notion that we are kaitiaki, stewards or guardians of the Earth, rather than its owners. We hold the Earth and its natural systems in trust for future generations. In case you think that is a radical notion, I remind you that even Margaret Thatcher, not by any stretch of the imagination a “greenie”, told the London conference on ozone-depleting substances that we are not owners of the planet “but tenants, with a fully repairing lease”. The transition to a sustainable society is above all else a change in values.

Let me also remind you that the future is not somewhere we are going, but something we are creating. Every day we make choices that increase the likelihood of some futures and reduce the likelihood of others. In Australia and Ao Tearoa New Zealand, we tend to be fatalistic about the future, thinking that it will inevitably be determined by global forces over which we have little control. Of course, we have to be aware of those forces, like the global economy and technological change. If I can use a metaphor appropriate to the City of Sails, we cannot choose which wind will blow, but we can set the sail. If you think about it, a canny sailor can use whichever wind is blowing to sail wherever they want to go. We should try to develop a vision of the future we want and then steer in that direction. If you don't know where you want to go, any road will do; if you know where you want to go, all of the small decisions are taken in that overall context. I sometimes think of the analogy of a family holiday. Not many people go on holiday by loading their family and some clothes into their car and driving randomly around the road system until they run out of fuel, making that point their destination. When we go on holiday, we usually have at least a general plan of where we want to go, what we want to do, what experiences we would like to have. We might retain the flexibility to respond to unforeseen problems or opportunities, but we will have a general plan. It is obvious that the future of your country is at least as important as a family holiday and deserves at least the same amount of planning.

In terms of the overall goals for the future, I believe the most important for Ao Tearoa New Zealand and Australia are to maintain the quality of life that makes these such wonderful countries in which to live. Our two countries are now well down the OECD league table of income per head. Those obsessed with short-term economics constantly urge us to work harder to claw our way up that table, into the top 20 or even the top 10. I don't believe that should be a priority. Think about the basis of the tourist industry in our two countries. Each day thousands of overseas visitors arrive, mostly from countries with a higher GDP per head. Do they come to admire our ancient buildings or our thriving economy, or to listen to inspiring speeches from our politicians? No, they come to enjoy for a few weeks aspects of the quality of life that local people almost take for granted: relatively clean air, open space, beaches and

bush and barbeques, good food at reasonable prices, good local beer and wine, cultural diversity and so on. We obviously shouldn't ignore the economy, as it gives us the wealth to look after our natural assets, but we shouldn't be so obsessed with it that we destroy our quality of life for economic gain, in the hope that there will be another unspoiled country to which we can escape for two or three weeks a year.

We also need to apply to our interaction with natural systems the same discipline that we now expect in economic planning. It is seen as irresponsible for firms or countries to run at a fiscal deficit, spending each year more money than they receive. It is equally irresponsible to run at an ecological deficit, using more of the natural world's resources than it produces. Studies of our "ecological footprint" show that we are now into deficit budgeting, with the size of the deficit increasing each year. That is just not responsible. In ecological terms, we are booked on the Titanic and steaming toward the icebergs. Some who should know better are still urging us to put our faith in economic growth, the equivalent of increasing our speed, a strategy that can only bring forward the inevitable collision. Others are in the equivalent of the First Class Bar, drinking vintage champagne and eating pate de foie gras, presumably hoping that the bill will never reach their bank. I recently heard a Minister in one Australian State say that if we are booked on the Titanic, we should make sure there are enough lifeboats for everyone. While that would have been a better approach to the Titanic's maiden voyage than the approach taken by the White Star Line, I can't see how it is a practical policy for planet Titanic. What form would the lifeboats take? Where would they go? How long would they expect to wait for rescue? The point is obvious. If we are booked on the Titanic, the only responsible action is to urge those on the bridge to steer a different course, possibly threatening to organise a mutiny if they continue to ignore our warnings of the looming danger ahead. This Earth is the only home we have, and it is the only home we will ever have. There is no realistic prospect of rescue by friendly aliens or mass migration to another part of the cosmos. We have to live sustainably here. That will involve major changes, not just to our technologies but also to our values, the way we deal with the natural world and with each other.

I have asserted that the way we are now living is not sustainable. That is not a new conclusion. The Club of Rome pointed out thirty years ago that continuation of the main growth trends that existed then would see us reach limits within a hundred years. The Global Change Science conference in Amsterdam in 2001 sent a wake-up call to decision-makers, saying that we are already seeing those limits being reached and exceeded. The second report in the UNEP series on the Global Environmental Outlook, GEO2000, said explicitly that the present approach is not sustainable: "doing nothing is no longer an option", it said. Many people are reluctant to hear that message. As US economist Lester Thurow said in a radio programme fifteen years ago, nobody likes to think the party may be over, especially if they haven't got to the bar yet! So I want to remind you briefly why the present approach can't be sustained. I could list some criteria for sustainability: no imminent resource shortages, no unacceptable environmental damage, a secure society based on equity, a solid cultural and spiritual framework. I don't think we are meeting any of those criteria at the moment. We are rapidly depleting some key resources, we have serious and worsening environmental problems, the world is becoming less equitable both within and between nations, while the decline of traditional religions and the rise of forms of fundamentalism mean we do not have a secure spiritual foundation for the future.

In terms of energy resources, there is no shortage of coal. Locally, there is a prospect of depletion of gas reserves in Aotearoa New Zealand in the relatively near future. There is potentially an economic solution to that problem, as other countries have larger reserves and a willingness to export. But there is no obvious economic solution to the most serious medium-term resource issue, the peak of world oil production. While optimists think it may not happen for another fifteen years, pessimists think it has already passed [in the year 2000]. The average estimate of when world oil production will peak is about 2012. The relatively small differences of opinion are not really important; the conclusion is that the peak of production is very near, after which oil will become steadily scarcer and more expensive. This is a problem because our entire transport systems are based on the assumption that cheap petroleum fuels will always be available. We pay less per litre for motor spirit than we pay for beer, or cask wine, or milk, or orange juice, or even bottled water, all of which can be produced sustainably. Future generations will find it difficult to believe or forgive the thoughtless way we waste the limited geological endowment of petroleum fuels, whether by driving one-to-a-car or by such indulgences as driving cars around in circles just to see which one can go the fastest. There is no shortage of energy, as the natural flows of solar, wind, wave, tidal and geothermal energy are huge compared with any credible future demand. The solar energy hitting the Earth is about 10,000 times out total energy use; to put that another way, the solar energy hitting Australia alone in one summer day alone is comparable to the total annual global energy use. It is entirely feasible to conceive of these renewable energy forms being used to produce a substitute energy vector for surface transport, with hydrogen the obvious candidate. The small country of Iceland decided five years ago to become the first oil-free society by converting their buses to run on hydrogen, produced from their plentiful supplies of hydro-electricity and geothermal energy, with the intention of extending the approach to boats and then cars. When *New Scientist* reported this policy, the magazine observed that Iceland had obvious advantages that made such an approach possible. As an island nation, it does not have transport systems interfacing with those of a neighbour at the border. It has plentiful renewable energy resources and a solid base in science and engineering. I thought at the time that if Australia or Aotearoa New Zealand had those advantages, they might have been able to take the same approach! Of course, our two countries do have all the advantages that Iceland has; but we don't have leaders who are looking twenty years ahead and seeing the need to shift away from oil-based surface transport. The alternatives, like hydrogen fuel cells, will be more expensive than burning petroleum fuels, but they will not be depriving future generations of an important resource.

I don't have time to discuss other resource issues, except to say that there are important renewable resources like water, soils, fisheries and forests that are not now being used at a sustainable rate. In the long term, we have to live off the interest rather than running down our natural capital. In the case of fisheries, that will mean reducing the catch. In the case of water and soils, it will mean less wasteful practices for using the precious resources.

We face very serious environmental problems. At the global level, UNEP identified five. The loss of biodiversity, mainly through the destruction of habitat, places us in the middle of the sixth major extinction event in the history of the planet. We produce each year more than 500 million tonnes of toxic waste for which we have no treatment except "secure disposal": throwing it away and hoping it doesn't come

back. The other three problems are our disturbances of the great natural cycles of carbon, nitrogen and water. These changes are already causing serious problems. The Global Change Science conference in 2001 warned that the changes we are causing are combining and cascading through the Earth's natural systems. Many of the important indicators of the Earth's systems are now outside the range of previous human experience. We now have the potential to do serious or irreversible damage to the balance of natural systems. Earlier this week, the Australian Climate Group [of which I am a member] released a report calling for a long-term target of reducing greenhouse gas emissions by 60 per cent by 2050. Such a radical change is essential if we are to avoid dangerous disruption of the climate.

There can be no hiding from the figures showing the growing inequality in the world. In 1980, the richest 20 per cent of the world got thirty times the wealth received by the poorest 20 per cent. By 1995, the ratio was 60:1 and by 2002 it had reached 75:1. We now produce 2 kilograms of food per person per day, but hundreds of millions go hungry while hundreds of millions eat enough to endanger their health. About 1.2 billion people do not have clean drinking water and about twice that many do not have adequate sanitation. As Professor Paul Ehrlich reminds people, there are more than 2 billion humans who live on less money than the average subsidy of each European cow! We cannot live securely in a world where half the human population have never used a telephone or ridden in a car. As the Australian delegation said to the UNESCO World Science Conference in 1999, we should aim to make this not just a new century, but a just new century. In one sense, that is our humanitarian duty. In another, it is enlightened self-interest to try to prevent the world being divided into a rich minority and an increasingly desperate global underclass. That is a recipe for violent conflict. We have the resources to eliminate extreme poverty if we have the political will. Lester Brown of the Worldwatch Institute calculated that a ten-year programme to provide all humans with clean drinking water, adequate nutrition, reasonable shelter and basic health care would cost about US\$220 billion a year. While a huge sum of money, it was only about 15 per cent of the global military budget at the time, and an even smaller fraction today. So poverty could be eliminated by trimming a small amount from the obscene sums that we spend preparing to kill each other.

Finally, the transition to a sustainable society must involve a change in values. This may be based on a re-enchantment of nature or on some form of humanism. It will involve changing our expectations and the way we see our interaction with the natural world. We now see ourselves as "consumers", an extraordinary metonym in which we are symbolised by our stomachs; we don't use resources, we consume them – at an ever-increasing rate. Consumption is now seen as an end in itself, despite the growing evidence that it doesn't necessarily make people happier when their possessions accumulate beyond a certain point. As a wise colleague of mine said to me many years ago, the trouble with the rat race is that even if you win, you are still a rat! A whole industry is devoted to persuading us, in Dr Clive Hamilton's words, to use money we don't have to buy things we don't want to impress people we don't like! As Dr Richard Eckersley has said, the traditional seven deadly sins – pride, lust, gluttony, laziness, envy etc – have become the seven marketing imperatives of the modern world.

The world cannot sustain the present level of consumption of resources and production of waste. If the poorest people in the world are to have the basic necessities of a civilised life, the wasteful consumption in the richest countries will have to be wound back. Professor Roland Clift said in his keynote address that many decision-makers do not understand the limits placed on our actions by the laws of thermodynamics. I think an equally serious problem is the failure to understand the nature of the exponential function. As a concrete local example, at the opening session of this conference, Gwen Bull of Auckland Regional Council mentioned that the city is growing at a rate of 3 per cent per annum. That sounds moderate enough, but the nature of exponential growth is that it has a fixed doubling time. A growth rate of 3 per cent is equivalent to a doubling time of 24 years. So at the present rate of growth, Auckland's population will increase to 2.5 million by 2028. Will that be acceptable? What about 5 million by 2052? 10 million by 2076? 20 million by 2100? Most people can see that this becomes unacceptable in the long term, but there are differences about its acceptability in the short term.

I have tried to set out what I see as the characteristics of a sustainable society. Ian Parton reminded you of the list I suggested to the recent Ingenium conference in his keynote presentation yesterday. It is clear that a future sustainable society will have stabilised its population; I don't see how a continually growing population can be sustainably supported. Resource consumption per person will also have to stabilise, at a much lower level than the current wasteful consumption in the industrialised world. The great engineering challenge of this century will be to find ways of supplying our needs using much less resources. I think all new developments should be biodiversity positive; in other words, where it is seen as being in the community's interest to destroy habitat, the approval should be contingent on a compensating investment in restoration or enhancement of habitat elsewhere. We need to follow the example of the European Union in moving toward a zero-waste society. All large projects should be designed to be energy, water and waste neutral. Our cities need to become connected series of urban villages, within which most services are readily accessible and between which there is clean, efficient, safe and affordable public transport. Above all else, the future sustainable society needs to be based on new values of equity, durability and concern for future generations.

I believe we should be aiming for a **HEALTHIER** future - one that is **H**umane, has an **E**cocentric Approach and a **L**ong **T**ime **H**orizon, is **I**nnovative, **E**fficient and **R**esourced. It would be **H**umane in the sense of developing technologies and approaches that can, at least in principle, be extended to the entire human community rather than just a privileged minority in a small group of countries. It would have an **E**cocentric Approach, recognising that our future is bound up with the future of the natural systems of the planet, its biodiversity and its ecological integrity. We rely on those systems for breathable air, potable water, nutritious food, a sense of cultural identity and spiritual sustenance. So we need to set our social and economic planning within the limits of natural systems. In so doing, we should recognise that our present knowledge of those systems is still quite primitive, so we should take a conservative approach when we are uncertain of the consequences. As engineers have always done, we should build safety margins into our engagement with natural systems. We should also have a **L**ong **T**ime **H**orizon, recognising that our decisions have impacts stretching many decades into the future; we should routinely ask ourselves what our choices will look like in fifty years! It should be **I**nformed because we are still

alarmingly ignorant of the natural world; in Australia, for example, it has been estimated that we have only even identified ten to fifteen per cent of the other species that live there. It must be more Efficient in its use of resources and energy because much of the technology we use today is still alarmingly primitive, from the light bulb to the car; such technologies turn only a small fraction of the energy they use into the desired service of lighting, transport etc. Finally, it would be Resourced because we would have planned ahead for smooth transitions away from those resources, which are running short [most obviously oil] to those that are abundant [most obviously solar energy and its derivatives].

The HEALTHIER future is a utopian vision, but so was a world without slavery 200 years ago, so was voting for all adults 100 years ago, and so 15 years ago was South Africa without apartheid and Berlin without the Wall – as were, for that matter, good coffee and civilised licensing laws in Brisbane! Many things we take for granted today, from social rights to technical services, were once utopian visions. We have them because people were not content with the world in which they lived, but strived to improve it. In the cases I have cited, there was a clear moral duty to abolish slavery, to give women the vote, to end the apartheid system and to eliminate the Berlin Wall. I think our moral duty today is equally clear. From the myriad different possible futures, we should be striving to make ours sustainable. Our science gives us better understanding than ever before of the natural world and our impacts on it. Our technology gives us unprecedented capacity to change the world to meet our needs and suit our desires. Our humanity requires us to use that scientific understanding and that technological capacity to develop a sustainable society. That is our moral responsibility to other species and to future generations.

I have at home a postcard in French. It says “Nous ferons changer le monde” – We are going to change the world. In smaller writing underneath it says, also in French, words that translate as “If it is not you, my little one, who will begin to change the world? Who will do it?”. The postcard is a reminder that we all have a duty to work toward a sustainable future. We can’t leave it to politicians, or to large corporations, or to other people. We should all be doing the little things we can, in our personal and professional lives, to move in the desired direction.

Thank you for taking time out of your conference dinner to listen to my thoughts. I hope to see you on the journey toward what is, after all, our common future. Kia ora.