The planet is capable of managing carbon, but are we?

Copenhagen, Climate Change, and the Economics of Nature in the 21st Century

Wentworth Talks
Sydney Theatre Company
Monday 8th February, 2010

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Thank you Cate for your wonderful introduction, for your personal commitment to conservation, and for hosting the first of what I hope will become a regular fixture of talks at the Sydney Theatre Company.

Introduction

Walsh Bay on which the Sydney Theatre Company is located has been the centre of economic activity since the arrival of the first fleet in 1788.

It is from here that the industrial revolution took hold and transformed this ancient and remote island continent, into one of the wealthiest and most successful nations in human history: where we built the first windmills, our first steam engine, our first power station.

What a most appropriate setting for what we hope will become, through these Wentworth Talks, the focus of a new conversation for how we manage the industrial revolution in an increasingly congested and resource hungry world.

Tonight I am going to talk about what happened in Copenhagen, and its implications for Australia and the world.

I'm going to look at what the science is telling us about climate change, and the economic implications of taking action to manage this risk.

And I'm going to put this in the context of the other great environmental challenges confronting our civilisation – global population growth, food security, the increasing scarcity of fresh water resources, and the catastrophic loss of the world's biodiversity.

I am then going to talk about a remarkable opportunity of using terrestrial carbon - the carbon stored in the world's forests, grasslands - on our farmlands, and in our soils - to not only help solve the climate change problem, but to also fundamentally transform the way humans manage planet Earth in the 21st century.

And then I want to pose the question to you – is humanity capable of overriding our biological programming and take action in time to avert what could well become a global catastrophe?

The Failure of Copenhagen

First, the failure of Copenhagen.

The international Copenhagen conference was supposed to be one of the great defining moments of our generation: when the largest gathering of world leaders in human history were to agree a plan to solve the world's climate change problem.

Everyone assumed that the presence of both President Obama and President Hu Jintao – which was unprecedented – meant that the United States and China had resolved their differences and had arrived with a deal to put to the conference.

And they hadn't.

It will be 18 years this July that Australia joined with the rest of the world in agreeing to stabilise *'greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system".*[1]

Eighteen years, nearly a whole generation, and the world still can't agree on a plan on how to do it.

So what went wrong?

Are our leaders simply too weak to make a decision?

Was it simply the human capacity for arrogance and pomposity?

Or was it more complex than that – did climate change get caught up in a bigger game of a realignment of global economic power from the West to Asia?

It was probably all of that, but whatever the cause, we humans still have a problem.

As Professor Garnaut said last week, *"if there were high risks of dangerous climate change … in November 2009, there are high risks in January 2010 … (and) a setback for international cooperation does not change the odds that the science is wrong."*[2]

The great irony is that had the world's leaders signed an agreement based on the high end of the targets these governments had already committed to before the Conference, we would now have a good global agreement on climate change.

This irony was reinforced just last week, when practically all the world's major economies reaffirmed these commitments.

What has the World Agreed to do?

So what has the world agreed to do and will it make the slightest difference?

The world's climate scientists tell us that we need to keep greenhouse gas concentrations in our atmosphere below 450ppm of CO_2e if we are to have a 50% chance of keeping global warming below a critical threshold of 2 degrees above pre-industrial levels[3].

The institutional and technological implications of achieving stabilisation at 450ppm are phenomenal.

It requires a global reduction in existing greenhouse gas emissions in the order of 85 percent by 2050 [4,5,6].

That's the global average for all nations, developed and developing: an 85% reduction in 40 years.

It sounds impossible doesn't it.

Nicholas Stern, the former Chief Economist to the World Bank, has conducted an assessment of how close we are to an agreement consistent with keeping temperature increases below 2°C.[7]

His conclusion will surprise many people.

If the major economies agree to and honour the high end of the commitments they have made, the world would go very close to setting us on a path towards this 450 ppm stabilisation target.

That will come as a shock to most people because we have been conditioned to believe that there is no point in developed countries like Australia taking strong action because all that effort will be overwhelmed by the growth in emissions from developing countries such as China.

So what's on the table?

The US confirmed last week that it is prepared to reduce emissions by 17% below 2005 levels by 2020, the EU has committed to reducing emissions by between 20% and 30% below 1990 levels, Japan by 25%, Russia by 25%, and Australia by between 5% and 25% against a 2000 baseline.

What about China? Won't the growth of China just blow these targets out of the water?

A few weeks before the conference, China announced that it will reduce the carbon intensity of their economy by between 40 and 45% below 2005 levels by 2020.

Other major developing economies also made significant, but conditional commitments: Brazil, Indonesia, South Korea, South Africa, India and Mexico.

Nicholas Stern looked at these commitments – from both developed and developing economies and concluded that if the major economies were to agree to and honour the higher end of these commitments, it would reduce global greenhouse gas emissions from an expected 54 billion tonnes to around 46 billion tonnes in 2020.

If we are to have a good chance of achieving stabilisation at 450 ppm, global emissions will need to be around 44 billion tonnes of CO_2e by 2020.

In other words, there is a gap of just 2 billion tonnes - less than 5 percent - of where we would need to be to have a good chance of achieving stabilisation of greenhouse gases at 450 ppm.

So what's the problem? What are we arguing about?

I'll come to this question in a moment.

But first a reality check: the science says that even if we achieved these high end targets, we humans still have a big problem, because the best available science says there is more than a 50% chance we will exceed 2°C, and that there is a 5% chance that temperature increases will exceed 4°C (above pre-industrial levels).[8,9]

Is this dangerous? Absolutely, because our modern civilisation was built in a period of the Earth's history when climate has been remarkably stable.

The past 10,000 years, the time when humans created agriculture, developed our cities, built the industrial revolution, global average temperature varied by no more than two degrees. [10]

The last time the world was 4 degrees warmer however was a very long time ago - over 30 millions years ago – when rainforests covered Antarctica.[11]

It's no wonder Ross Garnaut said that "*On the balance of probabilities, the failure of our generation … would lead to consequences that would haunt humanity until the end of time.*"[12]

The Economics of Climate Change

So why does humanity find it so hard to do what is so patently in our own economic self interest to do?

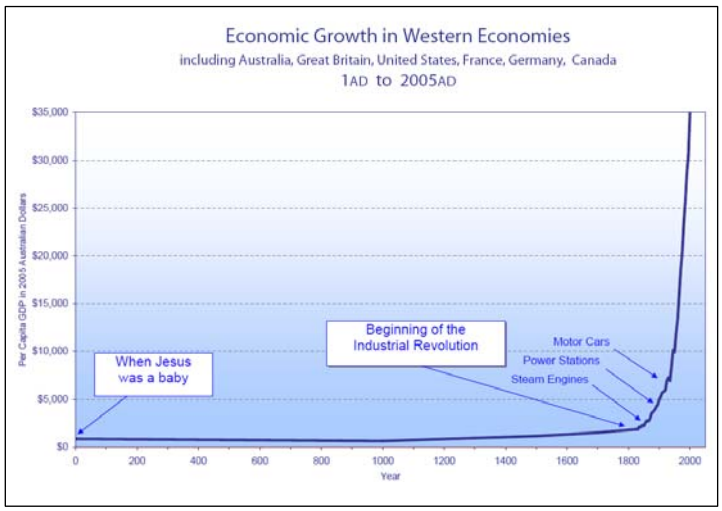
I believe that our problem is a fundamental one: that we have been conditioned – not just in recent times, but over many generations - into believing that to give up the machines means we have to give away our civilisation – that the only way to save the world is to turn off the light - that the economy will fall into a recession and we'll lose our jobs and our homes if we take action to fix climate change.

Climate change is not a conflict between economic growth and the environment.

We can fix this problem, not by turning our backs on the industrial revolution, but by building on what it has created for us.

We just need to change the way we power our machines.

This graph shows the explosion of personal wealth in western economies since the invention of machines[13].



It also provides the pathway for us to address our long-term environmental problems as well.

Let me explain - when Jesus was a baby average annual incomes in what are now the Western economies were around $800 in today's dollars.

They stayed at those levels for nearly 2,000 years.

Then, came the beginning of the industrial revolution: steam engines, power stations, motor cars.

Just look at the explosion in our wealth since the invention of the machines.

This is a graph of economic growth in Australia.

By the time we became a nation in 1901, average incomes had grown to nearly $6,000 a year in today's money.

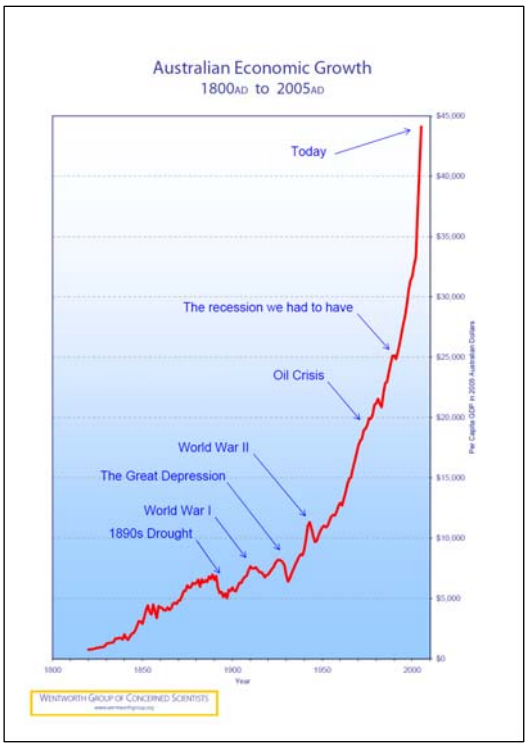
But even that was just the beginning.

Today, just over 100 years later, it is now over $50,000 for every man, woman and child.[14]

We are eight times more wealthy than our grandparents and we live in a world beyond their wildest imagination.

All because of machines.

The key to the revolution of the 21st century, a revolution that can change the course of history for all time, lies in our generation accepting the challenge of climate change.



The world's climate scientists tell us that we need to keep greenhouse gas concentrations in our atmosphere below 450ppm CO_2e if we are to have a 50% chance of keeping global warming below 2 degrees (above pre-industrial levels)[15].

To have any chance of achieving that target, highly industrialised economies such as Australia, on a per capita basis, will have to reduce our existing greenhouse gas emissions in the order of 97 percent by 2050 (based on a 15% probability)[16].

All the world's industrial and industrialising economies will need to reduce their emissions by similar amounts: Europe by 93%, the United States by 97%, China 79%.[17,18]

The implication of a global stabilisation target of 450ppm is simple, but profound.

No matter which phase in the industrial revolution countries are in, we are going to have to completely decarbonise the world's energy production systems and we are going to have to restore a positive carbon balance in the world's natural landscapes - our forests and our agricultural lands - and we have 40 years to do it.

The argument against action is founded on the cost of action: the cost to economic growth and jobs.

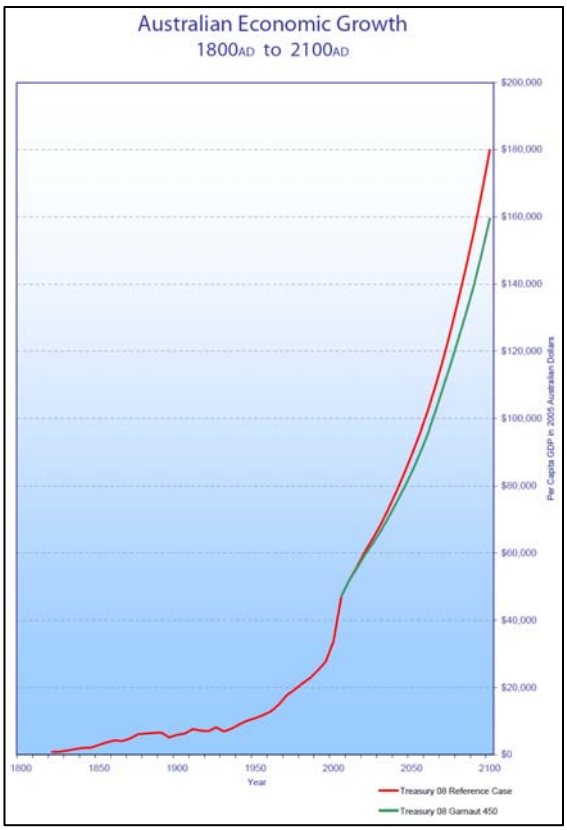
So let's just leave that aside for the moment that "the cost of action is less than the cost of inaction"[19,20], and simply look at the cost of action.

In 2008 the Australian Treasury released what has been described as the most comprehensive analysis of the economic impact of deep cuts to greenhouse gas emissions on the Australian economy.[21]

There is economic pain, because as Treasury says, demand will shift from emission intensive products such as coal, aluminium and road transport, towards lower emission products such as renewable energy, wood products and rail.

But they also say that large reductions in emissions do not require reductions in economic activity because, given time to adjust, the economy restructures in response to the emission price.

This graph is based on the Treasury modelling.



It puts into context the economic implications of achieving a 450 ppm CO_2e target on Australia.

The red line shows the explosion in wealth expected between now and the end of this century if GDP per capita continues to grow in the order of 1.5 per cent per annum.

The green line shows you what a reduction in GDP really means if we commit to stabilising greenhouse gas concentrations at 450 ppm CO_2e by 2050.

This graph should be on t-shirts because it is a most hopeful message.

It shows that we don't need to destroy the machines of the industrial revolution, but we do need to change the way we power them.

And the good news it that with the exception of the currently unproven carbon capture and storage technologies, we actually have all the technologies in place today to fix the problem.

What on earth are we arguing about.

Forty years ago we went to the moon with a machine with 10 times less computing power than in your mobile phone.

If we can go to the moon for an adventure, surely we can build new ways to power our machines to save the world.

Terrestrial Carbon and the Economics of Nature

But as our world gets smaller and nature's resources get scarcer, the implications of this graph goes well beyond climate change – it goes to the heart of what humanity is capable of achieving in the 21st century – an opportunity to create an economic system that is profoundly different to that of the 19th and 20th centuries.

The industrial revolution created staggering wealth.

We are, without doubt, the wealthiest, healthiest and most educated generation in history.

It has given us health care, aged pensions, fast cars, shops full of food, schools, 4 weeks annual leave, sick leave, television, the internet, coffee shops, the list goes on and on.

The industrial revolution also drove the green revolution, allowing us to produce and store vast quantities of food.

Our population exploded.

In 1800 there were one billion people on this planet. Two hundred years later, there are 6 billion.

But this success has been at the cost of our natural world.

We have already cleared half of the world's rainforests, we've degraded vast river basins, we have mined our rivers and aquifers of freshwater, and we stand to lose half of all species on earth.

The world's population has doubled from 3 billion to 6 billion in the lifetime of most people here tonight. In the next 40 years we expect to add another 3 billion people to this planet.

At the very time the world is experiencing the limits to the consumption of natural resources, we are faced with the need to increase food production by at least 70% to feed a hungry world.[22]

And now, on top of all this, we have discovered that the fossil fuels that are powering our machines that created all this wealth are changing our world's climate.

Quite simply this planet cannot support our civilisation if the developing nations reach our standard of living, at our current levels of consumption.

Our golden age cannot last forever – or can it?

I believe that the answers to the challenges of the next century can be found in the laws of nature: the same laws that have driven life on earth for billions of years. The same laws that allow some species to survive and prosper, but have also seen the extinction of 99% of all species that ever existed.

Does our civilisation need to conserve the world's biodiversity to survive? Of course not. We could probably destroy most of the species on earth and still hold on to our civilisation.

After all, only four species of plants - wheat, corn, rice and potato - provide over half of plant based calories in the human diet, and around a dozen animal species provide 90 per cent of the animal protein[23]. Europe wiped out most of its biodiversity centuries ago.

If our survival depended on extinguishing half the diversity of life then that's probably what would happen – for this is now the power of man.

This sounds heroic and once it was, but it's not anymore.

Let me show you why.

The solution to climate change has not one, but two components: yes, we do need to decarbonise the world's energy production systems, but we are also going to have to restore a positive carbon balance in the world's natural landscapes - our forests and our agricultural lands.

It is in this second component that lies at the heart of what humanity is capable achieving: what I call the economics of nature in the 21st century.

Because rainforests and restored river basins store vast quantities of carbon, we can design the carbon economics of the 21st century so that for the first time in human history we can grow the world economy without destroying nature.

This is an unbelievably important concept.

A 15% increase in the world's terrestrial carbon stock would remove the equivalent of all the carbon pollution emitted from fossil fuels since the beginning of the industrial revolution.[24]

Carbon economics of the 21st century present our generation with the opportunity to not only stabilise the world's climate system, but to also create an economic system that will conserve the world's biodiversity.

Healthy landscapes store vast quantities of carbon. Biodiversity is carbon.

Let me give you just two of hundreds upon hundreds of examples of how terrestrial carbon can help solve the world's climate problem: conserving the world's tropical rainforests, and repairing degraded landscapes across the Australian continent.

Conserving the World's Tropical Rainforests

Tropical rainforests cover 7% of the world's land surface[25], yet they contain almost half of the world's terrestrial biodiversity.

The Amazon, the African Congo, and just to our north, the Indonesian archipelago.

Over half of these forests have already been cleared, and current clearing rates are staggering – 13 million hectares of tropical rainforest is cleared every year.[26]

But tropical deforestation is not only destroying nature, it is also directly releasing the equivalent of 2 billion tonnes of carbon dioxide into the atmosphere every year.

This represents a staggering 20% of all global carbon emissions.[27]

If the western industrial economies of Europe, Australia and America are prepared to invest, it will not only help the world address climate change, it will for effectively no additional cost, also finance the conservation of vast tracts of tropical landscapes, and, in the process, open up new economic opportunities for people in the developing world.

It will be one of the great legacies of our generation.

Repairing Australia's Degraded Landscapes

A price on carbon can also be the catalyst for driving a new generation of economic reforms that will transform the way we farm in Australia and the way we manage our natural landscapes.

We have been struggling in Australia for decades with land and water degradation, and the loss of our unique biodiversity.

We have built great institutions, the Landcare movement, the Catchment Management Authorities, conservation groups such as Bush Heritage and the Australian Wildlife Conservancy, but we have never had the financial resources even within an order of magnitude to deal with the problems we are confronting.

Action on climate change will change all that.

CSIRO has assessed the biophysical potential of the Australian landscape to store carbon.

If Australia were to capture just 15% of this biophysical capacity, it would offset the equivalent of 25% of Australia's current annual greenhouse emissions, every year for the next 40 years.[28]

This represents a gross investment potential of terrestrial carbon in Australia of between $3 billion and $6 billion per annum.

Whilst there will be many issues affecting whether this potential is converted into reality, the implications are that a price on carbon presents an economic opportunity of almost unimaginable scale to pay our farmers to help us to fix a raft of major environmental challenges facing Australia:

- restoring native vegetation along the nation's rivers, wetlands and estuaries;
- expanding habitat to create viable populations of threatened species, which is a foundation stone for the long-term conservation of biodiversity; and
- improving soil carbon in agricultural landscapes, which have been in slow decline over the past two centuries.

Our landscapes are built from carbon and the new carbon economy would fundamentally transform the way we farm in Australia and the way we manage the Australian environment.

Conclusion

So let me conclude with these thoughts.

It was from around these wharfs in Sydney harbour that our forebears built the nation we have been so remarkably lucky to inherit.

It was from here that the industrial revolution took hold and transformed this ancient and remote island continent into one of the wealthiest and most successful and stable democracies in human history[29].

It has been an extraordinary story.

The industrial revolution was built on the harnessing of fossil fuels – the energy embedded in the vast oil, gas and coal reserves that were laid down millions of years ago, when the earth was a very different place.

It has given us health care, aged pensions, fast cars, shops full of food, schools, 4 weeks annual leave, sick leave, television, the internet, coffee shops, the list goes on and on.

We have more choices and more opportunity than any generation in history.

But with the new century comes new challenges – challenges that our founding fathers could not have dreamed of when they built the nation we now call Australia.

Our political systems were built to manage the industrial revolution where the great contest of the age was between capital and labour.

We have become as a nation highly skilled in economic management, highly skilled in the social sciences – education, health, law and order.

And therein lies our problem.

The world laughed at the Club of Rome[30] when they warned that the industrial revolution would send many of our natural systems to the point of collapse, and never in our wildest dreams did we imagine that the very machines that created all this wealth could change the world's climate system.

We built our economic and political institutions at a time when the natural world seemed endless – where nature was there for the taking – where land clearing was part of a heroic

vision to develop the nation – where fresh water flowing to the sea was thought to be wasted.

Today that has all changed.

The great challenge of our age it not wealth creation – certainly not in the western economies – the great challenge of our age is climate change, global food security, the growing scarcity of fresh water resources, and the catastrophic loss of the world's biodiversity.

These are the defining issues of our age – ones which will increasingly challenge our notion of progress.

The key to the revolution of the 21st century, a revolution that can change the course of history for all time, lies in our generation accepting the challenge of climate change.

The solution to climate change has not one, but two components: we need to effectively eliminate all carbon pollution from energy generation within the next 40 years and we are going to have to restore a positive carbon balance in the world's natural landscapes - our forests and our agricultural lands.

This requires deep emission targets and a price on carbon to drive that transformation.

The industrial revolution was remarkable for another reason, it created the intellectual conditions for one of the most profound ideas in human history – an idea crystallised by Charles Darwin – that human beings are part of, not separate to or above, nature.

That was is 1859. We have embraced this great idea, but we have never fully understood its implications for the future of our civilisation.

Tonight I hope that I have presented you with an idea that builds on Darwin's understanding of life on Earth, a simple idea, but one that could change the course of human history: that healthy landscapes store vast quantities of carbon; that biodiversity is carbon; and that by acting in our own self interest to solve the world's climate change problem, our generation has an opportunity to conserve the world's biodiversity.

In doing so we will not have abandoned the industrial revolution, we will have transformed it.

We will have changed the definition of progress and blown away forever the 19th century notion that economic progress must come at the cost of the environment.

But we won't do any of these things unless we redefine what is noble and what is heroic.

Science can provide the pathway forward, economics can provide us the structures, but we also need new stories – positive stories about what humanity is capable of.

Yes, planet Earth is indeed capable of managing carbon, but the question is: are we able to manage the economics of nature for our own self interest, or will our biological programming override rational thought?

So what does Australia do? What do we as individuals need to do to make this happen?

Our Prime Minister keeps saying that Australia will do no more, but no less than other nations.

We can do better than that. We are a great nation and I expect my government to show more leadership than that. I expect our nation to lead the world in this transformation, not just meekly follow along in its wake.

As individuals we need to register our commitment by taking action – green power, purchasing credible offsets – create positive momentum.

We must stand up and challenge our friends to think about the consequences of inaction, rather than use uncertainty as an excuse for putting off hard decisions.

But most importantly, we need to stop seeing climate change as a threat to economic prosperity and see it as the great opportunity of our generation to set humanity up for the next industrial revolution of the 21st century.

We now know that a modern economy can provide the means for protecting life on earth and still deliver spectacular economic growth, so it's no longer a question of money.

It's not the machines that are the problem, it's us.

Our parents invested in the economic future of their world with spectacular success. Now it is our turn. We must invest in the future of our natural world.

This is the great challenge of our generation.

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[16] These figures are based on a global per capita pollution permit in 2050, based on a 15% probability of reaching the 450ppm target, which in turn gives only a 50% probability of keeping climate change below 2 degrees warming above pre-industrial levels. Further details are in Cosier, P. 2008. *The Economics of Nature* State Library of NSW Lecture, February 2008.

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