Sustainable Cities Sustainable Transport

What is the future we should be planning our cities and transport systems for?

Summary Paper prepared by
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2009

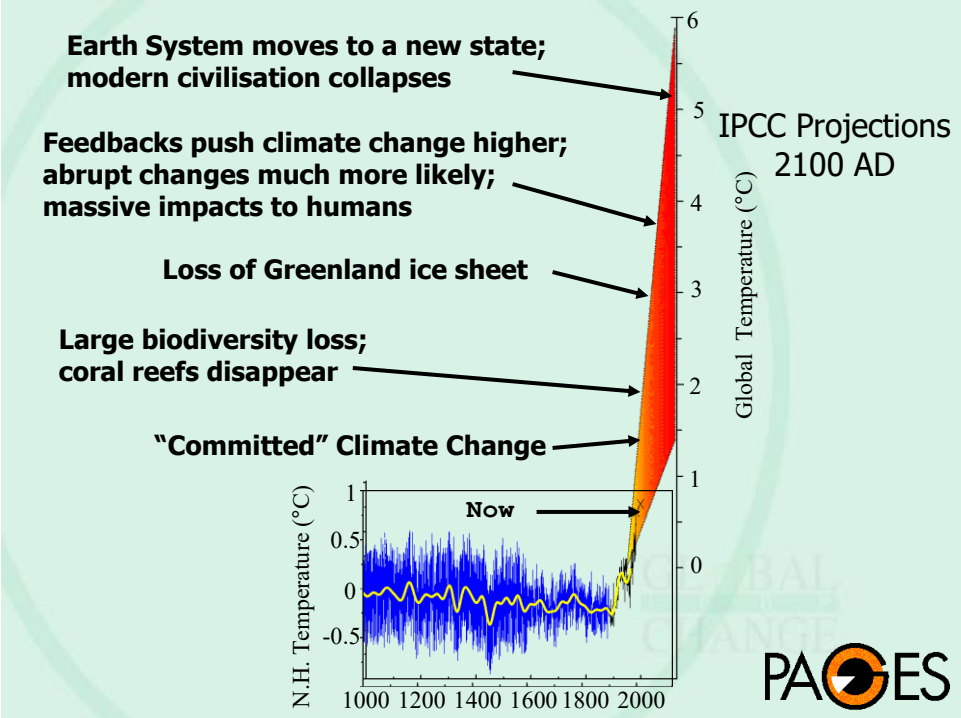
Introduction

Much of the planning carried out today by government planners at all levels remains based on business as usual approaches: that is based on current population and economic growth trends that have prevailed over the last 10 – 20 years and 'western' lifestyles that have prevailed for many decades. This period has been one of steady and largely uninterrupted population and economic growth and prosperity – an environment that would heavily influence the mindsets of most of the planners and policy makers today who have never experienced hard times.

The impact of environmental change has not been factored into government planning – certainly not in any significant way. It should be very clear now that it needs to be and be based on realistic scenarios for the future. One of the aims of the Sustainable Cities Sustainable Transport forum was to identify trends and future scenarios that planners and governments need to anticipate and start planning for. These are outlined in this discussion paper.

Longer term global environmental change

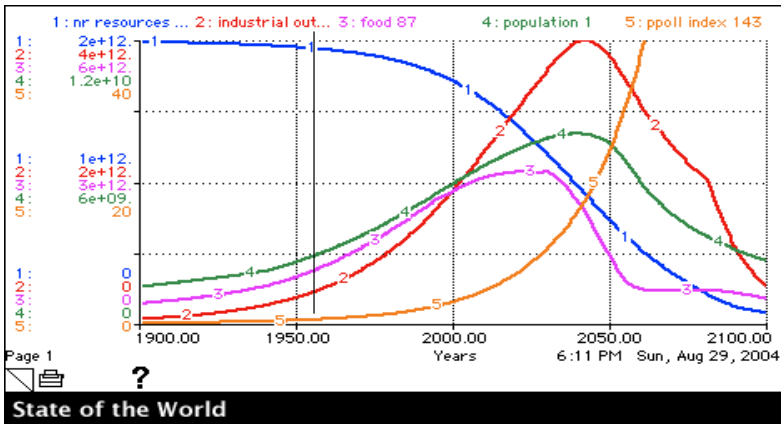
Much of the focus today is on climate change. IPPC projections as shown below based on 'business as usual' indicate significant increases in global temperatures by the end of this century – potentially as much as 6 degrees centigrade – at which point the earth can be expected to move to a new equilibrium state and human societies as we know them today would collapse. The temperature trajectory is largely locked in by lags in the system although it may be possible to reduce this increase to less than 2 degrees, but this would demand drastic action now by all societies throughout the world. Even a 2C degree rise will have severe implications. At this point large scale biodiversity loss occurs and this may be sufficient to precipitate global collapse.



Source: Will Steffen, Sustainable Cities Sustainable Transport Forum 2009

Unfortunately the earth does not act in a simple cause and effect manner and climate change is only one of many factors to consider when assessing the future scenarios. Resource depletion, environmental degradation, pollution and species loss also play an important part and will impose limits to future growth. Limits to growth under the business as usual scenario were assessed in the Club of Rome report in 1972. This report forecast ecological and population collapse starting around the middle of this century. Updating and remodeling by Richard Meadows (one of the original authors of the Club of Rome report) in 2004 and again more recently by the CSIRO 36 years later based on 30 years of data confirms the original Club of Rome forecast. Meadows' revised projection for the business as usual scenario is shown below. More recent re modeling by Dr Graham Turner (CSIRO) also confirms limits to growth projections for the Club of Rome's standard run (business as usual) and concerns that a highly intensive technology based 'solution' has not slowed environmental degradation, resource depletion or environmental pollution of which greenhouse gas emissions are really a symptom. Technology has merely accelerated resource depletion and the prospect of a bigger crash.

2004 Projection for 1900 - 2100



Pollution

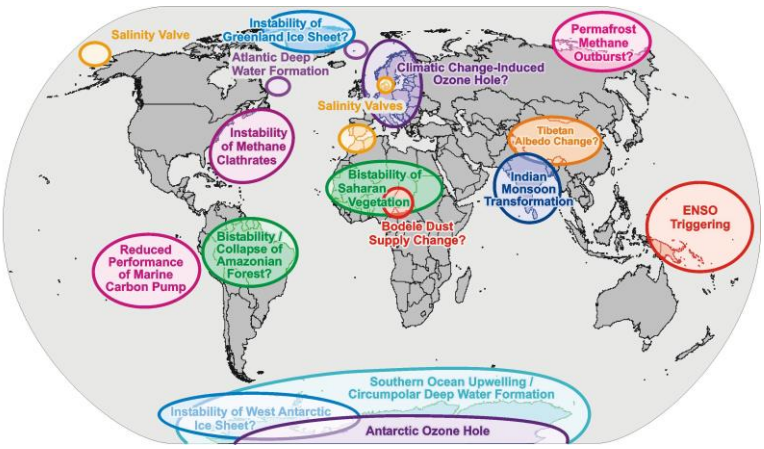
Population

Industrial Output

Food

Resources

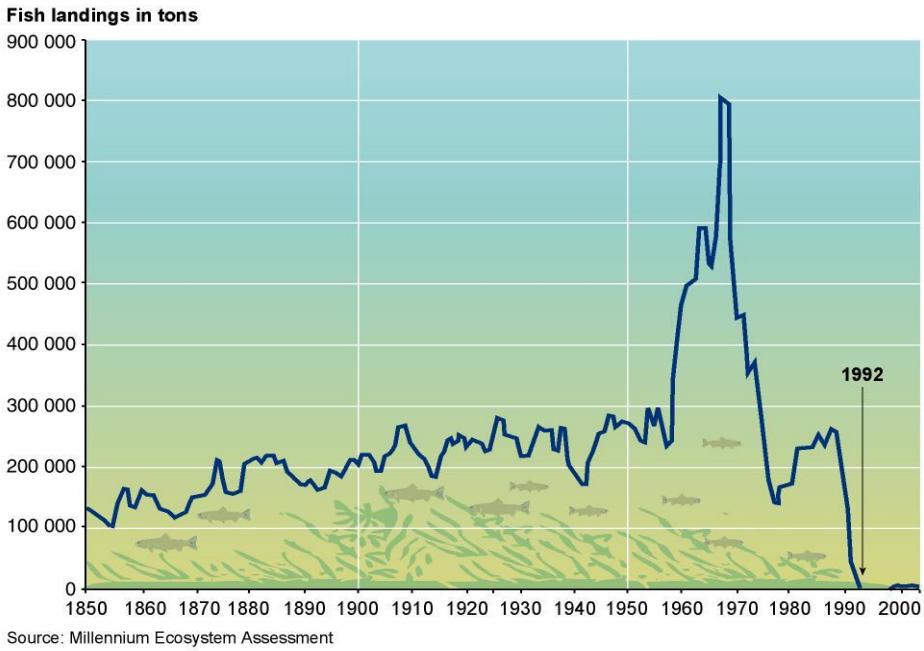
The limits to growth projections above have been assessed independently of climate change but will be adversely affected by it so the projections above are expected to overstate the time available in which act. But even taking this into account the projections exclude tipping points in the system, some examples of which are noted below, (which are difficult to model) and cascading and multiplier effects that follow and flow through the entire system and result in an even earlier collapse.



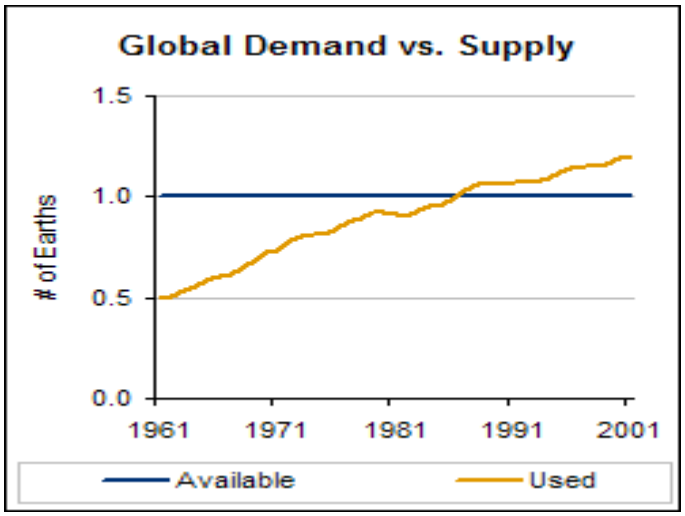
Tipping Elements in the Earth System

From presentation by Will Steffen Sustainable Cities Sustainable Transport Forum 2009
Source: Schellnhuber, after Lenton *et al*, *PNAS*, 2008

The collapse of the Newfound Bank cod fishery is a good example. This was one of the richest fishing grounds in the world before it collapsed suddenly around 1970 and again in 1992 ref diagram below, forcing the closure of the fishery. But many other fisheries are facing the same fate. As noted by Steffen about 50% of all fish stocks are fully exploited, 15-18% are over exploited, and 9-10% have been depleted or are recovering from depletion. But the impact of human activity has been even more severe on terrestrial (land based) systems. The global footprint of the human enterprise now exceeds on an annual basis the capacity of the planet by around 20%. This can only be achieved by



From presentation by Will Steffen, Sustainable Cities Sustainable Transport Forum 2009



Source: Global Footprints Network 2005,
From presentation by Will Steffen, Sustainable Cities Sustainable Transport Forum 2009

running down/mining the stocks of natural capital. This process cannot continue indefinitely. How much time do governments and planners really have if they want to make a difference? The most likely answer is very little - perhaps only a few decades if we start now. Beyond that the future is very difficult to plan for.

Economic predictions outlined by Dr Peter Brain for the short term are not encouraging either, particularly for Australia. He argues

"The Global Financial Crisis will fundamentally change the drivers of economic growth. The impact could well be to lower long-term growth because:

- *its severity will lead to weakened balance sheets, lower capacity to invest and lower expected future growth and hence incentive to invest;*
- *the financial system has been fundamentally weakened and will take years to be re-privatised;*
- *Anglo-sphere countries will have to re-focus on growth fundamentals (R&D, non-resource exporting, entrepreneurship and skills) which will take years to change business culture;*
- *climate change will demand a fundamental shift in resource use".*

With this will come the usual array of social problems such as rising unemployment and social stress and these problems are likely to worsen rather than improve. Brain anticipates:

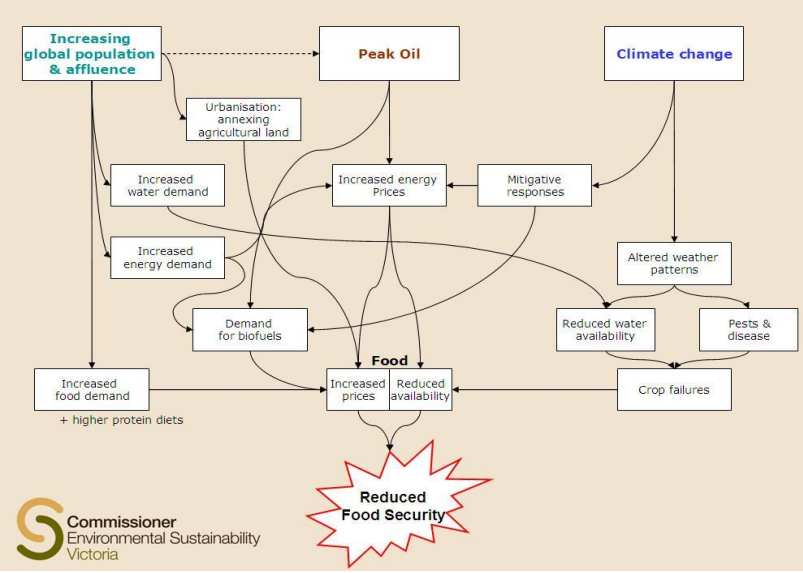
"Australia will experience long term difficulties. These will result from decades of unbalanced growth characterised by:

- *High current account deficits, total foreign debt and foreign debt holdings in banking system.*
- *Low household savings, high household debt and debt service ratios.*
- *The fact that Australia has only been able to grow resource export volumes over last 12 years, that service exports remain stagnant, up to 0.5% of total employment is lost each year from off-shoring.*
- *Largest vulnerability (as a nation) to carbon shock. Low capacity to attract capital inflow. Largest diversion (required as a nation) of resources from capacity expansion to energy efficiency.*
- *Over-dependence on non-productive finance sector."* [1]

The modern world economy is particularly vulnerable to change because it has become so efficient, finely tuned and interconnected and with a high degree of specialisation. 'Just in time' economies with no fat or margin for error lack the resilience necessary to cope with change. Even the smallest of changes such as the 1%- 2% down turn in GDP we are experiencing today can result in major disruption to modern economies. Changes in one area quickly flow through to other areas creating multiplier effects that affect the entire economic and social system.

[1] From presentation by Peter Brain Sustainable Cities Sustainable Transport Forum 2009

The cost of infrastructure will also continue to increase as materials and energy costs rise and Australia's population continues to grow (the equivalent of a new Canberra per year) and become an increasing burden for Australian governments. This will occur as the impact of broadly based environmental change start to manifest themselves. One of the early indicators of environmental decline will be increasing food scarcity – more people to feed at a time when the capacity of natural systems to produce the food and other resources become increasingly stressed. The diagram below is a simplified flow chart of some of the factors that affect food security.



Source: Commissioner of Environmental Sustainability Victoria, March 2009

In summary the most likely scenarios governments need to anticipate in their planning are

- Decades of low or declining economic growth which may be punctuated by a series of ecological collapses (local tipping points) which will result in food shortages and ultimately famine which will become increasingly widespread
- Increased poverty and degraded living conditions which will reduce the strength of the local communities to cope with life and increase their vulnerability to disease and plagues/pandemics
- increasing stress on all communities which will lead to social break down and ultimately population collapse. The timing for tipping points is difficult to predict but it seems inevitable that global collapse will occur some time this century, possibly as soon as the middle of this century – or even earlier.

What is a sustainable vision for the future?

A sustainable existence is one in which societies live within their means – that is within the limits imposed by the capacity of the natural environment to support that society at that time. Any system that operates on the basis of growth is inherently unstable and must collapse when the resources that feed it are exhausted. Relatively short periods of growth and overshoot may be tolerated provided system stability is not disturbed and in any case

will need to be followed by a period of lower consumption. The concept of a sustainable existence must also be specific to a given location and will change over time as the natural environment changes (due to climate change for example) and with it the resources it produces. It is in short a process that requires constant adjustment and adaption. The productivity of the earth's systems today is not increasing – quite the contrary – yields are declining as the natural systems continue to be over exploited and degraded and put under more and more stress. Most species adapt to changes in the natural environment by migrating or varying their numbers or per capita consumption or a combination of these. These controls have been implemented in a number of ways in the past but their effectiveness for human societies has been blunted by advances in science, and technology and changes in social and political structures and values, particularly over the last century or so, and migration is no longer an option for most people living on this planet.

Strategies for sustainable existence or living should therefore focus on population, lifestyle (per capita consumption) and the quality and integrity of the natural systems that support life in the first place. Energy use and greenhouse gas emissions are only an indicator or symptom of the diverse range of human activities that generate them. Strategies must also recognize that what might appear to be sustainable today will not be sustainable tomorrow so the aspirations for human societies may lie on a diminishing curve in the future. These aspirations will diminish further and dramatically once natural systems like the Newfoundland Bank cod fishery start to collapse. The Murray Darling basin may become another example with major implications for Australian food production.

The complexity of natural systems is such that precise estimates of a sustainable existence may not be possible and even if they were the findings may ultimately be of academic value if societies continually ignore them. Ultimately the natural environment will determine the level of human activity that can be supported on this planet and in this respect history may provide the best guide for the future.

Some lessons from history and models to aim for.

The most common scenario for human civilizations over the last 7,000 years has been characterized by slow but accelerating growth accompanied by increasing technological complexity followed by a peak and abrupt decline and collapse. It is a phenomena that has been repeated many times throughout the world on all continents. During that time only a small number of communities have demonstrated a capacity to survive in a relatively sustainable manner and avoid collapse, and some of these have achieved this for only a short time. Some case studies were examined briefly by Graham Turner at the Sustainable Cities Sustainable Transport forum. Most of these are unlikely to appeal to 'western' governments today although the lessons learnt from Cuba during its 'special period' when Soviet oil supplies were curtailed following Glasnos, are relevant and many of the strategies adopted by Cuba have application elsewhere.

Some Lessons from the Cuban 'Special Period'

The Cuban oil crisis occurred between 1989- early1990's. During this time oil imports dropped from between 13 and 14 million tones to around 4 million tonnes pa, exports dropped by 80% and GDP dropped by 34%, (seven times the decline that has occurred in the US during the last year). During this period the economy stalled and the people nearly starved. Cuba was denied international support including finance from the World Bank so it had to solve this problem without international help. Money became worthless so the only option available was to restructure the entire economy on a locally sustainable basis. This meant concentrating on the basic essentials – food self sufficiency, shelter, and maintaining community cohesion to ensure that the community worked together through the crisis and avoided social disintegration. There was no single fix. It required a complete reconstruction of the entire economy and the Cuban way of life. Growing food and rationing food supplies became the first priority but investment in education and public health was also critical. The economic crash created large numbers of unemployed so there was an imperative to create new jobs quickly, but it had to be done without capital from foreign loans, by substituting labour for capital.

Cuba survived the 'special period' without bloodshed or social disintegration. It is now largely self sufficient and its per capita energy use (which had been previously on a par with the US is now one eighth of the US and this reduction was achieved in less than a decade. Cuba's public health and education standards continue to be high by world standards, and Cubans enjoy a better diet and better health than average Americans. All Cubans have accommodation of some sort and 85% of people own their own houses (typically small, simple with few amenities). Whilst much of the physical infrastructure appears run down or even dilapidated it remains functional.

Comparison with western and Australian economic strategies is stark. Unlike western governments Cuba invested in its people – its social infrastructure particularly in education and health and restructured its economy in an attempt to become locally self sufficient (particularly in food). This was driven by a recognition that they had to radically change their way of life in order to survive and preserve their independence as a sovereign state. Western governments by comparison continue with business as usual strategies, such as pump priming their economies to restore consumer confidence and massive investment in resource and energy intensive physical infrastructure to create new jobs. Economic and population growth continue to be the seen as the way to maintain or improve community living standards. Unlike Cuba, investment in human capital and social and economic restructuring in Australia has largely been put on hold for the time being (in favour of physical infrastructure, much of which is likely to be designed to promote current lifestyles and business practices or business as usual), and unemployment is expected to rise dramatically over the next year at least.

Conclusion

Based on the evidence available today, environmental and economic collapse appears inevitable under the business as usual scenario. Any chance of avoiding a collapse will require a major reduction in the human footprint but this needs to happen very quickly. Cuba has demonstrated that this can be done, but it requires a complete change in the

government, business and community mindset. The question is whether governments have the collective will and commitment to make similar reductions and implement them as effectively and quickly. The Cuban response however demands a substantial reduction in living standards compared to those enjoyed in Australia and most other western countries today – standards which most countries will not want to give up and the responses by western governments to the global financial crisis to-date seem to confirm this. But this response should not come as a surprise. For thousands of years when societies have been confronted with declining yields and food shortages, the most common response has been to extract all the available resource usually degrading or destroying the natural environment in the process for short term gain rather than preserve the natural system and reduce the demands on it by reducing their ecological footprint. Will societies today behave any differently to their forebears? It seems unlikely but if they do there may still be a small window of opportunity in which to act and make a difference. But if societies really want to avoid the outcomes of business as usual scenarios they will need a very different vision and mindset to that which prevails at present. Changing this mindset must be the first step towards a more sustainable future.

Some Implications for City and Transport Planners

Our cities (where most Australians live today) will be extremely vulnerable to environmental change. Declining economic and social conditions will have a profound impact on the way the city functions in almost every way including the way people work and live. The growing scarcity and rising cost of all resources will force people to reuse, recycle and use less of everything and use it more efficiently. In many respect communities, governments and businesses will be forced to go back to the basics. Food will become increasingly scarce and expensive. People will be forced to grow some of their own food and spend more time repairing and maintaining their assets instead of throwing them way. This will create new economies reminiscent of earlier eras and the emergence of cottage industries and barter economies which will have profound implications for government revenue.

Rewinding history might provide some guide to the kind of lives people might be forced to lead as things getter tougher – but retreating back through history will be difficult because many of the bridges back have been destroyed. For example much of the land used to grow food within the Melbourne environs has now been built over or even polluted or its effectiveness reduced by shading from high rise development and an adequate water supply is now an issue. There are many more mouths to feed and reducing population size to reflect growing food shortages will not be easy – certainly not within the short time left to correct the environmental change overshoots today.

Declining social and economic prospects will affect community needs and the nature and scale of city services that can be afforded by city governments. Governments will have to do more with less. The cost of travel will become increasingly important as people have lower disposable incomes and will increasingly look for cheaper ways of getting about and will be forced to travel less often. This will encourage more people to walk and cycle, and these modes will compete more and more with the car and public transport. Declining traffic numbers will make it easier to provide more space on the roads for

cyclists. In parts of Melbourne this trend has started already. Increasing numbers of cyclists can be seen riding old bikes to get about (not just for recreation) and more would do so if roads were safer for cyclists. This trend can be expected to continue as disposable incomes fall and the cost of basic essentials, particularly food, accommodation and essential services including utilities continue to rise.

Declining revenues will have a profound effect on government's ability to provide many of the essential services the community takes for granted today, particularly social services for the elderly, infirm or socially and economically disadvantaged. Economic and social decline will put the entire community under increasing stress.

These trends can be expected to continue until ecological tipping points are reached which will have a sudden and dramatic impact on the community and threaten the political and social structures that hold the community together. A number of scenarios may be possible depending on how well the government and community worked together during the crisis, but large scale die off seems inevitable. Beyond that will be a lifestyle that few people would care to contemplate today. It will be a struggle – a much simpler existence and involve far fewer people whose main concern in life will be survival, for whom much of the physical infrastructure created in earlier decades will be worthless monuments of little practical value. But unlike the monuments of failed societies in the past, their presence will dominate the landscape throughout much of the world.

If city and transport planners wish to plan ahead based on current mindsets their planning horizon is likely to be very short and the prospect that much of the investment in city infrastructure including transport will have a much shorter economic life than expected today. Major projects with long lead times may run the risk of being obsolete by the time they are completed. If planners want to make a difference they will need to plan using projects that generate benefits very quickly– in months or a small number of years not decades and be realized at low cost. The best way to do this is by improving existing systems and making more efficient use of existing infrastructure. There are many ways in which this can be achieved, a number of which have already been presented to the Victorian government during the last ten years.