This document is a chapter which was removed (basically to reduce size) from the published edition of my book *Future Makers, Future Takers* (University of New South Wales Press, Sydney, 1999)

CH 5. MAKING IT TO 3000 AD

> We are never completely contemporaneous with our present. History advances in disguise; it appears on stage wearing the mask of the preceding scene, and we tend to lose the meaning of the play. Each time the curtain rises, continuity has to be re-established. The blame of course is not history's, but lies in our vision, encumbered with memories and images learned in the past. We see the past superimposed on the present, even when the present is a revolution (R. Debray 1967).
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> Australia will still be here in a thousand years (John Burke, Submission to LTSC (1994).
>
> Goal convergence is the test of adaptive success (Dunn 1971).

Chapter preview

In preceding chapters we have collated and reviewed diverse perceptions of how Australian and global society have changed this century and might change over coming decades. Given a working assumption that *quality survival* is an appropriate goal for Australian society--- high quality of life for most Australians and a society that has good prospects of lasting in an acceptable and recognisable form for a very long time, perhaps a thousand years---we need to look at how Australian society might or might not survive over coming centuries. Ideally, we would like to confidently identify indicators that allow a society with excellent long-term survival prospects to be distinguished from one with poor survival prospects.

Armed with such survival indicators we could try them, in imagination anyway, against each of the three national future-shaping strategies to be developed in coming chapters. That is, we need to be able to compare the consequences of different strategies in terms of both the quality of life they promise to deliver and the long-term survival prospects they imply.

A society that is judged highly likely to survive until it evolves gradually and easily (ie without violence, hunger, disease and other miseries) into a different society is also being judged as *well-adapted* to its environment. Unfortunately, there is no recognised theory of what characterises well-adapted societies with good survival prospects; nor is there any received material to speak of on Australia's long-term survival prospects in particular. In this chapter I will sample what I consider to be the most relevant thinking on this matter of long-termism, and come to some tentative conclusions.

Insights into the adaptability of societies can be gleaned from at least three disciplinary sources:

- History suggests factors behind the evolution, survival and demise of past societies, and hence, perhaps, of future societies. It alerts us to the possibilities of strong past trends (eg population growth, technological change) and cycles (economic, social) continuing into the future.
- Systems theory alerts us to the largely unpredictable behaviour of *complex adaptive systems*, of which Australian society is a good example; and suggests the need to monitor indicators of matters considered important, with a view to taking early corrective action in the face of adverse movements in such indicators.
- Ecology, if ecosystems are taken as analogous to human communities (there are many differences as well as the similarities), provides a wide range of insights into guidelines and principles that need to be adopted by human communities intent on long-term survival.

The result of these explorations is my tentative identification of two basic conditions for the long-term survival of Australian society, where survival is essentially a matter of remaining adaptive in an ever-changing environment:

1. A commitment to accumulating a high level of societal (physical, human, institutional, psychic etc) capital in order to provide the uncommitted potentiality for change (Bateson 1973) that an adaptive society must have.

2. A commitment to increasing our competence in social learning, in order to better guide the accumulation of societal capital in an ever-changing environment.

This chapter then is an exploration and elaboration of the thesis that societal capital and social learning are the twin pillars of an adaptable society intent on maximising its prospects for long-term survival.

The world of the third millennium

Chapter 2, *Global futures*, discussed the world's next 50 years, not the next 500 or 1000 years. So, what might the world be like in some hundreds of years? What *best case scenario* might lie within the reach of human societies? If all goes well, the human species could have stabilised its numbers and rates of materials and energy consumption. Most people could be leading decent lives, not working too hard to meet basic physiological needs and living long healthy lives in societies able to provide significant numbers with opportunities to meet their higher needs. The hazard of anthropogenic catastrophes, including wars and chronic-to-acute pollution, may have receded. The nascent great wave of species extinctions may have run its course. Greenhouse gas concentrations might have peaked and declined without causing havoc (metre-plus rises in sea level?) in the meantime. The struggle between counterurbanisation and centralised technopolises as the paradigm for human settlements may have been resolved (Starr 1996). The natural world could have become a well-managed garden, replete with wild spots as well as food bowls. The primary challenge of the 22nd century will be building a world federation in which peoples can retain their identities and in which most people have a decent life; and in which cycles of military and economic hegemony have been dampened (De Greene 1994).

While capitalism may or may not have disappeared, we do know that it will not last forever. The very essence of capitalism is change. At some stage it will change into something else. It may be, for example, a decline in world population which triggers a high value for the individual. It may be Joseph Schumpeter's (1942) view that the mindset of economic fundamentalism might eventually destroy the minimal set of social values (private property, enforceable contracts) on which acquisitive capitalism depends. But, while it survives, globalised capitalism will exploit successive clusters of new technologies. Nuclear fusion? Space colonisation? Nanotechnology? Robotics? Domed cities? Medical technologies? Dejouling and dematerialisation technologies? Perhaps, in the post-capitalist world, technology development and distribution of the associated benefits and disbenefits will be socially guided.

Not all will be change of course. The human gene pool will change only slowly over coming centuries. Even if biodiversity is being lost and climate changing, major vegetation formations around the world will re-form only within time frames of 1-3 centuries. Physiographic landscapes and seascapes will continue to change significantly only in geological time, measured in millions of years.

The *worst case global scenario* for the coming millennium is not the extinction of the human species (that would be highly surprising if anyone were around to be surprised), but the extinction of our civilisation, including the loss of democracy and of the technical skills needed to run our complex world. Apart from a deeper level of global change, the apocalyptic threats of war, hunger, mass movements of people, and disease will remain the same as ever, though in new guises.

And where does Australia fit into all this? We can be fairly confident that if most of the world enjoys rising quality of life, so will Australia. If most of the world descends into chaos, Australia will be dragged down too. But, in between these juggernaut scenarios, Australia will determine its own future to some extent and that is the focus and underlying hope of the present chapter.

This chapter is not about specific scenarios of Australia's long-term future. These could range from our being a small Eurasian nation managing a large continent with skill and pleasure to being a colony of serfs directed to produce crippling quantities of food and minerals. Rather it is about *the way in which we will*

have to think if we are to have reasonable prospects for surviving as a reasonably happy country for the next thousand years. We can worry about the fourth millennium somewhat nearer the time!

Our thinking begins with brief reviews of what history, systems theory and ecology can suggest about developing flexible strategies (conditional responses) which, whatever happens, offer Australia the hope of survival at worst and quality survival at best.

Lessons from history

> He that would know what shall be must consider what has been (Thomas Fuller 1723).
>
> ...as one particular pattern of human exploitation of the environment began to encounter difficulties, thanks to exhaustion of one or another key resource, human ingenuity found new ways to live, tapping new resources, and thereby expanded our dominion over animate and inanimate nature, time and again (McNeill 1979).
>
> We have no consistent explanation of the rise and fall of civilisations (Snooks 1996).

Despite the lack of understanding that Snooks identifies in this quote, there is a powerful and pervasive belief in the Western world that while our present civilisation might possibly evolve into something better than we have at present, it will not go into decline, at least not if one discounts the possibility of a third world war. Few Australians for example could imagine even civil war here and yet both our strongest role models, Britain and America, have experienced this trauma.

However civilisations and societies do rise and fall, sometimes for reasons which, small in themselves, act as triggers for larger change (the butterfly effect). As the Papua New Guineans found, 'one steel axe can ruin your stone age culture' and their country moved from a stone age to a greeting card culture (literally) in forty years. At other times it is the encountering and survival of extreme events which determine a society's subsequent evolution---the Irish potato famine, wars of independence, great droughts and so on.

After reviewing current theories on how history flows and the forces driving that flow, Snooks (1996) presents his own innovative interpretation of the dynamics of human society over the past 2 million years. He suggests that individuals in a competitive environment generate community growth by investing in the four dynamic strategies of family multiplication, conquest, commerce, and technological change. He argues that the rise and fall of societies is an outcome of the development and exhaustion of these strategies. He uses his dynamic-strategy model to discuss future outcomes for human society, arguing that far from leading to ecological destruction, growth-inducing technological change is both necessary and liberating.

Amongst the processes that have operated to rudely thwart the growth strategies of societies through history, two stand out---parasitism and resource degradation. McNeill's (1979) revelatory book *Plagues and People* makes it abundantly clear that microparasitism (disease) and macroparasitism have played a large and often unrecognised part in the rise and fall of the world's communities and civilisations. As regards microparasitism, the best known examples are the impacts of European diseases on the aboriginals of Australia and the Americas; but there are many others. There are good reasons for believing that disease remains a major latent threat to modern societies. McNeill's macroparasites include marauders and ruling classes and landlords who exact an unsustainable toll from the peasantry. The possibility of macroparasitic greed destroying the productive base of societies or inciting destructive revolt remains a hazard in much of today's world too.

Diamond (1992) notes three situations in which human populations tend to wreak great damage on their environments:

1. When people suddenly colonise an unfamiliar environment eg Maoris in New Zealand (Flannery 199?)

2. When people advance along a new frontier (like the first Indians to reach America) and can move on

when they have damaged the region behind.

3. When people acquire a new technology whose destructive power they have not had time to appreciate, eg New Guinea pigeon hunters with shotguns.

Diamond (1992) says it has always been hard for people to know the rate at which they can safely harvest biological resources indefinitely, without depleting them. Decline may be difficult to distinguish from normal year-to-year fluctuations. By the time the signs are clear enough it may be too late. We of course have no such excuse; we know what has happened and we know how to model sustainable harvesting and the importance of precautionary behaviour.

While well-recognised as important in isolated cases (eg Easter Island), resource degradation has also been the repeating process behind the steady westward movement of the centre of western civilisation over several millennia (Diamond 1992). Particularly in arid and variable climates, deforestation, time and again, has led to soil erosion and the destruction of dams and terraces. As a rule of thumb, irrigation-based civilisations such as first arose in Egypt, Mesopotamia and the Indus Valley several thousand years BC seldom last more than a few centuries before degrading the soil resource through salting and water-logging. There is no reason to expect Australia's irrigation regions to escape this fate.

The irrigation civilisations also provide an insight into the origins of collective action in the form of government. The first governments were charged with organising the infrastructure and managing the waters needed for practising irrigated agriculture. Efforts to achieve safety from human marauders provided further stimulus to political organisation (McNeill 1979). The original reasons for government then were public works, defence against external marauders and internal criminals, a trio of reasons surviving through to Adam Smith's identification of 'roads, defence and justice' as the functions of government.

Between the rise of sedentary agriculture and the Industrial Revolution, history reveals a basic repeating social pattern with strong implications for both personal quality of life and for individual societies' survival prospects. The bulk of the population of an area would be engaged in food production, producing sufficient surplus to provision a state bureaucracy and army. When the state's demands for food were tolerable, population would grow and expand into new areas, provided that the cost in lives from disease and wars of conquest was not too high. When the state's demands for food became excessive, population and/or the state would decline (McNeill 1979).

Kondratieff's model of long economic cycles

But the Industrial Revolution and its associated agricultural revolution have made that model inapplicable and analysts are finding it extremely difficult to suggest a graspable paradigm that summarises how and why late 20th century industrial capitalism is changing and hence how it might further change.

Although it is largely ignored by today's mainstream economists, one bold attempt to provide such a paradigm is the idea of *Kondratieff cycles*, named for the Russian who first identified these after a massive study of social and economic time series data (Kondratieff 1926). His empirical observation was that many innovations and processes diffuse through society over time in a way which can be described by an S-shaped (sigmoid) curve, ie slow growth at the beginning, followed by accelerating and then decelerating growth culminating in saturation or a full niche, eg mainframe computers 'saturated' around 1995.

Periods of global growth and expansion in economic activities last about 55 years under this model and are punctuated with phases of fundamental change in the structure of the economy, the technological base and many social institutions and relations. Towards the end of a growth phase in the economy, many markets saturate and growth slows. The search for revitalised profits induces a cluster of new technologies which slowly at first, and then more rapidly, penetrate markets (Grubler and Nakicenovic 1991).

Marchetti (1987) nominates 1940 and 1995 as the ends of such Kondratieff growth cycles. The data

supporting such a precise cyclical view of socio-techno-economic history is quite impressive but cannot 'prove' that the world economy is indeed entering a new growth phase that will only begin slowing towards 2050. Nonetheless, there is a cluster of new technologies currently beginning to generate products for growing world markets. These centre around computer and communication technologies and, to a lesser extent, biotechnologies, new energy technologies and new transport technologies.

So, innovation arises in periods of economic saturation-recession. While innovations tend to cluster at the start of Kondratieff cycles those which appear further into the cycle still tend, for various reasons, to reach saturation by the end of the cycle when economic activity is at a low (Grubler 1996). Another refinement is that some innovations show more than one pulse of growth towards saturation over successive Kondratieff cycles, eg steel-making.

Marchetti (1988) further argues, on the basis of empirical evidence, that many aspects of behaviour in society run in 55 year cycles matching economic cycles, eg suicide, homicide. Utilising data gathered by Levy (1983) on war severity, Goldstein (1988) demonstrates that there is a corresponding 50 to 60 year cycle in the number of battle deaths per year for the period 1495-1975. Beyond merely showing that the Kondratieff cycle and the war cycle are linked in a systematic fashion, Goldstein's research suggests that severe 'core' wars are much more likely to occur late in the upswing phase of the Kondratieff cycle. This finding is interpreted as showing that, while states always desire to go to war, they can afford to do so only when economic growth is providing them with sufficient resources! Watt's (1992) modelling of social systems suggests that the cyclic occurrence of wars and depressions are the alternate consequences of ineffective feedback controls, eg on the rate of repatriation of war debt, on post-war birth rates. Blainey (1988) sees the modern world as swinging between moods of techno-optimism and enviro-pessimism, but not with any strict periodicity.

While Kondratieff-type ideas are not widely accepted by modern economists, they are compatible with the well-regarded views of Joseph Schumpeter (1934) on the role of innovation and investment in new technologies as the dynamic driving the growth and renewal of capitalist economies. Schumpeter and neo-Schumpeterians have recognised that conventional macro-economic models quite fail to capture the constantly evolving nature of capitalist economies.

What does not seem to have been observed is that the Kondratieff model implies that capitalism itself stands to follow a sigmoid curve and eventually exhaust itself. Will the coming Kondratieff cycle be the last? Wagar (1989) foresees a single system of trade and production for the first time in 35 000 years by about 2030, one controlled by a very small number of giant co-operating corporations. The basic cause of the major depression of that period in Wagar's scenario is the same as other depressions, ie 'the system produced more than it could sell, by paying workers less than the true value of their labour in order to squeeze out more profits and fuel more growth'. The scenario goes on to foresee world nuclear war breaking out in 2044 following the chaos of economic depression.

Cyclical theories of history

As reviewed by Galtung and Inayatullah (1997) most macrohistorians see societies developing in organisational complexity and then declining, one replacing the other. For some, such cycling is superimposed on a progressive trend towards greater enlightenment and civilisation. At a finer scale, Strauss and Howe (1997) suggest that over the last five centuries, the national mood in Anglo-American society has swung every two decades or so in a way that can be described in terms of the oppositional waxing and waning of (a) individualism and (b) of civil society. And every 80 or so years, sparked by a crisis, and driven by style-differences between the generations, the cycle starts again---rebirth (renewal), growth, maturation and decay (release). They suggest that about 2005 American (and hence Western) society is likely to begin experiencing a 'decisive era of secular upheaval' (rebirth) that, after several decades, will lead to an era of strengthening institutions and weakening individualism (growth).

For what it is worth, both the Kondratieff and Strauss-Howe models suggest that the mid-21st century, the medium-term time horizon of this book, could be a time of economic and social well-being, at least in the western world.

Lessons from systems theory

The concept of *system* has arisen as part of humanity's efforts to make sense of the world it finds itself in. By definition, systems are networks of large numbers of isolable components or units continuously interacting with each other according to their own behavioural rules. Once discovered, the world turns out to be full of 'systems'! While components of any properly identified system interact with 'the rest of the world' (other systems), this interaction will be muted compared with the intensity of interactions between components within that system.

Complex systems are richly-connected systems whose evolution we find particularly difficult to predict if one or more of the interactions between components is perturbed, ie disturbed from outside the system. All complex systems change over time into ever-different configurations of components and most have very large numbers of components. Predicting the future configuration of a complex system is difficult because it requires knowing accurately what the state of each component is (on-off, big-small etc) and all the behavioural rules which each component follows, even those rules which have never been previously used. Even then, as suggested by *chaos theory* (Waldrop 1992), the behaviour of complex systems may still be inherently unpredictable over long enough periods to be useful, eg the difficulty of long-term weather forecasting.

A *complex adaptive system* is even more difficult to understand and make predictions about than a complex system. In a complex adaptive system, the behavioural rules followed by one or more of its components are themselves changing over time. For all practical purposes, it is only systems with living components---organisms or organisations of linked organisms---which show adaptive behaviour. Living components have an adaptive capacity to create new behavioural rules for themselves and they act as though they are using this capacity to try to turn whatever happens to their advantage. Inanimate system-components like rocks and atoms have behavioural rules but no adaptive capacity [Wilden 1978).

Examples of complex adaptive systems include:

- The world economy and world power structures (Shannon 1996).
- Australian society in its totality, ie what the residents of Australia, and their organisations, think, say and do.
- Ecosystems where populations of species compete for living-space in a physical environment having three major components---earth materials (eg soil), water masses (eg water in the soil's pores) and an atmosphere.
- The molecular biology of organisms.

Examples of complex systems which are not adaptive, insofar as the rules governing their behaviour do not change over time, are the cosmos, the weather and sub-atomic matter.

It is a useful metaphor to think of each adaptive component of a complex system as constantly playing a game with its environment---the rest of the system---in which it seeks to prosper (eg survive and reproduce) by constantly developing new behavioural rules, keeping those which pay off well and abandoning the others. The extraordinary difficulty of understanding complex adaptive systems comes from the fact that every one of the system's adaptive components is simultaneously 'trying' to implement the same rule-enhancing strategy!

In general terms, the behavioural rules generated by adaptive components of a system take the form of prescribing a behaviour lever which may be beneficial to the adaptive agent if 'the rest of the system' behaves according to some particular prediction made by the adaptive agent---given a correctly predicted situation A, then behaviour B may be successful. New forms of such rules arise 'spontaneously' or by the active combination of existing rules (crossovers).

Following the trial of a new behavioural rule, the rest of the system feeds back an 'error' message or a 'success' message to the adaptive component. That is, the environment behaved as predicted and the prescribed behaviour worked (success) or it did not (error). Behaviour which earns a 'success' message is

reinforced, meaning 'more likely to be used again' and behaviour which earns an error message is tentatively rejected.

This 'trial-and-error/ trial-and-success' process is the common core of what is meant in different contexts by the terms *adaptive behaviour, learning behaviour* and *evolution*. *Biological evolution* is an example of adaptive behaviour by a group of organisms linked through generational succession. *Individual learning* occurs when an organism's behavioural rules alter during its own lifetime. *Social learning* occurs when organisations of organisms acquire new collective behavioural rules which I call social technologies. *Social evolution* occurs when new organisations arise. **At some fundamental level, learning, evolution and adaptation are all the same.**

Can complexity be managed?

While science has made little progress in learning to predict the behaviour of complex adaptive systems, it has winnowed out various properties of such systems which provide some basis of understanding from which we might begin to purposively manage them (Waldrop 1992; De Greene 1994).

For example, complex adaptive systems are invariably hierarchical ie they have many levels of organisation (Clark et al 1995). One can identify 'systems within systems', 'systems within systems within systems' etc. Each system's building blocks, its sub-systems, sub-sub-systems etc are constantly being reorganised within and between hierarchy levels as the system gains experience (called feedback).

The hierarchical method of organising complex adaptive systems is efficient in the sense that it economises communication (Boulding 1978) and allows specialist sub-systems to evolve. Specialist sub-systems are those which can carry out tasks important to the system's survival in a particularly effective manner but at the price of losing their capacity to cope with a variable environment. Specialist sub-systems are therefore protected by the rest of the system from environmental 'shocks' as though in payment for their specialist services---a relationship of mutual dependence. Protection against shocks which destroy system components is achieved by having ‘backup’ or redundant components available to take over the functions of lost components. Upper levels of an hierarchical system impose behavioural rules or constraints which 'manage' the environments of the system's lower level components.

Given an increase in available energy, complex adaptive systems generally evolve towards greater complexity (Flannery 1996), ie towards more components and more elaborate inter-relationships between them. While such components and their rules evolve unconsciously in 'natural' systems, anthropic or human social systems have an awareness, albeit limited and patchy, of how successful hierarchical systems survive and consciously attempt to learn new and better behavioural rules or ’levers’. Evolution is ongoing and the evolutionary process selects for populations with the ability to learn new behavioural rules rather than following fixed rules regardless of context (Clark et al 1995).

What then does it mean to 'manage' a complex adaptive system? One answer is that it means being able to manage that system so as to keep the levels of some of its important characteristics within predefined bounds. Henderson (1978) identifies two basic strategies for managing complex systems, (a) introduce sophisticated controls or (b) simplify the system; more recent thinking conceptualises this task as one of *adaptive management,* involving the development of a comprehensive set of feedback policies or contingency plans, one for each possible state of the system. Thus, the manager regularly monitors the values of key attributes of the system and then applies the appropriate predefined adjustments to the system attributes under hir direct control---called control variables. For example, under adaptive management the feedback policy or recipe for avoiding wars and depressions might be to slow the rate of war debt repatriation and spread post-war baby booms over more years (Watt 1992).

Methodology for routinely and systematically developing such feedback policies is not yet available. One major difficulty is that controlled experiments on complex adaptive systems are either infeasible or extremely expensive. Feedback policies have to be developed on a 'learning while doing' basis. Present approaches to designing management guidelines for adaptive systems recognise that every management action can be chosen (i) to learn as much as possible about the system, or (ii) to improve system

performance or (iii) something in between. Actively adaptive management, in the style expounded by Carl Walters (1986), for example, seeks 'to establish some optimum, or at least reasonable, balance between learning and short-term performance.' Walters gives useful, but not rigorous criteria for when to probe.

The point being made is that while some very useful thinking about adaptive system management is around, it is still very much an art rather than a science and certainly not expressible as firm methods or recipes.

Lessons from ecology

> No population, animal or human, can survive without some form of organisation, some form of hierarchy that integrates its individual components into a well defined social structure. This implies not only organisation but a very intense kind of social discipline. Man cannot exist as an isolated individual. He must function as a member of a group, and therefore he must accept the values and goals of his group....uniformity is essential for the safe functioning of the group, and diversity is essential for the more complete development of the individual (Dubos 1969).

Ecology, the study of ecosystems, and biological evolution, the study of the rise and fall of species, provide the archetypal examples of complex adaptive systems at work.

The formal definition of an *ecosystem* is 'the physical and chemical environment of a community of organisms and all the interactions among those organisms and their environment'. Over time ecosystems change mainly in terms of the range and population sizes of species present but also in terms of the distribution and availability of the inanimate components of the ecosystem---soils, airbodies, waterbodies etc. For example, the number of representatives of a particular species can grow exponentially (ie at an absolute rate which increases as the population gets larger), can 'crash' or remain stable for long periods.

Ecosystem dynamics is the study of how ecosystems behave over periods long enough for significant changes to take place in the mix of species and the physical environment in which those species live. Ecosystem dynamics blurs into *evolutionary ecology* when starting to consider what happens over periods long enough for significant genetic change to build up in an ecosystem's populations. These disciplines ask questions like 'which species, populations and communities are extinction prone? Why'? Obviously such questions can be asked of the human population of Australia as easily as of plants and animals.

A catch-all answer to that basic question is that a small population of a species of low genetic diversity living in an uncommon, highly variable environment is particularly extinction prone. If that population's members have a short life-span and low fecundity and are highly specialised in their needs (eg a species dependent on just one other species to spread its pollen) and capabilities (eg a species only able to feed from one flower species) then the probability of extinction is higher again. Thus, humanity's long-term survival and increase in numbers is often attributed to a short-term ability to survive by flexibly drawing on a wide variety of resources in a wide variety of environments. If one feature sets humans apart from other animals, it is the breadth of the ecological niche we presently occupy.

Ecologists use terms like stability, fragility, resilience, persistence and resistance to compare the survival prospects of different multi-species communities. By building these properties into mathematical models some extraordinarily interesting scenarios of how communities might change over time can be developed. It is much harder though to confirm that a particular real community has particular properties and hence stands to evolve in a particular way.

Can Australian society be reasonably thought of as being like an ecosystem changing through time as it evolves to adapt to an ever-changing environment? If so, some of the insights coming out of the study of ecosystem dynamics and evolutionary ecology are available to help with the task of thinking about quality survival strategies for Australian society.

For example, is the Australian population likely to crash, stabilise or grow? What ecologists can assert

with high confidence is that like any other growing animal population, the human population of Australia will eventually stop growing and either stabilise or go into decline, rapidly or slowly. Prima facie, an ever-growing population is not a feasible option in a finite natural environment. What cannot be predicted at all well is when growth will stop for one reason or another. Almost certainly, the Australian population is not in equilibrium with its environment. A cautious judgment about where we are on the population growth curve could help avoid over-running the country's 'carrying capacity' population. Conversely, if further population growth has distinct advantages, such caution precludes the capturing of such advantages.

Following in the footsteps of Herbert Spencer of 'social Darwinism' fame (Inayatullah 1997), a submission by M & D Graetz to the Jones Inquiry (LTSC 1994) attempts to interpret Australian society in the terms used by professional ecologists as they study species populations in plant and animal communities. For example:

. The level of imports represents the amount of our habitat or living space located in other lands. Countries such as Singapore and Japan have a high population density but their habitats (ecological footprints) extend beyond their territorial boundaries.

. Complex adaptive systems have many niches. A niche exists when there is an opportunity for an organism with particular capabilities and needs to survive. Jobs in human societies are equivalent to niches in natural ecosystems.

Observations which flow from exploring the ecosystem metaphor include:

. The likelihood of resources from other lands (eg oil supplies) continuing to be available must be taken into account when managing Australia's population.

. In the wild the jobless would die. We continue to import people even when there are not enough niches for those already here. The shortage of niches is also expressed in Australia's below-replacement birthrate.

. The distinguishing characteristics of human societies which have allowed them to apparently override ecological rules include their ability to modify the environment, their ability to appropriate resources from other species' habitats and compassion (we feed those occupying poor niches).

Ecological communities and human communities exhibit the same basic principles of organisation (Odum 1983). They are networks that are organisationally closed but open to flows of materials, energy and information. There are many differences of course such as language, consciousness and culture. However, ecosystems have great capacity to continue functioning in a more-or-less unchanging way over time and the principles of successful ecological organisation therefore may offer guidance to human communities seeking to survive in acceptable form for hundreds of years. Capra (1996) identifies five such principles:

1. Recycling

Processes in ecosystems are cyclical. Successful ecosystems retain (hold within their boundaries) the materials (eg nutrients, substrate) on which their member organisms depend; or, at least, materials 'leak' from the ecosystem no faster than they are acquired from outside. Ecosystem members are linked mutualistically (interdependently) through an intricate set of feedback relationships in which the well-being of any member depends on the wellbeing of many other members. These feedback loops are the processes by which materials are cycled.

2. Solar power

The cycles of nearly all successful ecosystems are powered by solar energy that is transformed into chemical energy by photosynthesis or into the physical energy of winds, tides etc. Human communities seeking to organise themselves on the same principles as ecosystems would similarly rely on solar energy in its many forms---wind, tides, biomass, hydro power.

3. Co-operation and competition

The basic relationship between parts of ecosystems is one of mutual interdependence. Competition for resources is good insofar as it weeds out those that use resources inefficiently. Co-operation, the pursuit of mutually agreed goals, is good insofar as it allows resources to be saved through the benefits of specialisation. Since the creation of the first nucleated cells over 2 billion years ago evolution has proceeded through ever more intricate arrangements of co-operation and coevolution. Successful ecosystems continually upgrade their capacity to survive by creating and selecting for both new synergistic and new competitive relations between community members. Provided they are in dynamic balance, co-operation and competition release resources that may be used to improve adaptability, meaning an increase in the system's resilience and diversity (see 4 and 5).

4. Resilience

Successful ecosystems are resilient or flexible. That is, they have developed processes that allow them to cope with extreme events and rapid changes from one state to another, eg weather changes. While resilient systems can cope with such stresses on a temporary basis, prolonged stress will breach any system's tolerance limits and destroy it. Survival is a matter of avoiding threshold stress. Maintaining stores of energy and materials, analogous to holding uncommitted capital in human societies, is fundamental to the capacity of ecosystems to survive hard times (Odum 1983).

5. Diversity

Successful ecosystems are diverse, meaning that they have a wide variety of members (eg species) interacting in a wide variety of ways. When its environment undergoes permanent change (eg climate change), a diverse ecosystem is more likely to find, within itself, relationships that fit it to survive in the new environment. Fragmented communities, those with some parts weakly linked to the rest of the system, are less likely to survive environmental change.

While recycling and the use of solar power can be given ready meaning as principles for managing human communities, it is more difficult to operationalise and optimise competition-co-operation balance, resilience and diversity in human-society terms. A continuously changing strategy is probably required.

Managing society as a complex adaptive system

The generalisation that flows from the lessons of history, of systems theory and of ecology is that (Australian) society is a complex adaptive system which we cannot hope to manage directly but which we can manage adaptively perhaps. That is, we can monitor society's progress towards and away from situations we regard as desirable and undesirable---goals and anti-goals. Armed with that knowledge we can attempt to steer or lever society in a preferred direction by thoughtful trial and error---a process of social learning---backed up by efforts to accumulate various forms of capital as a buffer against shocks and for resourcing social learning experiments and trials. **The central thesis of this chapter is that an appropriate accumulation of societal capital and a capacity for social learning are the twin pillars of an adaptable society intent on maximising its prospects for long-term survival.** We turn then to an elaboration of these, the two primary tasks of the surviving society.

Social learning

There are two major differences between ecosystems containing large numbers of humans and 'natural' or 'undisturbed' ecosystems. One is quantitative and the other is qualitative.

Quantitatively, humans have evolved to possess behavioural rules which, relative to other species, involve the mobilisation and redirection of very large quantities of energy at very high rates, eg the use of fossil fuels. Whether the last history of the world will show this to have been a fatal mal-adaptation we do not know.

Qualitatively, humans have a capacity for social or collective learning which is present in only the most rudimentary form in other species, eg the hunting behaviour of a pride of lions or a wolf pack.

In social learning a population finds out by trial and error that some recurring problem can be solved or avoided by a new form of collective behaviour, eg that establishing a land titles register reduces conflicts over land ownership. Humans, as individuals and as populations, have the power to reprogram themselves, to reconfigure their behavioural repertoire, within a single generation. Social learning is the process that generates new behavioural rules for human societies.

a. *...versus human evolution*

The idea of adaptation through social learning is less familiar than that of adaptation through biological evolution and is best clarified by drawing out several comparisons between the two:

1. In social learning, speech and writing are the analogue of genes in biological evolution. With social learning, information can be transmitted without a generation gap which means that adaptation can be speeded up.

2. Bright new ideas which spread from person to person are the analogue in social learning of mutations in genes and crossovers in chromosomes. They have been given names such as memes by Dawkins (1989) and culturgens by Wilson (1975).

The meme concept is evocative rather than precise but, from the plethora of memes which begin life, a few are somehow selected to grow into ‘ideas in good currency’ (Schon 1971). However, as in biological evolution, most bright ideas do not survive. To quote Dunn (1971), who anticipated some of Wilson's and Dawkins' thinking:

'Like biological mutation, human 'idea mutation' does not always generate relevant ideas. Those idea inventions or behavioural innovations that are not consistent with the interplay between operating environment and operating goals tend to lose force. Those that promote a convergence between environment and social goals are reinforced.'

b. *Social goals*

Dunn's reference to social goals flags a critical difference between biological evolution and social learning. It is what writers like Sartre (1975 (1948)) and Camus (1946) have identified as the 'existential burden'. By this they mean that humans have to consciously choose the goals they want their behaviour to achieve. In this book I am suggesting quality survival (indefinite survival of the society plus high quality of life) as an overarching long-term social goal for Australia.

The difficulty with this imperative is that it carries with it little idea of whether the chosen goals will lead up an evolutionary blind alley---as has been the case for most species changing through biological evolution.

c. *Improving the capacity for social learning*

> Taken at any time, a social system is dynamically conservative in its structural, technological and conceptual dimensions. This last represents the `system' of ideas in good currency (IIGC). Characteristically, what precipitates a change in that system of powerful ideas is a disruptive event or sequence of events, which set up a demand for new ideas in good currency. At that point, ideas already present in free or marginal areas of the society begin to surface in the mainstream ... The broad diffusion of these ideas depends upon interpersonal networks and upon media of communication, all of which exert their influence on the ideas themselves. The ideas become powerful as centres of policy debate and political conflict. They gain widespread acceptance through the efforts of those who push or ride them through the fields of force created by the interplay of interests and commitments ... When the ideas are taken

> up by people already powerful in society this gives them a kind of legitimacy and completes their power to change public policy. After this, the ideas become an integral part of the conceptual dimension of the social system and appear, in retrospect, obvious (Schon 1971).
>
> > The solution of social problems lags behind technology because we have not organised the same sharp search for ideas to deal with them (JR Platt 1966).

Social technologies were introduced in chapter 2 as constituting the building blocks of the physical, social, cultural, educational and organisational infrastructure supporting society. They are all 'recipes' developed to solve a social problem, meet a social need or achieve a social objective. It is easy to think of dozens of examples: the alphabet, standard time, coinage, credit cards, the research and development team, pay-as-you-earn tax, debt-for-nature, the constitution, policy instruments such as transferable fishing quotas, milk quotas and so on.

As noted in chapter 3, Australia's existing social learning system seems to match the model proposed by Schon (1971, 1974), to wit, significant changes in the way society is managed follow the emergence of social technologies which allow newly widespread ideas in good currency to be implemented. Social technologies are thus the tangible expression of the social learning system in action.

Given that we need a powerful social learning system for getting us through coming centuries, could we do better with a more directed and planned system than the present ad hoc system? Is it possible to deliberately create successful social technologies. For if we do not learn faster than the rate of change, we go backwards; faster learning is the ultimate competitive advantage in the survival stakes. Can Australia, as a society, learn better how to learn?

One major difficulty is that because social, technological, and now natural environments are changing so rapidly, behaviour rules based on successful past experiences are likely to be irrelevant or even misleading (De Greene 1993)---basing farming decisions on past rainfall records may already be an example. This trend stands to continue or even accelerate; the essence of Alvin Toffler's (1970) 'future shock' is increasingly transient individual experiences in relation to things, people, ideas, organisations and places.

While the question of social learning strategy is too big to fully explore here, some of the core tasks needing to be addressed within such a strategy can be noted (Cocks 1992). They include:

- Setting and regularly updating explicit operational goals judged as needing to be achieved to advance the long-term quality-survival of Australian society. At the broadest level, such appear to divide into goals for achieving long-term quality of life and goals which promote survival. Notwithstanding, these two sorts of goals may turn out to be complementary rather than competitive.
- Learning how to purposively generate ideas for new social technologies which solve or pre-empt problems, exploit opportunities, reduce weaknesses and consolidate strengths.
- Developing a political framework within which alternative approaches to solving major societal management problems can be seriously debated, tried and compared; one with implementation, monitoring and evaluation components.

In organisational terms, these ongoing tasks need to be managed by a set of 'permanent' socially-sanctioned sub-systems or organisations, viz:

1. An *appreciation system* (to use Geoffrey Vickers' (1968) term) that identifies which tacit or explicit goals of the society are not coming any closer or, more urgently, are retreating. These can then become the focus for the learning process.

2. An *options system* for identifying existing social technologies which stand to ameliorate particular problems, or, finding none such, for developing new candidate social technologies (Box 5.1).

3. An *implementation system* for selecting and implementing one or more of the candidate social

technologies.

4. A *monitoring and evaluation system* that checks progress and restarts the learning system over again when progress is unsatisfactory. Formal program evaluation of the type beginning to be practised by Australian governments is an attempt to do this, eg do public housing programs work?

Such a set of systems would be implementing nothing more than thoughtful trial and error, characterised by a willingness to acknowledge this to be the case and a willingness to own up when you have made a mess of it. In Australia there is little overt recognition that changes in social organisation are essentially experimental. Unfortunately, our confrontationist political system does not allow a minister to brand a new program, say to encourage soil conservation, as experimental, even though the history of soil conservation is one of failed experiment.

While the above model suffices to introduce the idea of a social learning system, it is of course only a first suggestion. Any social learning system worth its salt will be continuously experimenting to improve itself.

Box 5.1

Some Principles for Designers of New Social Technologies
(after Cocks 1992)

It is not possible to anticipate the details of any future procedures which might be developed for routinely designing social technologies, but the search and design principles behind those procedures might well include, for example:

. the need to develop separate technologies for small parts of large problems (the 'adaptive muddling' principle);

. the importance of developing procedures which are accepted because they constitute 'instant carrot'. things like the alphabet, the credit card, standard time, penny postage were successful because it was in the immediate interests of people to adopt them (the 'instant feedback' principle);

. the importance of making maximum use of non-monetary values to motivate behaviour; conversely, the need to avoid solutions based on 'just throwing money at the problem' (the 'leather medal' principle);

. the importance of harnessing self-interest to pursue public interest (the 'invisible hand' principle);

. the importance of viewing the problem from many perspectives (the 'alternative realities' principle);

. the need to redistribute resources among the stakeholders (the 'power sharing' principle);

. the need to recognise the existence of a public interest beyond immediate stakeholder interests (the 'beyond pluralism' principle).

Accumulating societal capital

We turn from social learning now to the second pillar of the adaptive society---accumulating societal capital or, as it is sometimes called, capacity-building. *Societal capital* is an umbrella term for all the various forms of assets that a society (eg Australia) has available for achieving its social goals. These range from marketable assets like plant and machinery to non-marketable assets like a high level of trust between people.

There is no standard classification of types of societal capital but an earlier grouping of Australia's national assets (chapter 3) provides a starting point for thinking about the sort of capital mix that Australia should be seeking in order to build up the resilience and diversity potentially needed to adapt to internal and external change over the mid to distant future:

- Social and institutional capital, eg a respected government.
- Human and intellectual capital, eg a healthy, technically educated workforce.
- Built and natural capital
- Psychic capital, eg confidence in the future

To this list, in the light of the present discussion, we need to add:

- Social-learning capital

Social-learning capital is probably part of 'Social and institutional capital', but listing it separately emphasises the great importance I am placing on investing in society's capacity to develop social technologies that amplify the quality and quantity of existing societal capital. The converse link between societal capital and social technologies is that the stock of available societal capital constrains the range of social technologies that can be considered feasible at any time, ie only those social technologies that can be resourced from stocks of available capital are feasible. Capital-rich societies have the resources to experiment with social technologies for solving problems/ grasping opportunities as they arise without jeopardising the society's existing activity patterns. Always it is important to be able to develop and choose from a wide range of alternatives.

The broader conclusion from this discussion of societal capital is that making appropriate decisions about the size and composition of the societal capital portfolio is central to society's prospects for quality survival. However, while it is illuminating to see the importance of 'capital building' to the achievement of quality survival, the insight is very general. Difficult decisions about balance within and between capital categories and about consumption-investment balances still have to be made. For example, are there obvious deficiencies in today's portfolio of societal capital? Can future needs for particular forms of societal capital be foreseen? How far ahead? What is the tradeoff between consumption for quality of life today and investment in capital for long-term survival?

One pervasive tradeoff to be addressed in managing the societal capital portfolio is that between redundancy and efficiency. Efficient parts and processes have a fixed repertoire of responses that are adaptable only to a strictly limited set of environmental conditions. Investing in redundant parts (eg backup systems) can confer resilience or the ability to bounce back from disturbance and investing in redundant functions within parts (eg multiple ways of getting the job done) can confer diversity and hence long-term adaptability (Emery et al 1975). Redundancy, qualitative and quantitative, is nothing more than 'insurance' (Radnitsky and Bouillon 1995). While redundancy in the capital mix confers stability (fast recovery times in the face of a small disturbance), efficient systems are unstable. And redundancy becomes more important as environmental risk increases. Low redundancy in complex economic systems, replete with long-chain dependencies, means that they can be disrupted relatively easily in the short term and therefore are likely to generate demands for tight social control. In an increasingly uncertain world (eg S. Rushdie, ABC Radio, 12 Dec 1995) it would seem far more important to be increasing flexibility than efficiency. The challenge here is to convert that injunction into practical programs.

Apart from (a) the redundancy-efficiency tradeoff, and (b) assigning high importance to investing in social-learning capital, are there other principles for directing investment between different categories of societal capital in the surviving society? For example, the developing theory of evolutionary economics indicates that the linkage-structure of an economy influences that economy's ability to learn (Marceau and others 1997). Or, another example, technology is making skills and knowledge the only sources of sustainable strategic advantage (Thurow 1996). But, conversely, the technologies of modern capitalism generate environmental hazards and unforeseen 'revenge effects' (Tenner 1996). Capital in the form of land and natural resources will matter less because the industrialised world can produce its own food. Natural resources no longer fuel economic growth (McRae 1994). New growth theory (Marceau and others 1997) suggests the value of investing in healthy, educated workers---but not necessarily in producing more workers; the ultimate 'tragedy of the commons' is of course the Malthusian tragedy, wherein it is in the interest of the individual to have more children than the society can ultimately afford (Boulding 1978).

A meta-scenario for Australia's long-term future

The Learning Society

Recapitulating, a surviving society must be both stable and able to change; stable in the face of short-term shocks yet able to adapt to changed long-term conditions. This is prospectively achievable by building up human, intellectual, physical and social-learning capital while protecting natural capital. A redundancy of uncommitted capital permits society the option of experimenting with diverse ways of doing things as well as providing a buffer against capital-destroying shocks.

This perception suggests the possibility of a truly radical scenario for the normative management of Australian society, a scenario which has to be regarded as quite implausible for the short-term to mid-term but very attractive thereafter as a strategy for surviving the third millennium.

Under this scenario, which might be called T*he Learning Society,* Australians learn and go on learning to manage their society in accordance with the rules of successful evolution and adaptation, as revealed by the study of complex adaptive systems such as ecosystems, biological evolution and humanity's history (cf Marchetti 1980; Gunderson and others c1995). Note that it is the group that learns in the learning society, not just individuals.

The Learning Society is an optimistic scenario in that it offers a response to the post-modernists' resigned acceptance of the complexity of social systems and their intractability in the face of rational analysis. However, there are two reasons why Australia cannot even contemplate embracing a learning-society strategy fully for many decades:

- We will not be ready to become a learning society until we have learned much more about the adaptive management of complex adaptive systems.
- Survival is a matter of clever trial-and-error within a complex adaptive system. That is the essence of the learning-society paradigm and it is so very different from the ideology-centred paradigms of today's Australia (markets deliver, democracy delivers, mixed economies deliver...) that the community could never legitimate (assent to) the learning-society strategy without extensive re-education, perhaps over a generation.

So, while this book will be presently developing three scenarios of how Australia's mid-future might be managed, the Learning Society will not be one of them and none of the three scenarios to be developed will reflect a serious engagement with the 'survival' part of the social goal of quality survival . Notwithstanding, one of the scenarios to be developed, Post-materialism, will be portrayed as sympathetic to the learning-society strategy and receptive to the prospect of its further development.

Some lessons to date

While it is true that we have only fragmentary knowledge of how to manage Australian society as a complex adaptive system, these fragments add up to quite a body of advice and insights. To close this chapter, here is an eclectic selection of these as harbingers of the Learning Society as a preferred strategy for managing Australia's long-term future:

- Beware the insidious nature of cumulative change, both in itself and as bringing the system to the brink of even greater change (the toppling iceberg effect). Beware of slow variables, those that alter quietly over time but usher in great changes in social organisation once past some threshold value, eg Perrings (1995). The erosion of the invisible part of the consensus that assures social stability is often unseen and unnoticed until the equilibrium is destroyed and there is an unexpected catastrophic overturn (Boulding 1978). While small changes can produce big effects, areas of highest leverage are often least obvious. Beware of 'breakpoints', spasmic changes that occur when forces for change eventually gain ascendancy over powerful but deadlocked forces. Alternatively, be prepared to capitalise on breakpoints when they occur.
- Normally change is only desired when there is dissatisfaction (Maruyama 1978). Or, as Boulding

(1978) says, institutions collapse when their legitimacy is withdrawn by the lower members of the social hierarchy. Kennon (1995) sees stability of expectations as the basis of all other stability in society. Thus, if expectations of a better life begin to rise (eg under modernisation) and those rising expectations are not met (eg due to differential development between sectors of the economy), there is a 'breaking of the implicit web of promises which constitutes the social contract' and political discontent emerges. The basic idea of the social contract is one of a fair system of co-operation between and within generations (Rawls 1993). Similarly, declining expectations, such as many Australians currently have, are also very disruptive.

- Old, well established social systems usually have to experience a visible failure before it is possible for them to adapt to a new environment (Thurow 1996). Milbrath (1989) says paradigm shifts in social organisation occur when the old paradigm is breaking down and society is becoming more turbulent. Emery et al (1975) suggest that maladaptive responses to turbulence include segmentation, authoritarianism, dissociation, evangelism and superficiality.
- In the intervals between paradigm shifts in social organisation, societal change is slow. Societies take half a century to incorporate major technological changes into basic systems such as energy and transport, perhaps a century or more to modify cultural values substantially and many centuries to reconcile historically embedded ethnic and religious differences (Starr 1996). While societies react to threats with a combination of actions to reduce their probability and severity, this is usually very slow. But not always; the Maginot Line was a premature response by the French to the threat of German invasion. One reason why paradigms are slow to shift is that individuals find it hard to abandon the world views, the belief systems they acquired as children and young adults (Strauss and Howe 1997; Wilkin 1996) and so keep applying them when they ascend to power, irrespective of how the world has changed in the meantime---'generation drag'. It is only the next generation that grows up seeing the problems that are accumulating under the reigning paradigms and, with still-open mind, adopts paradigms suited to the times.
- Another reason for slow change is that large systems are homeostatic under shock. Marchetti (1987) notes the homeostatic behaviour of large systems that hold their growth trajectory even when subjected to significant external shocks. eg air traffic volumes under fuel price shocks, human population under plague. Because imposed changes tend to be countered by systems, you end up making little progress (Ridley's (1995) 'red queen' hypothesis). Or, more pessimistically, the harder you push, the harder the system pushes back (Tenner's (1996) 'revenge effects' hypothesis).
- Societal change is surprisingly difficult to detect 'We must accept...that we have to live for some time with the future before we recognise it as such.' (Emery et al 1975). Emery is recognising what is known as 'assumption drag'. As the quotation from Régis Debray at the head of this chapter says, it is sometimes hard to recognise that things have changed, even in a revolution. Emerging processes are sometimes difficult to detect because they are being nurtured by existing parts of the system still playing their traditional roles eg cancer cells. Aberrant behaviours by parts of a system indicate that the system is changing, but not necessarily how.
- The function of values is to provide more or less automatic guidance to people and societies when choosing between alternatives. As society's perceptions of the consequences of past choices change, values must change or become impediments to adaptation rather than useful decision aids. Ideologies are values frozen in stone. Adaptability means facing the long-term future without attachment to any aspect of the existing society, even fundamental values like democracy. If a goal is being approached very effectively, that is the time when it gets most seriously questioned, eg economic growth was not questioned after the 1973-74 oil crisis.
- While the choices we make today will have effects forever, like ripples from a stone thrown into a pond, we do not know the nature of those effects and whether they will be small or large. It is a basic principle of decision making under non-certainty (meaning that one cannot be sure of the consequences of any decision taken and implemented) that you never make a decision before you have to. In that way you make every decision with the maximum possible amount of information, including information eventuating right up to the moment of decision. The problem of overshoot appears when trends in society which start out being productive/adaptive become counterproductive/counteradaptive. Is economic growth an example? Many cause-effect links in social systems are not closely related in time and space and failure to understand this leads to

feedback errors and overshoot. Conversely, excessive concern for the distant future stultifies and constrains one's actions today.

- The advantage of long-term planning is that although the future becomes less foreseeable it also becomes more able to be influenced by ongoing small changes. In the short term there are limits to the amount of change that can be effected, whereas over the long-term the impact of incremental change can be profound (DAS 1996). Major tensions can be avoided if ameliorative action starts early enough. While society is regularly caught napping by the totally unforeseen (AIDS is a good example), the fact is that almost all major problems (and opportunities) are identified well before they become threatening (are lost). The greenhouse effect has been foreseen for decades by scientists. Rachel Carson wrote *Silent Spring* in 1969. Agriculturists in Australia have been warning about soil erosion for more than 100 years. And so on. However, history constrains the possible rate of response to such early warnings because it bequeaths us a complement of societal capital that we are loathe to abandon and that is not optimal for effecting change. This brake on the rate of change can be a force for stability but, if we want to deal with problems that current trends suggest will begin to bite in the medium to long-term future, it may mean we need to start redirecting those trends now.
- At the heart of changes in society, lie processes of diffusion, spread and accumulation of largely imitative or repetitive entities, ranging from ideas to artefacts. And, as previously noted, the temporal patterns of accumulation or growth of many of these entities are sigmoid rather than linear. At the turnover point on a sigmoid growth curve, the rate of diffusion stops increasing and starts declining as niches for the diffusing entities to occupy become scarcer or more attractive to competing diffusion processes, eg new road links. Handy (1994) uses the idea of 'linked sigmoid curves' as a normative model for national, business and personal development, making much of the need to embark on new paths before growth or development rates decline. His message is to start on a new path *before* the old begins to peter out.
- And finally. For a surviving society, community fitness and adaptability are more important than individual fitness and adaptability (Diamond and Case 1986). That is why altruistic self-sacrificing traits can be retained in a community when they clearly operate to the disadvantage of individuals (Rushton 1980). If the benefit to the community outweighs the cost to the altruistic individual, the trait will persist in the community (Batson 1991).

Coda

If Australian society is adaptable it may survive till 3000 AD (or CE for Common Era if preferred). If it is not adaptable it will not survive. This chapter has presented and argued for the tentative hypothesis that an adaptable society is one that determinedly accumulates a balanced portfolio of various forms of societal capital---social, human, physical etc, but particularly capital dedicated to a social learning strategy of developing innovative social technologies through systematic trial and error. Flowering social technologies will be the marks of a Learning Society.